

## Appendix 1

### SYLLABY

**School** : SMA Negeri 1 Rantau Selatan  
**Lesson** : Chemistry (Development of Natural Sciences and Mathematics).  
**Class / Semester** : XI/2

#### Core Competence:

- CC 1** : Living and practicing the religious teachings he embraces
- CC 2** : Living and practicing honest behavior, discipline, responsibility, caring (gotong royong, asama, tolerant, peaceful), courteous, responsive and proactive, and show attitude as part of the solution to various problems in interacting effectively with social and natural environment and in placing ourselves as a reflection of the nation in the association of the world.
- CC 3** : Understand , apply , analyze knowledge factual , conceptual , and procedural by curiosity about science knowledge, technology, art, culture , and humanities with the insights of humanity, nationality, state and civilization on the causes of phenomena and events, and apply procedural knowledge to specific areas of study corresponding with talent and interest for solve problem .
- CC 4** : Processing , reasoning , and serving in a concrete realm and domain abstract , related with development from learned in school on independent , and able use method corresponding rule scholarship.

| Basic Competence                                                                                                                                                                                                                  | Subject Matter                                                                                                                                                                                | Indicator | Learning Activities                                                                                                                                                                                                                                                                                                 | Assessment                                                                                                                                                                                                                   | Time Allocation | Learning Resources                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------|
| Recognizing the orderliness of the structure of material particles as a form of the greatness of God YME and the knowledge of the particle structure of matter as the result of human creative thinking whose truth is tentative. | <b>Hydrolysis</b> <ul style="list-style-type: none"> <li>• Properties of the hydrolyzed salt.</li> <li>• The hydrolysis constant (<math>K_h</math>).</li> <li>• Hydrolyzed salt pH</li> </ul> |           | <b>Observing</b> <ul style="list-style-type: none"> <li>• Seek information from various sources about salt hydrolysis</li> </ul><br><b>Ask(Questioning)</b> <ul style="list-style-type: none"> <li>• Why are there salts that are acidic, alkaline and neutral?</li> </ul><br><b>Data Collection(Experimenting)</b> | <b>Task</b> <p>Designing an experimental pH gram identification</p><br><b>Observation</b> <ul style="list-style-type: none"> <li>• Scientific attitudes in experiments and presentations, for example: how to use</li> </ul> | 3 x4 jp         | <ul style="list-style-type: none"> <li>• Chemistry Book</li> <li>• Chemistry Book with Spiritual Value</li> </ul> |

| Basic Competence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Subject Matter | Indicator | Learning Activities                                                                                                                                                                                                                                                                                                                 | Assessment                                                                                                                                                                                                                                                     | Time Allocation | Learning Resources |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------|
| <p>2.1 Shows scientific behavior (curiosity, discipline, honest, objective, open, able to distinguish facts and opinions, resilient, conscientious, responsible, critical, creative, invasive, democratic, communicative) in designing and conducting experiments and discussions that are realized in everyday attitude.</p> <p>2.2 Demonstrate co-operative, courteous, tolerant, peace-loving and caring about the environment and cost-effective in utilizing natural resources.</p> <p>2.3 Demonstrate responsive and proactive</p> |                |           | <ul style="list-style-type: none"> <li>Designing experiments for the identification of saline pH and presenting it to equate perception</li> <li>Experiment for identification of salt pH by using litmus paper or universal indicator or pH meter</li> <li>Observe and record experiment data</li> </ul> <p><b>Associating</b></p> | <p>litmus paper, universal indicator or pH meter; liveliness, cooperation, communicative, and caring environment, etc.)</p> <p><b>Portfolio</b></p> <ul style="list-style-type: none"> <li>Experiment report</li> </ul> <p><b>Test Written description</b></p> |                 |                    |

| Basic Competence                                                                                                                                                                                                                                                   | Subject Matter | Indicator | Learning Activities                                                                                                                                                                                                                                                                                                           | Assessment                                                                                                                                                                                                                                                                                  | Time Allocation | Learning Resources |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------|
| <p>and wise behavior as a form of problem-solving ability and decision making.</p> <p>3.12 Analyze the salts undergoing hydrolysis.</p> <p>Design, perform, and conclude and present experimental results to determine the type of salt undergoing hydrolysis.</p> |                |           | <ul style="list-style-type: none"> <li>Processing and analyzing observed data</li> <li>Summing up the hydrolysed properties of salts</li> <li>Analyze the salt chemical formula and predict its properties</li> <li>Determine the graph of the relationship of pH price changes to acid-base titrations to explain</li> </ul> | <ul style="list-style-type: none"> <li>Analyze the graph of the relationship of pH price changes to acid-base titration to explain the nature of the hydrolyzed salt</li> <li>Determine the hydrolysis (<math>K_h</math>) constant and the pH of the hydrolyzed salt solution by</li> </ul> |                 |                    |

| Basic Competence | Subject Matter | Indicator | Learning Activities                                                                                                                                                                                                                                                                                                                        | Assessment  | Time Allocation | Learning Resources |
|------------------|----------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------|--------------------|
|                  |                |           | <p>the nature of the hydrolyzed salt</p> <ul style="list-style-type: none"> <li>Determine the hydrolysis (<math>K_h</math>) constant and the pH of the hydrolyzed salt solution by calculation</li> </ul> <p><b>Communicating</b><br/>           Make a salt identification experiment report and present it using the correct grammar</p> | calculation |                 |                    |



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**Appendix 2****LESSON PLAN**

School : SMA NEGERI 1 RANTAU SELATAN  
 Program : Science  
 Sub Matter : Chemistry  
 Topic : Salt Hydrolysis  
 Grade : XI/ Second Semester  
 Time Allocation : 3 x Meeting (4JP x 45 Minutes)

**A. CORE COMPETENCIES(CC)**

CC 1 : Living and practicing the religious teachings that he embraces:

CC 2 : Living and practicing honest, disciplined, responsible, caring (polite, cooperative, tolerant, peaceful) behavior, polite, responsive and proactive, and showing attitude as part of the solution to problems in interacting effectively with the social and natural environment and in placing ourselves as a reflection of the nation in the association of the world

CC 3 : Understand, apply, analyze factual, conceptual, and procedural knowledge based on his curiosity about science, technology art, culture, and humanities with the insights of humanity, nationality, state and civilization on the causes of phenomena and events, and apply procedural knowledge to the field specific studies according to their talents and interests to solve problems.

CC 4 : Processing, reasoning, and recruiting in the realm of concrete and abstract realm, related to the development of the self-study in the school independently, and able to use methods according to scientific rules

## **B. BASIC COMPETENCES**

3.12 Analyzing the salts undergoing hydrolysis

4.12 Designing, performing, concluding and presenting the experimental results to determining type of salt that undergoing hydrolysis.

## **C. COMPETENCE ACHIEVEMENT INDICATORS**

### **Cognitive**

3.12.1 Determining the characteristic of the salt solution by experiment.

3.12.2 Explaining the characteristic of salt solution with the concept of hydrolysis

3.12.3 Calculating the pH of a hydrolyzed salt solution.

#### D. LEARNING OBJECTIVES

After completion of learning activities, such as giving stimulus, identifying problems, collecting data, proving, and concluding characteristic and type of salt hydrolyzed, learners are expected to be able to:

1. Comprehending the concept of hydrolysis
2. Analyzing properties of salt that hydrolyzed
3. Determining the types of hydrolysis and the reaction of hydrolysis
4. Calculating the pH of solution that is hydrolyzed

#### E. LEARNING MATERIAL

| Knowledge  | Learning material                                                                                                                                       |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| Factual    | <ul style="list-style-type: none"><li>• Salt solution</li><li>• The presence of salts that react with water and which do not react with water</li></ul> |
| Conceptual | <ul style="list-style-type: none"><li>• Four types of salt</li></ul>                                                                                    |

|           |                                                                                                                                        |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------|
|           | <ul style="list-style-type: none"> <li>• Partial hydrolysis</li> <li>• Total hydrolysis</li> </ul>                                     |
| Principle | <ul style="list-style-type: none"> <li>• Cations</li> <li>• Anions</li> <li>• Cation hydrolysis</li> <li>• Anion hydrolysis</li> </ul> |
| Procedure | <ul style="list-style-type: none"> <li>• Steps of experiment of salt solution</li> </ul>                                               |

#### **F. LEARNING STRATEGY :**

Approach: Scientific

Model : Discovery Learning

Method : Discussion, Question and answer, presentations, and assignment

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**G. Learning Activity :****First Meeting : (2 x 45 menit)****KD. 3.12 Analyzing the salts undergoing hydrolysis.****3.12.1 Determining the characteristic of the salt solution by experiment.**

| LEARNING ACTIVITIES | SYNTAX OF LEARNING MODEL | SCIENTIFIC | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                 | TIME     |
|---------------------|--------------------------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| Opening             |                          |            | <ul style="list-style-type: none"> <li>➤ Teacher greets the student</li> <li>➤ Teacher is open the learning process by asking the students to pray before start learning according to their religion.</li> <li>➤ Teacher take a list of student attendance and call the student's name</li> <li>➤ Teacher giving pre-test</li> <li>➤ Teacher is giving direction about the indicator that would be achieved and learning purpose</li> </ul> | 5 minute |

|             |                        |                        |                                                                                                                                                                                                                                                                                                                                                |            |
|-------------|------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
|             |                        |                        | <ul style="list-style-type: none"> <li>➤ Teacher is giving information how the process of discovery learning</li> </ul>                                                                                                                                                                                                                        |            |
| <b>Core</b> | Giving Stimulation     | <b>Observing</b>       | <ul style="list-style-type: none"> <li>➤ Teacher is giving stimulus a picture example of salt and an animation about salt hydrolysis</li> <li>➤ And then teacher instruct the student to forming groups</li> <li>➤ Teacher is presenting power point as a learning resources</li> </ul>                                                        | 70 minutes |
|             | Problem Identification | <b>Asking</b>          | <ul style="list-style-type: none"> <li>➤ Teacher is giving opportunity to ask the displayed impressions</li> <li>➤ Teacher invite students to discuss with friend in group to identify the problem is relevant to learning and relating to daily life</li> <li>➤ Teacher is giving a direction related with the question that occur</li> </ul> |            |
|             | Data Collecting        | <b>Data Collecting</b> | <ul style="list-style-type: none"> <li>➤ Teachers is inviting students to collect the information from various sources based on the material that has been discussed</li> </ul>                                                                                                                                                                |            |

|                |                 |                      |                                                                                                                                                                                                                                                                |            |
|----------------|-----------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
|                | Data processing | <b>Associating</b>   | ➤ Teacher is conducting students in data processing and information that has been obtained                                                                                                                                                                     |            |
|                | Verification    |                      | ➤ Teachers invite students to present the results of discussion about concept and the types of salt hydrolysis to other friends.                                                                                                                               |            |
|                | Generalitation  | <b>Communicating</b> | ➤ Teacher is choosing the groups one by one to present the result of discussion.                                                                                                                                                                               |            |
| <b>Closing</b> |                 |                      | ➤ Teachers and student concluding the important point about the lesson that have already learned.<br>➤ Close the lesson by asking the student to read and comprehend the next lesson about the characteristic of salt<br>➤ And pray according to their beliefs | 15 minutes |

**Second Meeting : (2 x 45 menit)**

**KD. 3.12 Analyzing the salts undergoing hydrolysis.**

**3.12.2 Explaining the characteristic of salt solution with the concept of hydrolysis.**

| Learning Activity | SYNTAX OF LEARNING MODEL | SCIENTIFIC | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Time       |
|-------------------|--------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Opening           |                          |            | <ul style="list-style-type: none"> <li>➤ Teacher greets the student</li> <li>➤ Teacher is open the learning process by asking the students to pray before start learning according to their religion.</li> <li>➤ Teacher take a list of student attendance and call the student's name</li> <li>➤ Teacher is asking student to make a group</li> <li>➤ Teacher is remembering again the material in last week and relating with the material that</li> </ul> | 10 Minutes |

|             |                        |                        |                                                                                                                                                       |  |
|-------------|------------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|             |                        |                        | will be discuss                                                                                                                                       |  |
| <b>Core</b> | Giving Stimulation     | <b>Observing</b>       | ➤ Teacher showing an animation about the characteristic of salt                                                                                       |  |
|             | Problem identification | <b>Asking</b>          | ➤ Teacher is giving opportunity to ask the displayed impressions<br>➤ Teacher is inviting students to discuss how to know the characteristic of salts |  |
|             | Data Collecting        | <b>Data Collecting</b> | ➤ Teachers is inviting students to collect the information from various sources based on the                                                          |  |

|                |                 |                      |                                                                                                                                                                                                                                                                                                                                            |            |
|----------------|-----------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
|                |                 |                      | <p>material that has been discussed</p> <ul style="list-style-type: none"> <li>➤ Teacher is inviting students to identify the formation of salts based on the reaction</li> <li>➤ Teacher is inviting students to conclude the characteristic of salt</li> </ul>                                                                           | 70 Minutes |
|                | Data processing | <b>Associating</b>   | <ul style="list-style-type: none"> <li>➤ Teacher is conducting students in data processing and information that has been obtained</li> <li>➤ Teachers invite students to present the results of discussion about the characteristic of salt</li> </ul>                                                                                     |            |
|                | Verification    |                      |                                                                                                                                                                                                                                                                                                                                            |            |
|                | Generalitation  | <b>Communicating</b> | <ul style="list-style-type: none"> <li>➤ Teacher is choosing the groups one by one to present the result of discussion</li> </ul>                                                                                                                                                                                                          |            |
| <b>Closing</b> |                 |                      | <ul style="list-style-type: none"> <li>➤ Teachers and student concluding the important point about the lesson that have already learned.</li> <li>➤ Close the lesson by asking the student to read and comprehend the next lesson about calculating pH of salt hydrolysis</li> <li>➤ Teacher close the lesson and pray together</li> </ul> | 10 Minutes |

**Third Meeting (2 x 45 menit) 3.12.3 Calculating the pH of a hydrolyzed salt solution.**

| Learning Activity | SYNTAX OF LEARNING MODEL | SCIENTIFIC | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Time       |
|-------------------|--------------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| Opening           |                          |            | <ul style="list-style-type: none"> <li>➤ Teacher greets the student</li> <li>➤ Teacher is open the learning process by asking the students to pray before start learning according to their religion.</li> <li>➤ Teacher take a list of student attendance and call the student's name</li> <li>➤ Teacher is remembering again the material in last week and relating with the material that will be discuss</li> <li>➤ Teacher asking students to forming groups same as with last week</li> </ul> | 10 Minutes |

|             |                                 |                        |                                                                                                                                                                                                           |               |
|-------------|---------------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>Core</b> | Stimulation                     | <b>Observing</b>       | <ul style="list-style-type: none"> <li>➤ Teachers continue learning materials on last week</li> <li>➤ Teacher showing the video about salt hydrolysis</li> </ul>                                          | 60<br>Minutes |
|             | Problem identification          | <b>Asking</b>          | <ul style="list-style-type: none"> <li>➤ Teacher is giving opportunity to ask the displayed impressions</li> <li>➤ Teacher asking what happen if salt diluted in water?</li> </ul>                        |               |
|             | Data collection                 | <b>Data Collecting</b> | <ul style="list-style-type: none"> <li>➤ Teacher inviting students to discussing the determination of pH of salt solution based on the types of salt hydrolysis</li> </ul>                                |               |
|             | Data processing<br>Verification | <b>Associating</b>     | <ul style="list-style-type: none"> <li>➤ Teacher give a question</li> <li>➤ Teachers invite students to solve the problem of determining the pH of salt solution</li> </ul>                               |               |
|             | Generalitation                  | <b>Communicating</b>   | <ul style="list-style-type: none"> <li>➤ Teacher correcting the problem that they have solved as together</li> <li>➤ Teachers invite students to communicate the conclusions of today's lesson</li> </ul> |               |

|                |  |  |                                                                                                                                                                                                                                  |              |
|----------------|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|                |  |  |                                                                                                                                                                                                                                  |              |
| <b>Closing</b> |  |  | <ul style="list-style-type: none"> <li>➤ Teachers and student concluding the important point about the lesson that have already learned.</li> <li>➤ Teacher giving the post-test, and pray according to their beliefs</li> </ul> | 20<br>Minute |

## H. ASSESSMENT

### 1. Assessment Technique

Knowledge assessment : Written Test

Skills assessment : Discussion

### Form of assessment

Written Test/instrument : Multiple Choice

Group Discussion : Sheet of Discussion Assessment

## I. Media and Learning Source

### 1. Media

- Power Point Presentation
- Sheet of Question

## 2. Instrument

- Whiteboard
- Boardmarker
- LCD
- Laptop, Infocus

## 3. Learning Source

- Utami, Yodia. 2016. Hidrolisis Garam.
- Purba, Michael. 2006. Kimia untuk Kelas XI. Jakarta: Erlangga

Known,  
Head Master of SMA Negeri 1 Rantau Selatan

H. YAHYA, S.Pd, M.Si  
NIP. 19580703 198703 1 003

Rantau Prapat, April 2018

Researcher

ANGGIE BUDIARTY  
NIM.4143332003



#### Appendix 4

##### INSTRUMENT TEST (BEFORE VALIDATION)

Mata Pelajaran : Kimia  
 Pokok Bahasan : Hidrolisis Garam  
 Kelas/Semester : XI IPA/II  
 Waktu : 90 Menit

Petunjuk soal :

1. Terlebih dahulu tuliskan nama pada lembar jawaban yang tersedia.
  2. Bacalah soal dengan teliti sebelum anda menjawab.
  3. Berilah tanda silang (x) pada salah satu jawaban yang anda anggap benar.
- 

Nama :

Kelas :

1. Senyawa yang larutannya dalam air tidak mengalami hidrolisis adalah...
  - a.  $\text{NH}_4\text{Cl}$
  - b.  $\text{K}_2\text{SO}_4$
  - c.  $\text{CH}_3\text{COOK}$
  - c.  $(\text{NH}_4)_2\text{SO}_4$
  - d.  $\text{CH}_3\text{COONH}_4$
2. Ion berikut mengalami hidrolisis dalam air, kecuali...
  - a.  $\text{Na}^+$
  - b.  $\text{CN}^-$
  - c.  $\text{CO}_3^{2-}$
  - c.  $\text{Al}^{3+}$
  - d.  $\text{S}^{2-}$
3. Zat-zat berikut ini jika dilarutkan dalam air akan mengalami hidrolisis, kecuali...
  - a. Amonium Klorida
  - b. Natrium Karbonat
  - c. Aluminium Sulfide
  - c. Barium Nitrat
  - d. Kalium Asetat
4. Larutan  $\text{NH}_4\text{Cl}$  dalam air mempunyai  $\text{pH} < 7$ . Penjelasan mengenai hal ini adalah...
  - a.  $\text{Na}^+$  menerima proton dari air
  - b.  $\text{Cl}^-$  bereaksi dengan air membentuk  $\text{HCl}$
  - c.  $\text{NH}_4^+$  dapat memberi proton kepada air
  - d.  $\text{NH}_4\text{Cl}$  mudah larut dalam air

e.  $\text{NH}_3$  mempunyai tetapan kesetimbangan yang besar

5. Garam berikut yang larutannya bersifat asam adalah...

- |                                 |                             |
|---------------------------------|-----------------------------|
| a. $\text{KBr}$                 | c. $\text{CH}_3\text{COOK}$ |
| b. $\text{NH}_4\text{Cl}$       | d. $\text{NaCl}$            |
| c. $(\text{NH}_4)_2\text{CO}_3$ |                             |

- |                                          |                             |
|------------------------------------------|-----------------------------|
| 6. 1. $\text{NH}_4\text{Cl}$             | 4. $\text{FeCl}_3$          |
| 2. $(\text{CH}_3\text{COOH})_2\text{Ca}$ | 5. $\text{Na}_2\text{CO}_3$ |
| 3. $\text{Ba}(\text{NO}_3)_2$            |                             |

Pasangan garam yang larutannya dalam air dapat mengubah lakmus biru menjadi merah adalah...

- |            |            |
|------------|------------|
| a. 2 dan 5 | d. 4 dan 5 |
| b. 1 dan 4 | e. 2 dan 3 |
| c. 3 dan 4 |            |

7. Garam berikut yang dapat mengalami hidrolisis dan  $\text{pH} < 7$  adalah...

- |                              |                         |
|------------------------------|-------------------------|
| a. $\text{CH}_3\text{COONa}$ | d. $\text{NaNO}_3$      |
| b. $\text{KNO}_3$            | e. $\text{K}_2\text{S}$ |
| c. $\text{NH}_4\text{Cl}$    |                         |

8. Garam berikut ini yang berasal dari asam lemah dan basa kuat dan bersifat basa adalah...

- |                    |                    |
|--------------------|--------------------|
| a. Amonium asetat  | d. Natrium klorida |
| b. Amonium klorida | e. Kalium klorida  |
| c. Natrium asetat  |                    |

9. Pencampuran asam basa yang menghasilkan garam terhidrolisis sebagian bersifat basa adalah campuran ekuivalen dari larutan...

- |                                               |                                               |
|-----------------------------------------------|-----------------------------------------------|
| a. $\text{HCl}$ dan $\text{NaOH}$             | d. $\text{CH}_3\text{COOH}$ dan $\text{NaOH}$ |
| b. $\text{HCl}$ dan $\text{NH}_3$             | e. $\text{H}_2\text{SO}_4$ dan $\text{NH}_3$  |
| c. $\text{CH}_3\text{COOH}$ dan $\text{NH}_3$ |                                               |

10. Garam berikut yang memiliki  $\text{pH} > 7$  adalah...

- |                           |                             |
|---------------------------|-----------------------------|
| a. $\text{NH}_4\text{CN}$ | d. $\text{KCN}$             |
| b. $\text{NaCl}$          | e. $\text{Fe}(\text{CN})_3$ |
| c. $\text{KCl}$           |                             |

11. Senyawa yang larutannya dalam air akan mengalami hidrolisis total adalah...
- a.  $\text{NH}_4\text{CN}$
  - b.  $\text{CH}_3\text{COOK}$
  - c.  $\text{K}_2\text{SO}_4$
  - d.  $(\text{NH}_4)_2\text{SO}_4$
  - e.  $\text{CH}_3\text{COONa}$
12. Dari garam berikut, yang mengalami hidrolisis total adalah...
- a.  $\text{NH}_4\text{Br}$
  - b.  $\text{K}_2\text{CO}_3$
  - c.  $\text{BaCO}_3$
  - d.  $\text{AlCl}_3$
  - e.  $\text{Al}_2(\text{CO}_3)_3$
13. Berapa pH larutan yang diperoleh dengan mencampurkan 50 mL  $\text{HNO}_3$  0,2 dan 50 mL  $\text{KOH}$  0,2 M?
- a. 2
  - b. 5
  - c. 7
  - d. 10
  - e. 13
14. Pencampuran dua larutan berikut menghasilkan larutan dengan pH sama dengan 7 adalah...
- a. 100 mL  $\text{H}_2\text{SO}_4$  0,1 M dan 100 mL  $\text{Ca}(\text{OH})_2$  0,1 M
  - b. 100 mL  $\text{H}_2\text{SO}_4$  0,1 M dan 100 mL  $\text{Ca}(\text{OH})_2$  0,2 M
  - c. 100 mL  $\text{H}_2\text{SO}_4$  0,1 M dan 100 mL  $\text{Ca}(\text{OH})_2$  0,3 M
  - d. 100 mL  $\text{H}_2\text{SO}_4$  0,2 M dan 100 mL  $\text{Ca}(\text{OH})_2$  0,1 M
  - e. 100 mL  $\text{H}_2\text{SO}_4$  0,4 M dan 100 mL  $\text{Ca}(\text{OH})_2$  0,3 M
15. Jika  $K_b \text{ NH}_4\text{OH} = 10^{-5}$  larutan  $\text{NH}_4\text{Cl}$  0,1 M mempunyai pH...
- a. 5
  - b. 6
  - c. 7
  - d. 8
  - e. 9
16. Dari larutan 0,2 M  $(\text{NH}_4)_2\text{SO}_4$  diketahui bahwa  $K_b = 10^{-5}$  pH larutan tersebut adalah...
- a.  $3 - \log 2$
  - b.  $3 - \log 5$
  - c.  $4 - \log 3$
  - d.  $4 - \log 5$
  - e.  $5 - \log 2$
17. Sebanyak 20 mL larutan  $\text{NH}_3$  0,5 M dicampur dengan 80 mL larutan  $\text{HCl}$  0,125 M. Jika diketahui bahwa  $K_b \text{ NH}_3 = 10^{-5}$  maka pH campuran yang terjadi adalah...
- a. 4
  - d. 9

- b. 5  
c. 6
- e. 10

18. Sebanyak 2,64 gram Kristal  $(\text{NH}_4)_2\text{SO}_4$  dilarutkan dalam air, sehingga volumenya menjadi 1 liter. (Ar N = 14 dan S = 32), maka besarnya pH larutan adalah... ( $K_b = 10^{-5}$ )

- a.  $5,5 + \log 2$   
b.  $5,5 - \log 2$   
c.  $5,5 + \log 3$
- d.  $8,5 + \log 2$   
e.  $9 + \log \sqrt{2}$

19. Larutan zat berikut yang dalam air mempunyai pH paling besar, kecuali...

- a.  $\text{CH}_3\text{COONa}$   
b.  $(\text{NH}_4)_2\text{SO}_4$   
c. KCN
- d. NaCl  
e.  $\text{CH}_3\text{COONH}_4$

20. Berapa gram  $\text{NH}_4\text{Br}$  harus dilarutkan dalam 500 mL larutan, untuk mendapatkan larutan dengan  $\text{pH} = 5 - \log 2$  ( $K_b \text{ NH}_4\text{OH} = 1,8 \times 10^{-5}$ )

- a. 35,3  
b. 33,5  
c. 53,3
- d. 3,53  
e. 5,33

21. Jika 5,35 gram  $\text{NH}_4\text{Cl}$  ( $M_r = 53,5$ ) dilarutkan dalam air hingga volumenya menjadi 250 mL akan diperoleh larutan dengan pH ( $K_b \text{ NH}_3 = 1 \times 10^{-5}$ )...

- a. 5  
b.  $5 - \log 2$   
c.  $5 + \log 2$
- d.  $8 + \log 2$   
e.  $9 + \log 2$

22. Larutan garam  $\text{CH}_3\text{COONa}$  0,1 M memiliki  $K_a = 10^{-5}$ , maka pH larutan tersebut adalah...

- a. 3  
b. 5  
c. 13
- d. 10  
e. 9

23. Jika dua liter larutan natrium asetat ( $K_a = 10^{-5}$ ) mempunyai  $\text{pH} = 9$ , maka massa natrium asetat yang terdapat dalam larutan tersebut adalah... (Ar C = 12, O = 16, Na = 23)

- a. 8,2  
b. 16,4  
c. 82
- d. 164  
e. 1,64

24. Dilarutkan 0,98 gram NaCN sampai volume 125 mL. ( $K_a = 4 \times 10^{-10}$ , Ar Na = 23, C = 12, N = 14) pH larutan adalah...

- a.  $2 - \log 3$
- b.  $3 - \log 2$
- c.  $12 + \log 3$
- d.  $11 - \log 2$
- e.  $11 + \log 2$

25. Larutan  $\text{CH}_3\text{COONa}$  ( $M_r = 82$ ) sebanyak 4,1 gram dilarutkan dalam air hingga volume larutan 500 mL, jika  $K_a = 10^{-5}$ , maka pH larutan adalah...

- a. 5
- b. 6
- c. 7
- d. 8
- e. 9

26. Jika diketahui  $K_a \text{CH}_3\text{COOH} = 1 \times 10^{-5}$ , maka pH larutan  $\text{Ca}(\text{CH}_3\text{COO})_2$  0,1 M adalah...

- a.  $5 + \log 2$
- b.  $3 + \log 2$
- c.  $4 + \log 2$
- d.  $9 + \log \sqrt{2}$
- e.  $8 + \log 2$

27. Barium asetat  $\text{Ba}(\text{CH}_3\text{COO})_2$  seberat 2,55 gram dilarutkan ke dalam air sampai volumenya menjadi 500 mL. Bila  $K_a = 10^{-5}$ ; Ar Ba = 137, C = 12, O = 16, maka pH larutan adalah...

- a. 5
- b.  $5,5 - \log 2$
- c.  $8 + \log 2$
- d.  $8,5 + \log 2$
- e.  $9 + \log 2$

28. Ditimbang 1,34 gram LX dilarutkan sampai volume 100 mL. pH larutan 9 dan  $K_a \text{HX} = 10^{-5}$ . Mr zat X adalah...

- a. 268
- b. 134
- c. 90
- d. 67
- e. 60

29. Jika  $K_a \text{CH}_3\text{COOH} = 1,8 \times 10^{-5}$  dan  $K_b \text{NH}_4\text{OH} = 1,8 \times 10^{-5}$ , maka pH 1 liter larutan ammonium asetat 0,1 mol/Liter adalah...

- a. 5
- b. 6
- c. 7
- d. 8
- e. 9

30. Jika  $K_a \text{HF} = 6,6 \times 10^{-4}$  dan  $K_b \text{NH}_4\text{OH} = 1,8 \times 10^{-5}$ , maka pH 1 liter larutan  $\text{NH}_4\text{F}$  0,1 mol/Liter adalah...

- a. 5,22  
b. 6,22  
c. 7,22  
d. 8,24  
e. 9,24
31. Jika  $K_a \text{ HCN} = 6,2 \times 10^{-10}$  dan  $K_b \text{ NH}_4\text{OH} = 1,8 \times 10^{-5}$ , maka pH 1 Liter larutan  $\text{NH}_4\text{CN}$  0,1 mol/Liter adalah...
- a. 5,2  
b. 6,2  
c. 7,2  
d. 9,24  
e. 4,28
32.  $\text{NH}_4\text{X}$  mempunyai pH = 6 dan  $K_b \text{ NH}_4\text{OH} = 1,8 \times 10^{-5}$ , berapakah harga  $K_a \text{ X}$  larutan tersebut ...
- a.  $1,8 \times 10^{-4}$   
b.  $1,8 \times 10^{-3}$   
c.  $2,4 \times 10^{-4}$   
d.  $2,4 \times 10^{-3}$   
e.  $6,6 \times 10^{-6}$
33. Hasil percobaan perubahan warna lakmus dalam larutan garam adalah sebagai berikut :

| No. | Larutan Garam      | Perubahan Warna |             |
|-----|--------------------|-----------------|-------------|
|     |                    | Lakmus Merah    | Lakmus Biru |
| 1.  | NH <sub>4</sub> CN | Biru            | Merah       |
| 2.  | NaCl               | Biru            | Biru        |
| 3.  | NH <sub>4</sub> Cl | Merah           | Biru        |
| 4.  | MgSO <sub>4</sub>  | Merah           | Merah       |
| 5.  | CaCO <sub>3</sub>  | Merah           | Biru        |

Berdasarkan data diatas, larutan garam yang bersifat asam kuat dan basa kuat adalah...

34. Hasil percobaan perubahan warna lakmus dalam larutan garam adalah sebagai berikut :

| No. | Larutan Garam                   | Perubahan Warna |             |
|-----|---------------------------------|-----------------|-------------|
|     |                                 | Lakmus Merah    | Lakmus Biru |
| 1.  | NH <sub>4</sub> CN              | Biru            | Merah       |
| 2.  | Na <sub>2</sub> PO <sub>4</sub> | Biru            | Biru        |
| 3.  | KCl                             | Merah           | Biru        |
| 4.  | AlCl <sub>3</sub>               | Merah           | Merah       |
| 5.  | NaNO <sub>3</sub>               | Merah           | Biru        |

Berdasarkan data diatas, larutan garam yang bersifat asam kuat dan basa kuat asam kuat dan basa kuat adalah...

- a. 1 dan 2
- b. 1 dan 3
- c. 2 dan 4
- d. 4 dan 5
- e. 3 dan 5

35. Data percobaan :

| No. | Jenis Larutan                                   | Kertas Lakmus (Warna) |             |
|-----|-------------------------------------------------|-----------------------|-------------|
|     |                                                 | Lakmus Merah          | Lakmus Biru |
| 1.  | NaCl                                            | Merah                 | Biru        |
| 2.  | NH <sub>4</sub> Cl                              | Merah                 | Merah       |
| 3.  | KCN                                             | Biru                  | Biru        |
| 4.  | CH <sub>3</sub> COONa                           | Biru                  | Biru        |
| 5.  | (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> | Merah                 | Merah       |

Larutan garam yang bersifat asam adalah...

- a. 1 dan 2
- b. 1 dan 3
- c. 3 dan 4
- d. 2 dan 5
- e. 4 dan 5

36. Dibawah ini, garam yang jika diberi indicator fenoftalein (pp) akan berubahwarna dari tak berwarna menjadi merah muda dalam larutannya adalah.....

- a. K<sub>2</sub>CO<sub>3</sub>
- b. H<sub>2</sub>SO<sub>4</sub>
- c. NH<sub>4</sub>Cl
- d. CH<sub>3</sub>COOH
- e. NaNO<sub>3</sub>

37. Di bawah ini, larutan yang jika diberi indicator fenolftalein (pp) akan tetap bening menandakan larutan memiliki pH dibawah 7 adalah.....

- a. K<sub>2</sub>SO<sub>4</sub>
- b. (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>
- c. (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub>
- d. CH<sub>3</sub>COOK
- e. KNO<sub>3</sub>

38. Larutan NaCN 0,1 M mempunyai pH 11, maka larutan tersebut terhidrolisis sebanyak.....

- a. 1%
- b. 10%
- c. 25%
- d. 50%
- e. 100%

39. Larutan NH<sub>4</sub>Cl 0,1 M terhidrolisis 5%, pH larutan tersebut adalah.....

- a. 3
- b. 3 – log 5
- c. 4
- d. 4-log 5
- e. 11 + log 5

40. Besar  $[\text{OH}^-]$  dalam larutan garam yang berasal dari asam lemah dan basa kuat..
- Berbanding lurus dengan  $K_a$ -nya
  - Berbanding terbalik dengan  $K_a$ -nya
  - Berbanding lurus dengan akar kuadrat  $K_a$ -nya
  - Berbanding terbalik dengan akar kuadrat  $K_a$ -nya
  - Berbanding terbalik dengan konsentrasi molar garamnya



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*Appendix 5*

KEY ANSWER  
(BEFORE VALIDATION)

- |       |       |
|-------|-------|
| 1. B  | 21. B |
| 2. A  | 22. E |
| 3. D  | 23. B |
| 4. C  | 24. E |
| 5. B  | 25. E |
| 6. B  | 26. D |
| 7. C  | 27. D |
| 8. C  | 28. B |
| 9. D  | 29. B |
| 10. D | 30. B |
| 11. A | 31. D |
| 12. E | 32. B |
| 13. C | 33. C |
| 14. A | 34. E |
| 15. A | 35. D |
| 16. E | 36. A |
| 17. B | 37. B |
| 18. B | 38. A |
| 19. B | 39. B |
| 20. A | 40. D |

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| Appendix 6                                       |                                                                                                                                                                                                                                        |                 |               |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------|
| KISI – KISI INSTRUMEN TES<br>(BEFORE VALIDATION) |                                                                                                                                                                                                                                        |                 |               |
| Indicator                                        | Soal                                                                                                                                                                                                                                   | Tujuan Kognitif | Kunci Jawaban |
| Memahami konsep hidrolisis                       | 7. Senyawa yang larutannya dalam air tidak mengalami hidrolisis adalah...<br>d. $\text{NH}_4\text{Cl}$ c. $(\text{NH}_4)_2\text{SO}_4$<br>e. $\text{K}_2\text{SO}_4$ d. $\text{CH}_3\text{COONH}_4$<br>f. $\text{CH}_3\text{COOK}$     | C1              | B             |
|                                                  | 8. Ion berikut mengalami hidrolisis dalam air, kecuali...<br>d. $\text{Na}^+$ c. $\text{Al}^{3+}$<br>e. $\text{CN}^-$ d. $\text{S}^{2-}$<br>f. $\text{CO}_3^{2-}$                                                                      | C2              | A             |
|                                                  | 9. Za-zat berikut ini jika dilarutkan dalam air akan mengalami hidrolisis, kecuali...<br>a. Amonium Klorida                      c. Barium Nitrat<br>b. Natrium Karbonat                      d. Kalium Asetat<br>c. Aluminium Sulfide | C2              | D             |
|                                                  | 10. Larutan $\text{NH}_4\text{Cl}$ dalam air mempunyai pH < 7. Penjelasan mengenai hal ini adalah...<br>f. $\text{Na}_4^+$ menerima proton dari air                                                                                    | C2              | C             |

|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |    |   |
|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
|                                                   | <p>g. <math>\text{Cl}^-</math> bereaksi dengan air membentuk <math>\text{HCl}</math></p> <p>h. <math>\text{NH}_4^+</math> dapat memberi proton kepada air</p> <p>i. <math>\text{NH}_4\text{Cl}</math> mudah larut dalam air</p> <p>j. <math>\text{NH}_3</math> mempunyai tetapan kesetimbangan yang besar</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |    |   |
| Menganalisis sifat-sifat garam yang terhidrolisis | <p>11. Garam berikut yang larutannya bersifat asam adalah...</p> <p>d. <math>\text{KBr}</math> c. <math>\text{CH}_3\text{COOK}</math></p> <p>e. <math>\text{NH}_4\text{Cl}</math> d. <math>\text{NaCl}</math></p> <p>f. <math>(\text{NH}_4)_2\text{CO}_3</math></p> <p>12. 1. <math>\text{NH}_4\text{Cl}</math> 4. <math>\text{FeCl}_3</math></p> <p>2. <math>(\text{CH}_3\text{COOH})_2\text{Ca}</math> 5. <math>\text{Na}_2\text{CO}_3</math></p> <p>3. <math>\text{Ba}(\text{NO}_3)_2</math></p> <p>Pasangan garam yang larutannya dalam air dapat mengubah lakmus biru menjadi merah adalah...</p> <p>a. 2 dan 5 d. 4 dan 5</p> <p>b. 1 dan 4 e. 2 dan 3</p> <p>c. 3 dan 4</p> <p>7. Garam berikut yang dapat mengalami hidrolisis dan <math>\text{pH} &lt; 7</math> adalah...</p> <p>a. <math>\text{CH}_3\text{COONa}</math> d. <math>\text{NaNO}_3</math></p> | C2 | B |
|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | C2 | B |
|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | C2 | C |

|     | <p>b. <math>\text{KNO}_3</math> e. <math>\text{K}_2\text{S}</math></p> <p>c. <math>\text{NH}_4\text{Cl}</math></p> <p>8. Garam berikut ini yang berasal dari asam lemah dan basa kuat dan bersifat basa adalah...</p> <p>a. Amonium asetat d. Natrium klorida</p> <p>b. Amonium klorida e. Kalium klorida</p> <p>c. Natrium asetat</p> <p>10. Garam berikut yang memiliki <math>\text{pH} &gt; 7</math> adalah...</p> <p>a. <math>\text{NH}_4\text{CN}</math> d. <math>\text{KCN}</math></p> <p>b. <math>\text{NaCl}</math> e. <math>\text{Fe}(\text{CN})_3</math></p> <p>c. <math>\text{KCl}</math></p> <p>33. Hasil percobaan perubahan warna lakmus dalam larutan garam adalah sebagai berikut :</p> <table border="1"> <thead> <tr> <th rowspan="2">No.</th><th rowspan="2">Larutan Garam</th><th colspan="2">Perubahan Warna</th></tr> <tr> <th>Lakmus Merah</th><th>Lakmus Biru</th></tr> </thead> <tbody> <tr> <td></td><td><math>\text{NH}_4\text{CN}</math></td><td>Biru</td><td>Merah</td></tr> <tr> <td></td><td><math>\text{NaCl}</math></td><td>Biru</td><td>Biru</td></tr> <tr> <td></td><td><math>\text{NH}_4\text{Cl}</math></td><td>Merah</td><td>Biru</td></tr> </tbody> </table> | No.          | Larutan Garam | Perubahan Warna |  | Lakmus Merah | Lakmus Biru |  | $\text{NH}_4\text{CN}$ | Biru | Merah |  | $\text{NaCl}$ | Biru | Biru |  | $\text{NH}_4\text{Cl}$ | Merah | Biru | <p>C1</p> <p>C2</p> <p>C3</p> | <p>C</p> <p>D</p> <p>C</p> |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------|-----------------|--|--------------|-------------|--|------------------------|------|-------|--|---------------|------|------|--|------------------------|-------|------|-------------------------------|----------------------------|
| No. | Larutan Garam                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |              |               | Perubahan Warna |  |              |             |  |                        |      |       |  |               |      |      |  |                        |       |      |                               |                            |
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Lakmus Merah | Lakmus Biru   |                 |  |              |             |  |                        |      |       |  |               |      |      |  |                        |       |      |                               |                            |
|     | $\text{NH}_4\text{CN}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Biru         | Merah         |                 |  |              |             |  |                        |      |       |  |               |      |      |  |                        |       |      |                               |                            |
|     | $\text{NaCl}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Biru         | Biru          |                 |  |              |             |  |                        |      |       |  |               |      |      |  |                        |       |      |                               |                            |
|     | $\text{NH}_4\text{Cl}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Merah        | Biru          |                 |  |              |             |  |                        |      |       |  |               |      |      |  |                        |       |      |                               |                            |

a. 1 dan 2  
b. 1 dan 3  
c. 2 dan 4  
d. 3 dan 4  
e. 4 dan 5

| No. | Larutan Garam                   | Perubahan Warna |             |
|-----|---------------------------------|-----------------|-------------|
|     |                                 | Lakmus Merah    | Lakmus Biru |
| 1.  | NH <sub>4</sub> CN              | Biru            | Merah       |
| 2.  | Na <sub>2</sub> PO <sub>4</sub> | Biru            | Biru        |
| 3.  | KCl                             | Merah           | Biru        |
| 4.  | AlCl <sub>3</sub>               | Merah           | Merah       |
| 5.  | NaNO <sub>3</sub>               | Merah           | Biru        |

Berdasarkan data diatas, larutan garam yang bersifat asam kuat dan basa kuat asam kuat dan basa kuat adalah...

E

a. 1 dan 2

d. 4 dan 5

b. 1 dan 3

e. 3 dan 5

c. 2 dan 4

35.Data percobaan

| No. | Jenis Larutan                                   | Kertas Lakmus (Warna) |             |
|-----|-------------------------------------------------|-----------------------|-------------|
|     |                                                 | Lakmus Merah          | Lakmus Biru |
| 1.  | NaCl                                            | Merah                 | Biru        |
| 2.  | NH <sub>4</sub> Cl                              | Merah                 | Merah       |
| 3.  | KCN                                             | Biru                  | Biru        |
| 4.  | CH <sub>3</sub> COONa                           | Biru                  | Biru        |
| 5.  | (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> | Merah                 | Merah       |

Larutan garam yang bersifat asam adalah...

a. 1 dan 2

d. 2 dan 5

b. 1 dan 3

e. 4 dan 5

c. 3 dan 4

C3

D

|                                                   |                                                                                                                                                                                                                                                                                                                                                                             |    |   |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
|                                                   |                                                                                                                                                                                                                                                                                                                                                                             |    |   |
| Menentukan jenis hidrolisis dan reaksi hidrolisis | <p>9. Pencampuran asam basa yang menghasilkan garam terhidrolisis sebagian bersifat basa adalah campuran ekuivalen dari larutan...</p> <p>a. HCl dan NaOH                      d. CH<sub>3</sub>COOH dan NaOH</p> <p>b. HCl dan NH<sub>3</sub>                        e. H<sub>2</sub>SO<sub>4</sub> dan NH<sub>3</sub></p> <p>c. CH<sub>3</sub>COOH dan NH<sub>3</sub></p> | C2 | D |
|                                                   | <p>11. Senyawa yang larutannya dalam air akan mengalami hidrolisis total adalah...</p> <p>a. NH<sub>4</sub>CN                                d. (NH<sub>4</sub>)<sub>2</sub> SO<sub>4</sub></p> <p>b. CH<sub>3</sub>COOK                           e. CH<sub>3</sub>COONa</p> <p>c. K<sub>2</sub>SO<sub>4</sub></p>                                                         | C2 | A |
|                                                   | <p>12. Dari garam berikut, yang mengalami hidrolisis total adalah...</p> <p>a. NH<sub>4</sub>Br                                d. AlCl<sub>3</sub></p> <p>b. K<sub>2</sub>CO<sub>3</sub>                                e. Al<sub>2</sub>(CO<sub>3</sub>)<sub>3</sub></p> <p>c. BaCO<sub>3</sub></p>                                                                        | C2 | E |
|                                                   | <p>36. Dibawah ini, garam yang jika diberi indicator fenoftalein (pp) akan berubah warna dari tak berwarna menjadi merah muda dalam larutannya adalah....</p> <p>a. K<sub>2</sub>CO<sub>3</sub>                                d. CH<sub>3</sub>COOH</p> <p>b. H<sub>2</sub>SO<sub>4</sub>                                e. NaNO<sub>3</sub></p>                           | C3 | A |



|                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                     |                   |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------|
|                                               | <ul style="list-style-type: none"> <li>c. Berbanding lurus dengan akar kuadrat <math>K_a</math>-nya</li> <li>d. Berbanding terbalik dengan akar kuadrat <math>K_a</math>-nya</li> <li>e. Berbanding terbalik dengan konsentrasi molar garamnya</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                     |                   |
| Menghitung pH larutan garam yang dihidrolisis | <p>13. Berapa pH larutan yang diperoleh dengan mencampurkan 50 mL <math>\text{HNO}_3</math> 0,2 dan 50 mL <math>\text{KOH}</math> 0,2 M?</p> <ul style="list-style-type: none"> <li>a. 2</li> <li>b. 5</li> <li>c. 7</li> <li>d. 10</li> <li>e. 13</li> </ul> <p>14. Pencampuran dua larutan berikut menghasilkan larutan dengan pH sama dengan 7 adalah...</p> <ul style="list-style-type: none"> <li>a. 100 mL <math>\text{H}_2\text{SO}_4</math> 0,1 M dan 100 mL <math>\text{Ca(OH)}_2</math> 0,1 M</li> <li>b. 100 mL <math>\text{H}_2\text{SO}_4</math> 0,1 M dan 100 mL <math>\text{Ca(OH)}_2</math> 0,2 M</li> <li>c. 100 mL <math>\text{H}_2\text{SO}_4</math> 0,1 M dan 100 mL <math>\text{Ca(OH)}_2</math> 0,3 M</li> <li>d. 100 mL <math>\text{H}_2\text{SO}_4</math> 0,2 M dan 100 mL <math>\text{Ca(OH)}_2</math> 0,1 M</li> <li>e. 100 mL <math>\text{H}_2\text{SO}_4</math> 0,4 M dan 100 mL <math>\text{Ca(OH)}_2</math> 0,3 M</li> </ul> | <p>C3</p> <p>C3</p> | <p>C</p> <p>A</p> |

|  |                                                                                                                                                                                                                                                                                                                                                        |    |   |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
|  | <p>15. Jika <math>K_b \text{ NH}_4\text{OH} = 10^{-5}</math> larutan <math>\text{NH}_4\text{Cl}</math> 0,1 M mempunyai pH...</p> <p>a. 5                                  d. 8</p> <p>b. 6                                  e. 9</p> <p>c. 7</p>                                                                                                       | C3 | A |
|  | <p>16. Dari larutan 0,2 M <math>(\text{NH}_4)_2\text{SO}</math> diketahui bahwa <math>K_b = 10^{-5}</math> pH larutan tersebut adalah...</p> <p>a. <math>3 - \log 2</math>                      d. <math>4 - \log 5</math></p> <p>b. <math>3 - \log 5</math>                      e. <math>5 - \log 2</math></p> <p>c. <math>4 - \log 3</math></p>     | C3 | E |
|  | <p>17. Sebanyak 20 mL larutan <math>\text{NH}_3</math> 0,5 M dicampur dengan 80 ml larutan HCl 0,125 M. Jika diketahui bahwa <math>K_b \text{ NH}_3 = 10^{-5}</math> maka pH campuran yang terjadi adalah...</p> <p>a. 4                                  d. 9</p> <p>b. 5                                  e. 10</p> <p>c. 6</p>                      | C3 | B |
|  | <p>18. Sebanyak 2,64 gram Kristal <math>(\text{NH}_4)_2\text{SO}_4</math> dilarutkan dalam air, sehingga volumenya menjadi 1 liter. (<math>A_r \text{ N} = 14</math> dan <math>S = 32</math>), maka besarnya pH larutan adalah... (<math>K_b = 10^{-5}</math>)</p> <p>a. <math>5,5 + \log 2</math>                    d. <math>8,5 + \log 2</math></p> | C3 | B |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                   |    |   |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
|  | <p>b. <math>5,5 - \log 2</math>                      e. <math>9 + \log \sqrt{2}</math></p> <p>c. KCN</p>                                                                                                                                                                                                                                                                                                          |    |   |
|  | <p>19. Larutan zat berikut yang dalam air mempunyai pH paling besar, kecuali...</p> <p>a. <math>\text{CH}_3\text{COONa}</math>                      d. NaCl</p> <p>b. <math>(\text{NH}_4)_2\text{SO}_4</math>                      e. <math>\text{CH}_3\text{COONH}_4</math></p> <p>c. KCN</p>                                                                                                                    | C2 | B |
|  | <p>20. Berapa gram <math>\text{NH}_4\text{Br}</math> harus dilarutkan dalam 500 mL larutan, untuk mendapatkan larutan dengan <math>\text{pH} = 5 - \log 2</math> (<math>K_b \text{ NH}_4\text{OH} = 1,8 \times 10^{-5}</math>)</p> <p>a. 35,3                      d. 3,53</p> <p>b. 33,5                      e. 5,33</p> <p>c. 53,3</p>                                                                         | C3 | A |
|  | <p>21. Jika 5,35 gram <math>\text{NH}_4\text{Cl}</math> (<math>M_r = 53,5</math>) dilarutkan dalam air hingga volumenya menjadi 250 mL akan diperoleh larutan dengan pH (<math>K_b \text{ NH}_3 = 1 \times 10^{-5}</math>)...</p> <p>a. 5                      d. <math>8 + \log 2</math></p> <p>b. <math>5 - \log 2</math>                      e. <math>9 + \log 2</math></p> <p>c. <math>5 + \log 2</math></p> | C3 | B |
|  | <p>22. Larutan garam <math>\text{CH}_3\text{COONa}</math> 0,1 M memiliki <math>K_a = 10^{-5}</math>, maka pH larutan tersebut adalah...</p>                                                                                                                                                                                                                                                                       | C3 | E |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |   |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
|  | <p>a. 3 d. 10</p> <p>b. 5 e. 9</p> <p>c. 13</p> <p>23. Jika dua liter larutan natrium asetat (<math>K_a = 10^{-5}</math>) mempunyai pH = 9, maka massa natrium asetat yang terdapat dalam larutan tersebut adalah... (Ar C = 12, O = 16, Na = 23)</p> <p>a. 8,2 d. 164</p> <p>b. 16,4 e. 1,64</p> <p>c. 82</p> <p>24. Dilarutkan 0,98 gram NaCN sampai volume 125 mL. (<math>K_a = 4 \times 10^{-10}</math>, Ar Na = 23, C = 12, N = 14) pH larutan adalah...</p> <p>a. <math>2 - \log 3</math> d. <math>11 - \log 2</math></p> <p>b. <math>3 - \log 2</math> e. <math>11 + \log 2</math></p> <p>c. <math>12 + \log 3</math></p> <p>25. Larutan <math>\text{CH}_3\text{COONa}</math> (<math>M_r = 82</math>) sebanyak 4,1 gram dilarutkan dalam air hingga volume larutan 500 mL, jika <math>K_a = 10^{-5}</math>, maka pH larutan adalah...</p> <p>a. 5 d. 8</p> <p>b. 6 e. 9</p> <p>c. 7</p> |    |   |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | C3 | B |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | C3 | B |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | C4 | E |



|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |    |   |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
|  | <p>b. 6 e. 9</p> <p>c. 7</p> <p>30. Jika <math>K_a \text{ HF} = 6,6 \times 10^{-4}</math> dan <math>K_b \text{ NH}_4\text{OH} = 1,8 \times 10^{-5}</math>, maka pH 1 liter larutan <math>\text{NH}_4\text{F}</math> 0,1 mol/Liter adalah...</p> <p>a. 5,22 d. 8,24</p> <p>b. 6,22 e. 9,24</p> <p>c. 7,22</p> <p>31. Jika <math>K_a \text{ HCN} = 6,2 \times 10^{-10}</math> dan <math>K_b \text{ NH}_4\text{OH} = 1,8 \times 10^{-5}</math>, maka pH 1 Liter larutan <math>\text{NH}_4\text{CN}</math> 0,1 mol/Liter adalah...</p> <p>a. 5,2 d. 9,24</p> <p>b. 6,2 e. 4,28</p> <p>c. 7,2</p> <p>32. <math>\text{NH}_4\text{X}</math> mempunyai pH = 6 dan <math>K_b \text{ NH}_4\text{OH} = 1,8 \times 10^{-5}</math>, berapakah harga <math>K_a \text{ X}</math> larutan tersebut ...</p> <p>a. <math>1,8 \times 10^{-4}</math> d. <math>2,4 \times 10^{-3}</math></p> <p>b. <math>1,8 \times 10^{-3}</math> e. <math>6,6 \times 10^{-6}</math></p> <p>c. <math>2,4 \times 10^{-4}</math></p> |    |   |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | C3 | B |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | C3 | D |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | C3 | B |

## Appendix 7

### Table of Values of r-Product Moment

| N  | Significant Level |       | N  | Significant Level |       | N    | Significant Level |       |
|----|-------------------|-------|----|-------------------|-------|------|-------------------|-------|
|    | 5%                | 1%    |    | 5%                | 1%    |      | 5%                | 1%    |
| 3  | 0.997             | 0.999 | 27 | 0.381             | 0.487 | 55   | 0.266             | 0.345 |
| 4  | 0.950             | 0.990 | 28 | 0.374             | 0.478 | 60   | 0.254             | 0.330 |
| 5  | 0.878             | 0.959 | 29 | 0.367             | 0.470 | 65   | 0.244             | 0.317 |
| 6  | 0.811             | 0.917 | 30 | 0.361             | 0.463 | 70   | 0.235             | 0.306 |
| 7  | 0.754             | 0.874 | 31 | 0.355             | 0.456 | 75   | 0.227             | 0.296 |
| 8  | 0.707             | 0.834 | 32 | 0.349             | 0.449 | 80   | 0.220             | 0.286 |
| 9  | 0.666             | 0.798 | 33 | 0.344             | 0.442 | 85   | 0.213             | 0.278 |
| 10 | 0.632             | 0.765 | 34 | 0.339             | 0.436 | 90   | 0.207             | 0.270 |
| 11 | 0.602             | 0.735 | 35 | 0.334             | 0.430 | 95   | 0.202             | 0.263 |
| 12 | 0.576             | 0.708 | 36 | 0.329             | 0.424 | 100  | 0.195             | 0.256 |
| 13 | 0.553             | 0.684 | 37 | 0.325             | 0.418 | 125  | 0.176             | 0.230 |
| 14 | 0.532             | 0.661 | 38 | 0.320             | 0.413 | 150  | 0.159             | 0.210 |
| 15 | 0.514             | 0.641 | 39 | 0.316             | 0.408 | 175  | 0.148             | 0.194 |
| 16 | 0.497             | 0.623 | 40 | 0.312             | 0.403 | 200  | 0.138             | 0.181 |
| 17 | 0.482             | 0.606 | 41 | 0.308             | 0.398 | 300  | 0.113             | 0.148 |
| 18 | 0.468             | 0.590 | 42 | 0.304             | 0.393 | 400  | 0.098             | 0.128 |
| 19 | 0.456             | 0.575 | 43 | 0.301             | 0.389 | 500  | 0.088             | 0.115 |
| 20 | 0.444             | 0.561 | 44 | 0.297             | 0.384 | 600  | 0.080             | 0.105 |
| 21 | 0.433             | 0.549 | 45 | 0.294             | 0.380 | 700  | 0.074             | 0.097 |
| 22 | 0.423             | 0.537 | 46 | 0.291             | 0.376 | 800  | 0.070             | 0.091 |
| 23 | 0.413             | 0.526 | 47 | 0.288             | 0.372 | 900  | 0.065             | 0.086 |
| 24 | 0.404             | 0.515 | 48 | 0.284             | 0.368 | 1000 | 0.062             | 0.081 |
| 25 | 0.396             | 0.505 | 49 | 0.281             | 0.364 |      |                   |       |
| 26 | 0.388             | 0.496 | 50 | 0.279             | 0.361 |      |                   |       |

## Appendix 8

## VALIDITY TEST

| Name    | Questions |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | Y    | Y2    |      |     |
|---------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|------|-----|
|         | Q1        | Q2    | Q3    | Q4    | Q5    | Q6    | Q7    | Q8    | Q9    | Q10   | Q11   | Q12   | Q13   | Q14   | Q15   | Q16   | Q17   | Q18   | Q19   | Q20   | Q21   | Q22   | Q23   | Q24   | Q25   | Q26   | Q27   | Q28   | Q29   | Q30   | Q31   | Q32   | Q33   | Q34   | Q35   | Q36   | Q37   | Q38   | Q39   | Q40   |      |       |      |     |
| S1      | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 38    | 1444 |       |      |     |
| S2      | 1         | 1     | 0     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 1     | 26   | 676   |      |     |
| S3      | 1         | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 1     | 0     | 0     | 1     | 1     | 1     | 27   | 729   |      |     |
| S4      | 1         | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 38    | 1444 |       |      |     |
| S5      | 1         | 0     | 0     | 0     | 1     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 9     | 81   |       |      |     |
| S6      | 1         | 0     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 7     | 49   |       |      |     |
| S7      | 1         | 1     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 13    | 169  |       |      |     |
| S8      | 1         | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 0     | 1     | 28   | 784   |      |     |
| S9      | 1         | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 28    | 784  |       |      |     |
| S10     | 1         | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 0     | 1     | 0     | 0     | 0     | 0     | 1     | 1     | 0     | 1     | 0     | 1     | 1     | 0     | 1     | 0     | 28   | 784   |      |     |
| S11     | 1         | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 0     | 0     | 0     | 1     | 1     | 0     | 1     | 0     | 1     | 1     | 26   | 676   |      |     |
| S12     | 1         | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 0     | 1     | 0     | 1     | 1     | 0     | 0     | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 1     | 0     | 0     | 1    | 24    | 576  |     |
| S13     | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 0     | 0     | 35   | 1225  |      |     |
| S14     | 1         | 0     | 1     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 1     | 1     | 1     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 12   | 144   |      |     |
| S15     | 1         | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 1     | 1     | 0     | 0     | 1     | 0     | 0     | 1     | 0     | 0     | 1    | 26    | 676  |     |
| S16     | 1         | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 1     | 1     | 1     | 1     | 1    | 32    | 1024 |     |
| S17     | 1         | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 7    | 49    |      |     |
| S18     | 1         | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 1     | 1     | 1     | 1     | 0     | 0    | 30    | 900  |     |
| S19     | 1         | 1     | 1     | 0     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 0     | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 0     | 0     | 0    | 24    | 576  |     |
| S20     | 1         | 1     | 0     | 0     | 0     | 1     | 0     | 0     | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 1     | 1     | 1     | 1     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 1     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 13   | 169   |      |     |
| S21     | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 0     | 1     | 1     | 1     | 0     | 1     | 0     | 1     | 0     | 0     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 0     | 1    | 32    | 1024 |     |
| S22     | 1         | 1     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 1     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 1     | 1     | 1     | 0     | 0     | 1     | 0     | 0    | 1     | 13   | 169 |
| S23     | 1         | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 7    | 49    |      |     |
| S24     | 1         | 0     | 0     | 1     | 0     | 1     | 1     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 1    | 17    | 289  |     |
| S25     | 1         | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 1     | 0    | 8     | 64   |     |
| S26     | 1         | 1     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 1     | 1     | 10   | 100   |      |     |
| S27     | 1         | 1     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 0     | 0     | 0     | 1     | 1     | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 0     | 0     | 1    | 13    | 169  |     |
| S28     | 1         | 1     | 1     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 1     | 0     | 0     | 1     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 1     | 1     | 1     | 1     | 0     | 1     | 0     | 17   | 289   |      |     |
| S29     | 1         | 0     | 1     | 0     | 1     | 1     | 0     | 0     | 1     | 1     | 0     | 1     | 0     | 0     | 0     | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 13   | 169   |      |     |
| S30     | 0         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 13   | 169   |      |     |
| S31     | 0         | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 0     | 1     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 1     | 0     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 26   | 676   |      |     |
| S32     | 0         | 1     | 1     | 0     | 1     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 0     | 1     | 1     | 0     | 1     | 1     | 0    | 15    | 225  |     |
| ΣX      | 29        | 25    | 20    | 7     | 22    | 29    | 21    | 17    | 21    | 15    | 18    | 18    | 19    | 22    | 13    | 23    | 23    | 19    | 20    | 11    | 15    | 17    | 19    | 15    | 11    | 17    | 7     | 17    | 11    | 10    | 9     | 16    | 13    | 11    | 11    | 14    | 12    | 11    | 12    | 15    | 614  | 16351 |      |     |
| (ΣX)2   | 841       | 625   | 400   | 49    | 484   | 841   | 441   | 289   | 441   | 225   | 324   | 324   | 361   | 484   | 169   | 529   | 529   | 361   | 400   | 121   | 225   | 289   | 361   | 225   | 121   | 289   | 49    | 289   | 121   | 100   | 81    | 256   | 169   | 121   | 121   | 196   | 144   | 121   | 144   | 225   |      |       |      |     |
| ΣXY     | 601       | 583   | 512   | 171   | 542   | 624   | 523   | 468   | 509   | 415   | 485   | 485   | 507   | 523   | 358   | 559   | 508   | 457   | 504   | 252   | 423   | 465   | 466   | 408   | 248   | 448   | 201   | 401   | 275   | 255   | 213   | 415   | 347   | 242   | 302   | 376   | 322   | 308   | 278   | 376   |      |       |      |     |
| r cal.  | 0.083     | 0.562 | 0.691 | 0.218 | 0.644 | 0.340 | 0.639 | 0.784 | 0.543 | 0.705 | 0.641 | 0.766 | 0.783 | 0.511 | 0.610 | 0.639 | 0.567 | 0.452 | 0.637 | 0.184 | 0.757 | 0.764 | 0.511 | 0.659 | 0.157 | 0.581 | 0.455 | 0.346 | 0.342 | 0.248 | 0.209 | 0.570 | 0.537 | 0.116 | 0.527 | 0.587 | 0.514 | 0.568 | 0.218 | 0.450 |      |       |      |     |
| r table | 0.349     | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 | 0.349 |       |      |       |      |     |
| Status  | UV        | V     | V     | UV    | V     | UV    | V     | V     | V     | V     | V     | V     | V     | V     | V     | V     | V     | V     | V     | UV    | V     | V     | V     | V     | UV    | V     | V     | UV    | UV    | UV    | UV    | V     | V     | UV    | V     | V     | V     | V     | V     | UV    | V    |       |      |     |

## Appendix 9

## RELIABILITY TEST

| Name   | Questions |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       | Y   | Y2   |
|--------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|------|
|        | Q5        | Q7    | Q8    | Q9    | Q11   | Q12   | Q13   | Q14   | Q15   | Q16   | Q17   | Q18   | Q21   | Q22   | Q23   | Q24   | Q26   | Q33   | Q35   | Q36   |     |      |
| S1     | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 19  | 361  |
| S2     | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 18  | 324  |
| S3     | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 0     | 1     | 0     | 16  | 256  |
| S4     | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 19  | 361  |
| S5     | 1         | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 5   | 25   |
| S6     | 1         | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1   | 1    |
| S7     | 0         | 0     | 1     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 8   | 64   |
| S8     | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 17  | 289  |
| S9     | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 0     | 0     | 17  | 289  |
| S10    | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 19  | 361  |
| S11    | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 1     | 0     | 13  | 169  |
| S12    | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 12  | 144  |
| S13    | 1         | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 18  | 324  |
| S14    | 0         | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 1     | 1     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 7   | 49   |
| S15    | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 0     | 1     | 17  | 289  |
| S16    | 1         | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 0     | 17  | 289  |
| S17    | 0         | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 3   | 9    |
| S18    | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 0     | 17  | 289  |
| S19    | 1         | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 0     | 16  | 256  |
| S20    | 0         | 0     | 0     | 1     | 0     | 1     | 0     | 0     | 0     | 1     | 1     | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 6   | 36   |
| S21    | 1         | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 1     | 1     | 1     | 1     | 0     | 1     | 17  | 289  |
| S22    | 0         | 0     | 0     | 0     | 0     | 1     | 1     | 1     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 5   | 25   |
| S23    | 0         | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 3   | 9    |
| S24    | 0         | 1     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 4   | 16   |
| S25    | 0         | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 3   | 9    |
| S26    | 0         | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 1     | 0     | 0     | 4   | 16   |
| S27    | 0         | 1     | 0     | 1     | 0     | 0     | 1     | 1     | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 6   | 36   |
| S28    | 1         | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 1     | 0     | 1     | 1     | 6   | 36   |
| S29    | 1         | 0     | 0     | 1     | 1     | 0     | 1     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 5   | 25   |
| S30    | 1         | 1     | 1     | 1     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 0     | 0     | 0     | 6   | 36   |
| S31    | 1         | 1     | 0     | 1     | 1     | 0     | 1     | 0     | 0     | 1     | 1     | 0     | 0     | 1     | 0     | 1     | 0     | 1     | 1     | 1     | 11  | 121  |
| S32    | 1         | 1     | 0     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 0     | 0     | 0     | 0     | 0     | 1     | 1     | 1     | 1     | 1     | 8   | 64   |
| ΣX     | 22        | 21    | 17    | 21    | 18    | 18    | 19    | 22    | 13    | 23    | 23    | 19    | 15    | 17    | 19    | 15    | 17    | 13    | 11    | 14    | 343 | 4867 |
| p      | 0.688     | 0.656 | 0.531 | 0.656 | 0.563 | 0.563 | 0.594 | 0.688 | 0.406 | 0.719 | 0.719 | 0.594 | 0.469 | 0.531 | 0.594 | 0.469 | 0.531 | 0.406 | 0.344 | 0.438 |     |      |
| q      | 0.313     | 0.344 | 0.469 | 0.344 | 0.438 | 0.438 | 0.406 | 0.313 | 0.594 | 0.281 | 0.281 | 0.406 | 0.531 | 0.469 | 0.406 | 0.531 | 0.469 | 0.594 | 0.656 | 0.563 |     |      |
| Σpq    | 4.700     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |     |      |
| S2     | 37.202    |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |     |      |
| r11    | 0.905     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |     |      |
| rable  | 0.349     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |     |      |
| Status | Reliable  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |     |      |





## Appendix 12

### THE SELF ASSESSMENT OF SPIRITUAL ATTITUDE

#### Student Identity

Name :  
Class :  
Address :

#### Hints

- Read the statements inside column with be careful.
- Give it sign check (✓) accordingly with condition and your daily circumstances.

| No  | Statement                                                                             | Score |   |   |   |
|-----|---------------------------------------------------------------------------------------|-------|---|---|---|
|     |                                                                                       | 1     | 2 | 3 | 4 |
| 1.  | I always pray before and after do something .                                         |       |   |   |   |
| 2 . | I always give regards on moment start and end presentation.                           |       |   |   |   |
| 3 . | I feel with studying salt hydrolysis add confidence against God the creator.          |       |   |   |   |
| 4 . | I feel with salt hydrolysis can learn add confidence will greatness God Almighty.     |       |   |   |   |
| 5 . | I could feel benefits learn redox reaction so could improve faith I against God .     |       |   |   |   |
| 6 . | I always say thank goodness each time successful complete and do something .          |       |   |   |   |
| 7 . | I always be grateful on favors and the gift of God .                                  |       |   |   |   |
| 8.  | I always run worship right time .                                                     |       |   |   |   |
| 9.  | I always respect others run worship corresponding with his religion.                  |       |   |   |   |
| 10. | I always surrendered self (tawakal) to God . After seek or do effort.                 |       |   |   |   |
| 11. | I attempted maintain relationship good with fellow followers creation God.            |       |   |   |   |
| 12. | I attempted keep environment live around home the place stay , school and community . |       |   |   |   |

#### Information :

- 4 : Always, if they always perform according to a statement.  
3 : Often, if appropriate statements frequently and sometimes not do it.  
2 : Sometimes, if sometimes do and often do not.  
1 : Never, if not ever do.

### Appendix 13

## Observation Sheet Spiritual Attitude

Petunjuk :

Lembar ini diisi oleh guru untuk menilai sikap spiritual peserta didik. Berilah tanda cek (√) pada kolom skor sesuai sikap spiritual yang ditampilkan sebagai berikut :

### Instrumen Penelitian

Nama Peserta Didik :

Kelas :

Tanggal Pengamatan :

| No. | Aspek Pengamatan                                                    | Skor |   |   |   |
|-----|---------------------------------------------------------------------|------|---|---|---|
|     |                                                                     | 1    | 2 | 3 | 4 |
| 1.  | Berdoa sebelum dan sesudah melakukan sesuatu.                       |      |   |   |   |
| 2.  | Mengucapkan rasa syukur atas karunia Allah SWT.                     |      |   |   |   |
| 3.  | Memberi salam sebelum dan sesudah menyampaikan pendapat/presentasi. |      |   |   |   |

### Rubrik Penilaian

| No. | Aspek Pengamatan                                                    | Penjabaran Skor                                                                                                                                                                                        |
|-----|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | Berdoa sebelum dan sesudah melakukan sesuatu.                       | Skor 1, Berdoa dengan tidak sungguh-sungguh.<br>Skor 2, Kadang-kadang berdoa dengan sungguh-sungguh.<br>Skor 3, Sering berdoa dengan sungguh-sungguh.<br>Skor 4, Selalu berdoa dengan sungguh-sungguh. |
| 2.  | Mengucapkan rasa syukur atas karunia Allah SWT.                     | Skor 1, Tidak pernah mengucap syukur.<br>Skor 2, Kadang-kadang mengucapkan syukur.<br>Skor 3, Sering mengucapkan syukur.<br>Skor 4, Selalu mengucapkan syukur                                          |
| 3.  | Memberi salam sebelum dan sesudah menyampaikan pendapat/presentasi. | Skor 1, Tidak pernah memberi salam.<br>Skor 2, Kadang-kadang memberi salam.<br>Skor 3, Sering memberi salam.<br>Skor 4, Selalu memberi salam.                                                          |

## Appendix 14

INSTRUMENT TEST  
(AFTER VALIDATION)

Mata Pelajaran : Kimia  
 Pokok Bahasan : Hidrolisis Garam  
 Kelas/Semester : XI IPA/II  
 Waktu : 90 Menit

Petunjuk soal :

4. Terlebih dahulu tuliskan nama pada lembar jawaban yang tersedia.
  5. Bacalah soal dengan teliti sebelum anda menjawab.
  6. Berilah tanda silang (x) pada salah satu jawaban yang anda anggap benar.
- 

Nama :

Kelas

13. Senyawa yang larutannya dalam air tidak mengalami hidrolisis adalah....
  - g.  $\text{NH}_4\text{Cl}$
  - h.  $\text{K}_2\text{SO}_4$
  - i.  $\text{CH}_3\text{COOK}$
  - d.  $(\text{NH}_4)_2\text{SO}_4$
  - e.  $\text{CH}_3\text{COONH}_4$
14. Ion berikut mengalami hidrolisis dalam air, kecuali....
  - g.  $\text{Na}^+$
  - h.  $\text{CN}^-$
  - i.  $\text{CO}_3^{2-}$
  - d.  $\text{Al}^{3+}$
  - e.  $\text{S}^{2-}$
15. Za-zat berikut ini jika dilarutkan dalam air akan mengalami hidrolisis, kecuali....
  - a. Amonium klorida
  - b. Natrium karbonat
  - c. Aluminium sulfide
  - d. Barium nitrat
  - e. Kalium asetat
16. Larutan  $\text{NH}_4\text{Cl}$  dalam air mempunyai  $\text{pH} < 7$ . Penjelasan mengenai hal ini adalah....
  - k.  $\text{Na}^+$  menerima proton dari air
  - l.  $\text{Cl}^-$  bereaksi dengan air membentuk  $\text{HCl}$
  - m.  $\text{NH}_4^+$  dapat memberi proton kepada air
  - n.  $\text{NH}_4\text{Cl}$  mudah larut dalam air
  - o.  $\text{NH}_3$  mempunyai tetapan kesetimbangan yang besar
17. Garam berikut yang larutannya bersifat asam adalah....

- g. KBr
- h.  $\text{NH}_4\text{Cl}$
- i.  $(\text{NH}_4)_2\text{CO}_3$
- d.  $\text{CH}_3\text{COOK}$
- e. NaCl

18. Diketahui garam-garam berikut :

- 1.  $\text{NH}_4\text{Cl}$
- 2.  $(\text{CH}_3\text{COOH})_2\text{Ca}$
- 3.  $\text{Ba}(\text{NO}_3)_2$
- 4.  $\text{FeCl}_3$
- 5.  $\text{Na}_2\text{CO}_3$

Pasangan garam yang larutannya dalam air dapat mengubah lakmus biru menjadi merah adalah....

- a. 2 dan 5
- b. 1 dan 4
- c. 3 dan 4
- d. 4 dan 5
- e. 2 dan 3

7. Garam berikut yang dapat mengalami hidrolisis dan  $\text{pH} < 7$  adalah....

- a.  $\text{CH}_3\text{COONa}$
- b.  $\text{KNO}_3$
- c.  $\text{NH}_4\text{Cl}$
- d.  $\text{NaNO}_3$
- e.  $\text{K}_2\text{S}$

8. Besar  $[\text{OH}^-]$  dalam larutan garam yang berasal dari asam lemah dan basa kuat....

- f. Berbanding lurus dengan  $K_a$ -nya
- g. Berbanding terbalik dengan  $K_a$ -nya
- h. Berbanding lurus dengan akar kuadrat  $K_a$ -nya
- i. Berbanding terbalik dengan akar kuadrat  $K_a$ -nya
- j. Berbanding terbalik dengan konsentrasi molar garamnya

9. Pencampuran asam basa yang menghasilkan garam terhidrolisis sebagian bersifat basa adalah campuran ekuivalen dari larutan....

- a. HCl dan NaOH
- b. HCl dan  $\text{NH}_3$
- c.  $\text{CH}_3\text{COOH}$  dan  $\text{NH}_3$
- d.  $\text{CH}_3\text{COOH}$  dan NaOH
- e.  $\text{H}_2\text{SO}_4$  dan  $\text{NH}_3$

10. Garam berikut yang memiliki  $\text{pH} > 7$  adalah....

- a.  $\text{NH}_4\text{CN}$
- b. NaCl
- c. KCl
- d. KCN
- e.  $\text{Fe}(\text{CN})_3$

11. Senyawa yang larutannya dalam air akan mengalami hidrolisis total adalah....

- a.  $\text{NH}_4\text{CN}$
- b.  $\text{CH}_3\text{COOK}$
- c.  $\text{K}_2\text{SO}_4$
- d.  $(\text{NH}_4)_2\text{SO}_4$
- e.  $\text{CH}_3\text{COONa}$

12. Dari garam berikut, yang mengalami hidrolisis total adalah....
- a.  $\text{NH}_4\text{Br}$
  - b.  $\text{K}_2\text{CO}_3$
  - c.  $\text{BaCO}_3$
  - d.  $\text{AlCl}_3$
  - e.  $\text{Al}_2(\text{CO}_3)_3$
13. Jika  $K_b \text{ NH}_4\text{OH} = 10^{-5}$  larutan  $\text{NH}_4\text{Cl}$  0,1 M mempunyai pH....
- a. 5
  - b. 6
  - c. 7
  - d. 8
  - e. 9
14. Dari larutan 0,2 M  $(\text{NH}_4)_2\text{SO}_4$  diketahui bahwa  $K_b = 10^{-5}$  pH larutan tersebut adalah....
- a.  $3 - \log 2$
  - b.  $3 - \log 5$
  - c.  $4 - \log 3$
  - d.  $4 - \log 5$
  - e.  $5 - \log 2$
15. Dilarutkan 0,98 gram NaCN sampai volume 125 mL. ( $K_a = 4 \times 10^{-10}$ , Ar Na = 23, C = 12, N = 14) pH larutan adalah....
- a.  $2 - \log 3$
  - b.  $3 - \log 2$
  - c.  $12 + \log 3$
  - d.  $11 - \log 2$
  - e.  $11 + \log 2$
16. Barium asetat  $\text{Ba}(\text{CH}_3\text{COO})_2$  seberat 2,55 gram dilarutkan ke dalam air sampai volumenya menjadi 500 mL. Bila  $K_a = 10^{-5}$ ; Ar Ba = 137, C = 12, O = 16, maka pH larutan adalah....
- a. 5
  - b.  $5,5 - \log 2$
  - c.  $8 + \log 2$
  - d.  $8,5 + \log 2$
  - e.  $9 + \log 2$
17. Garam berikut ini yang berasal dari asam lemah dan basa kuat dan bersifat basa adalah....
- a. Amonium asetat
  - b. Amonium klorida
  - c. Natrium asetat
  - d. Natrium klorida
  - e. Kalium klorida
18. Jika  $K_a \text{ HF} = 6,6 \times 10^{-4}$  dan  $K_b \text{ NH}_4\text{OH} = 1,8 \times 10^{-5}$ , maka pH 1 liter larutan  $\text{NH}_4\text{F}$  0,1 mol/Liter adalah....
- a. 5,22
  - b. 6,22
  - c. 7,22
  - d. 8,24
  - e. 9,24
19. Jika  $K_a \text{ HCN} = 6,2 \times 10^{-10}$  dan  $K_b \text{ NH}_4\text{OH} = 1,8 \times 10^{-5}$ , maka pH 1 Liter larutan  $\text{NH}_4\text{CN}$  0,1 mol/Liter adalah....

- a. 4,28                      d. 7,2  
b. 5,2                        e. 9,24  
c. 6,2

20. Hasil percobaan perubahan warna lakmus dalam larutan garam adalah sebagai berikut :

| No. | Larutan Garam      | Perubahan Warna |             |
|-----|--------------------|-----------------|-------------|
|     |                    | Lakmus Merah    | Lakmus Biru |
| 1.  | NH <sub>4</sub> CN | Biru            | Merah       |
| 2.  | NaCl               | Merah           | Biru        |
| 3.  | NH <sub>4</sub> Cl | Merah           | Merah       |
| 4.  | MgSO <sub>4</sub>  | Merah           | Merah       |
| 5.  | CaCO <sub>3</sub>  | Merah           | Biru        |

Berdasarkan data di atas, larutan garam yang bersifat asam kuat dan basa kuat adalah....

- a. 1 dan 2  
b. 1 dan 3  
c. 2 dan 4  
d. 3 dan 4  
e. 4 dan 5

*Appendix 15*KEY ANSWER  
(AFTER VALIDATION)

1. B
2. A
3. D
4. C
5. B
6. B
7. C
8. D
9. D
10. D

11. A
12. E
13. A
14. E
15. E
16. D
17. C
18. B
19. C
20. D



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|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                  |                |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------|
|                                             | <p>q. Cl<sup>-</sup> bereaksi dengan air membentuk HCl</p> <p>r. NH<sub>4</sub><sup>+</sup> dapat memberi proton kepada air</p> <p>s. NH<sub>4</sub>Cl mudah larut dalam air</p> <p>t. NH<sub>3</sub> mempunyai tetapan kesetimbangan yang besar</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                  |                |
| Analyze the properties of hydrolyzed salts. | <p><b>23.</b> Garam berikut yang larutannya bersifat asam adalah...</p> <div style="display: flex; justify-content: space-between;"> <span>j. KBr</span> <span>c. CH<sub>3</sub>COOK</span> </div> <div style="display: flex; justify-content: space-between;"> <span>k. NH<sub>4</sub>Cl</span> <span>d. NaCl</span> </div> <p>l. (NH<sub>4</sub>)<sub>2</sub>CO<sub>3</sub></p> <p><b>24.</b></p> <div style="display: flex; justify-content: space-between;"> <span>1. NH<sub>4</sub>Cl</span> <span>4. FeCl<sub>3</sub></span> </div> <div style="display: flex; justify-content: space-between;"> <span>2. (CH<sub>3</sub>COOH)<sub>2</sub>Ca</span> <span>5. Na<sub>2</sub>CO<sub>3</sub></span> </div> <p>3. Ba(NO<sub>3</sub>)<sub>2</sub></p> <p>Pasangan garam yang larutannya dalam air dapat mengubah lakmus biru menjadi merah adalah...</p> <div style="display: flex; justify-content: space-between;"> <span>a. 2 dan 5</span> <span>d. 4 dan 5</span> </div> <div style="display: flex; justify-content: space-between;"> <span>b. 1 dan 4</span> <span>e. 2 dan 3</span> </div> <p>c. 3 dan 4</p> <p><b>7.</b> Garam berikut yang dapat mengalami hidrolisis dan pH &lt; 7 adalah...</p> <div style="display: flex; justify-content: space-between;"> <span>a. CH<sub>3</sub>COONa</span> <span>d. NaNO<sub>3</sub></span> </div> | C2<br><br><br>C4 | B<br><br><br>B |
|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | C2               | C              |

|     | <p>b. <math>\text{KNO}_3</math><br/>c. <math>\text{NH}_4\text{Cl}</math></p> <p>8. Garam berikut ini yang berasal dari asam lemah dan basa kuat dan bersifat basa adalah...</p> <p>a. Amonium asetat<br/>b. Amonium klorida<br/>c. Natrium asetat</p> <p>10. Garam berikut yang memiliki <math>\text{pH} &gt; 7</math> adalah...</p> <p>a. <math>\text{NH}_4\text{CN}</math><br/>b. <math>\text{NaCl}</math><br/>c. <math>\text{KCl}</math></p> <p>33. Hasil percobaan perubahan warna lakmus dalam larutan garam adalah sebagai berikut :</p> <table border="1"> <thead> <tr> <th>No.</th><th>Larutan Garam</th><th colspan="2">Perubahan Warna</th></tr> <tr> <th></th><th></th><th>Lakmus Merah</th><th>Lakmus Biru</th></tr> </thead> <tbody> <tr> <td></td><td><math>\text{NH}_4\text{CN}</math></td><td>Biru</td><td>Merah</td></tr> <tr> <td></td><td><math>\text{NaCl}</math></td><td>Biru</td><td>Biru</td></tr> </tbody> </table> | No.             | Larutan Garam | Perubahan Warna |  |  |  | Lakmus Merah | Lakmus Biru |  | $\text{NH}_4\text{CN}$ | Biru | Merah |  | $\text{NaCl}$ | Biru | Biru | <p>C2</p> <p>C2</p> <p>C4</p> | <p>C</p> <p>D</p> <p>C</p> |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------|-----------------|--|--|--|--------------|-------------|--|------------------------|------|-------|--|---------------|------|------|-------------------------------|----------------------------|
| No. | Larutan Garam                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Perubahan Warna |               |                 |  |  |  |              |             |  |                        |      |       |  |               |      |      |                               |                            |
|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Lakmus Merah    | Lakmus Biru   |                 |  |  |  |              |             |  |                        |      |       |  |               |      |      |                               |                            |
|     | $\text{NH}_4\text{CN}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Biru            | Merah         |                 |  |  |  |              |             |  |                        |      |       |  |               |      |      |                               |                            |
|     | $\text{NaCl}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Biru            | Biru          |                 |  |  |  |              |             |  |                        |      |       |  |               |      |      |                               |                            |

|  |                        |       |       |
|--|------------------------|-------|-------|
|  | $\text{NH}_4\text{Cl}$ | Merah | Biru  |
|  | $\text{MgSO}_4$        | Merah | Merah |
|  | $\text{CaCO}_3$        | Merah | Biru  |

Berdasarkan data diatas, larutan garam yang bersifat asam kuat dan basa kuat adalah...

- a. 1 dan 2  
b. 1 dan 3  
c. 2 dan 4  
d. 3 dan 4  
e. 4 dan 5

34. Hasil percobaan perubahan warna lakmus dalam larutan garam adalah sebagai berikut :

| No. | Larutan Garam            | Perubahan Warna |             |
|-----|--------------------------|-----------------|-------------|
|     |                          | Lakmus Merah    | Lakmus Biru |
| 1.  | $\text{NH}_4\text{CN}$   | Biru            | Merah       |
| 2.  | $\text{Na}_2\text{PO}_4$ | Biru            | Biru        |
| 3.  | $\text{KCl}$             | Merah           | Biru        |
| 4.  | $\text{AlCl}_3$          | Merah           | Merah       |
| 5.  | $\text{NaNO}_3$          | Merah           | Biru        |

C4

E

- ### 35. Data percobaan

| No. | Jenis Larutan                                   | Kertas Lakmus (Warna) |             |
|-----|-------------------------------------------------|-----------------------|-------------|
|     |                                                 | Lakmus Merah          | Lakmus Biru |
| 1.  | NaCl                                            | Merah                 | Biru        |
| 2.  | NH <sub>4</sub> Cl                              | Merah                 | Merah       |
| 3.  | KCN                                             | Biru                  | Biru        |
| 4.  | CH <sub>3</sub> COONa                           | Biru                  | Biru        |
| 5.  | (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> | Merah                 | Merah       |

Larutan garam yang bersifat asam adalah...

- a. 1 dan 2  
b. 1 dan 3  
c. 3 dan 4  
d. 2 dan 5  
e. 4 dan 5

D

|                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                         |                                     |
|-----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------|
|                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                         |                                     |
| Determine the type of hydrolysis and hydrolysis reaction. | <p>9. Pencampuran asam basa yang menghasilkan garam terhidrolisis sebagian bersifat basa adalah campuran ekuivalen dari larutan...</p> <p>a. HCl dan NaOH                      d. CH<sub>3</sub>COOH dan NaOH</p> <p>b. HCl dan NH<sub>3</sub>                        e. H<sub>2</sub>SO<sub>4</sub> dan NH<sub>3</sub></p> <p>c. CH<sub>3</sub>COOH dan NH<sub>3</sub></p> <p>11. Senyawa yang larutannya dalam air akan mengalami hidrolisis total adalah...</p> <p>a. NH<sub>4</sub>CN                                d. (NH<sub>4</sub>)<sub>2</sub> SO<sub>4</sub></p> <p>b. CH<sub>3</sub>COOK                          e. CH<sub>3</sub>COONa</p> <p>c. K<sub>2</sub>SO<sub>4</sub></p> <p>12. Dari garam berikut, yang mengalami hidrolisis total adalah...</p> <p>a. NH<sub>4</sub>Br                                d. AlCl<sub>3</sub></p> <p>b. K<sub>2</sub>CO<sub>3</sub>                                e. Al<sub>2</sub>(CO<sub>3</sub>)<sub>3</sub></p> <p>c. BaCO<sub>3</sub></p> <p>36. Dibawah ini, garam yang jika diberi indicator fenoftalein (pp) akan berubah warna dari tak berwarna menjadi merah muda dalam larutannya adalah.....</p> <p>a. K<sub>2</sub>CO<sub>3</sub>                                d. CH<sub>3</sub>COOH</p> <p>b. H<sub>2</sub>SO<sub>4</sub>                                e. NaNO<sub>3</sub></p> <p>c. NH<sub>4</sub>Cl</p> | <p>C2</p> <p>C2</p> <p>C2</p> <p>C2</p> | <p>D</p> <p>A</p> <p>E</p> <p>A</p> |

|                                                                                                                                                                                                                                                                                                                                            |    |   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
| <p>37. Di bawah ini, larutan yang jika diberi indikator fenolftalein (pp) akan tetap bening menandakan larutan memiliki pH dibawah 7 adalah.....</p> <p>a. <math>K_2SO_4</math>                      d. <math>CH_3COOK</math><br/> b. <math>(NH_4)_2SO_4</math>                e. <math>KNO_3</math><br/> c. <math>(NH_4)_2CO_3</math></p> | C2 | B |
| <p>38. Larutan NaCN 0,1 M mempunyai pH 11, maka larutan tersebut terhidrolisis sebanyak.....</p> <p>a. 1%                                d. 50%<br/> b. 10%                              e. 100%<br/> c. 25%</p>                                                                                                                           | C3 | A |
| <p>39. Larutan <math>NH_4Cl</math> 0,1 M terhidrolisis 5%, pH larutan tersebut adalah.....</p> <p>a. 3                                    d. <math>4 - \log 5</math><br/> b. <math>3 - \log 5</math>                        e. <math>11 + \log 5</math><br/> c. 4</p>                                                                      | C3 | B |
| <p>40. Besar <math>[OH^-]</math> dalam larutan garam yang berasal dari asam lemah dan basa kuat..</p> <p>a. Berbanding lurus dengan <math>K_a</math>-nya<br/> b. Berbanding terbalik dengan <math>K_a</math>-nya<br/> c. Berbanding lurus dengan akar kuadrat <math>K_a</math>-nya</p>                                                     | C1 | B |

|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                               |                            |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------|
|                                                 | <p>d. Berbanding terbalik dengan akar kuadrat <math>K_a</math>-nya</p> <p>e. Berbanding terbalik dengan konsentrasi molar garamnya</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                               |                            |
| Calculate the pH of a hydrolyzed salt solution. | <p>13. Berapa pH larutan yang diperoleh dengan mencampurkan 50 mL <math>\text{HNO}_3</math> 0,2 dan 50 mL <math>\text{KOH}</math> 0,2 M?</p> <p>a. 2 d. 10</p> <p>b. 5 e. 13</p> <p>c. 7</p> <p>14. Pencampuran dua larutan berikut menghasilkan larutan dengan pH sama dengan 7 adalah...</p> <p>a. 100 mL <math>\text{H}_2\text{SO}_4</math> 0,1 M dan 100 mL <math>\text{Ca(OH)}_2</math> 0,1 M</p> <p>b. 100 mL <math>\text{H}_2\text{SO}_4</math> 0,1 M dan 100 mL <math>\text{Ca(OH)}_2</math> 0,2 M</p> <p>c. 100 mL <math>\text{H}_2\text{SO}_4</math> 0,1 M dan 100 mL <math>\text{Ca(OH)}_2</math> 0,3 M</p> <p>d. 100 mL <math>\text{H}_2\text{SO}_4</math> 0,2 M dan 100 mL <math>\text{Ca(OH)}_2</math> 0,1 M</p> <p>e. 100 mL <math>\text{H}_2\text{SO}_4</math> 0,4 M dan 100 mL <math>\text{Ca(OH)}_2</math> 0,3 M</p> <p>15. Jika <math>K_b \text{ NH}_4\text{OH} = 10^{-5}</math> larutan <math>\text{NH}_4\text{Cl}</math> 0,1 M mempunyai pH...</p> <p>a. 5 d. 8</p> <p>b. 6 e. 9</p> | <p>C3</p> <p>C3</p> <p>C3</p> | <p>C</p> <p>A</p> <p>A</p> |

|  |                                                                                                                                                                                                      |    |   |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
|  | c. 7                                                                                                                                                                                                 |    |   |
|  | 16. Dari larutan 0,2 M $(\text{NH}_4)_2\text{SO}$ diketahui bahwa $K_b = 10^{-5}$ pH larutan tersebut adalah...                                                                                      | C3 | E |
|  | a. 3-log 2<br>d. 4-log 5<br>b. 3- log 5<br>e. 5-log 2<br>c. 4- log 3                                                                                                                                 |    |   |
|  | 17. Sebanyak 20 mL larutan $\text{NH}_3$ 0,5 M dicampur dengan 80 ml larutan HCl 0,125 M. Jika diketahui bahwa $K_b \text{ NH}_3 = 10^{-5}$ maka pH campuran yang terjadi adalah...                  | C3 | B |
|  | a. 4<br>d. 9<br>b. 5<br>e.10<br>c. 6                                                                                                                                                                 |    |   |
|  | 18. Sebanyak 2,64 gram Kristal $(\text{NH}_4)_2\text{SO}_4$ dilarutkan dalam air, sehingga volumenya menjadi 1 liter. (Ar N = 14 dan S = 32), maka besarnya pH larutan adalah... ( $K_b = 10^{-5}$ ) | C3 | B |
|  | a. 5,5 + log 2<br>d. 8,5 + log 2<br>b. 5,5 – log 2<br>e. 9 + log√2<br>c. KCN                                                                                                                         |    |   |
|  | 19. Larutan zat berikut yang dalam air mempunyai pH paling besar,                                                                                                                                    |    |   |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |    |   |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
|  | <p>kecuali...</p> <p>a. <math>\text{CH}_3\text{COONa}</math>                      d. <math>\text{NaCl}</math></p> <p>b. <math>(\text{NH}_4)_2\text{SO}_4</math>                      e. <math>\text{CH}_3\text{COONH}_4</math></p> <p>c. <math>\text{KCN}</math></p>                                                                                                                                                                                                      | C2 | B |
|  | <p>20. Berapa gram <math>\text{NH}_4\text{Br}</math> harus dilarutkan dalam 500 mL larutan, untuk mendapatkan larutan dengan <math>\text{pH} = 5 - \log 2</math> (<math>K_b \text{ NH}_4\text{OH} = 1,8 \times 10^{-5}</math>)</p> <p>a. 31,36                                      d. 3,53</p> <p>b. 33,5                                        e. 5,33</p> <p>c. 53,3</p>                                                                                              | C3 | A |
|  | <p>21. Jika 5,35 gram <math>\text{NH}_4\text{Cl}</math> (<math>M_r = 53,5</math>) dilarutkan dalam air hingga volumenya menjadi 250 mL akan diperoleh larutan dengan <math>\text{pH}</math> (<math>K_b \text{ NH}_3 = 1 \times 10^{-5}</math>)...</p> <p>a. 5                                              d. <math>8 + \log 2</math></p> <p>b. <math>5 - \log 2</math>                                  e. <math>9 + \log 2</math></p> <p>c. <math>5 + \log 2</math></p> | C3 | B |
|  | <p>22. Larutan garam <math>\text{CH}_3\text{COONa}</math> 0,1 M memiliki <math>K_a = 10^{-5}</math>, maka <math>\text{pH}</math> larutan tersebut adalah...</p> <p>a. 3                                              d. 10</p> <p>b. 5                                              e. 9</p> <p>c. 13</p>                                                                                                                                                                 | C3 | E |

|                                                                                                                                                                                       |    |   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
| 23. Jika dua liter larutan natrium asetat ( $K_a = 10^{-5}$ ) mempunyai pH = 9, maka massa natrium asetat yang terdapat dalam larutan tersebut adalah... (Ar C = 12, O = 16, Na = 23) | C3 | B |
| a. 8,2<br>b. 16,4<br>c. 82<br>d. 164<br>e. 1,64                                                                                                                                       |    |   |
| 24. Dilarutkan 0,98 gram NaCN sampai volume 125 mL. ( $K_a = 4 \times 10^{-10}$ , Ar Na = 23, C = 12, N = 14) pH larutan adalah...                                                    | C3 | B |
| a. $2 - \log 3$<br>b. $3 - \log 2$<br>c. $12 + \log 3$<br>d. $11 - \log 2$<br>e. $11 + \log 2$                                                                                        |    |   |
| 25. Larutan $\text{CH}_3\text{COONa}$ ( $M_r = 82$ ) sebanyak 4,1 gram dilarutkan dalam air hingga volume larutan 500 mL, jika $k_a = 10^{-5}$ , maka pH larutan adalah...            | C3 | E |
| a. 5<br>b. 6<br>c. 7<br>d. 8<br>e. 9                                                                                                                                                  |    |   |
| 26. Jika diketahui $K_a \text{CH}_3\text{COOH} = 1 \times 10^{-5}$ , maka pH larutan $\text{Ca}(\text{CH}_3\text{COO})_2$ 0,1 M adalah...                                             | C3 | D |
| a. $5 + \log 2$<br>d. $9 + \log \sqrt{2}$                                                                                                                                             |    |   |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |   |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|
|  | <p>b. <math>3 + \log 2</math> e. <math>8 + \log 2</math></p> <p>c. <math>4 + \log 2</math></p> <p>27. Barium asetat <math>\text{Ba}(\text{CH}_3\text{COO})_2</math> seberat 2,55 gram dilarutkan ke dalam air sampai volumenya menjadi 500 mL. Bila <math>K_a = 10^{-5}</math>; Ar Ba = 137, C = 12, O = 16, maka pH larutan adalah...</p> <p>a. 5 d. <math>8,5 + \log 2</math></p> <p>b. <math>5,5 - \log 2</math> e. <math>9 + \log 2</math></p> <p>c. <math>8 + \log 2</math></p> <p>28. Ditimbang 1,34 gram LX dilarutkan sampai volume 100 mL. pH larutan 9 dan <math>K_a \text{HX} = 10^{-5}</math>. Mr zat X adalah...</p> <p>a. 268 d. 67</p> <p>b. 134 e. 60</p> <p>c. 90</p> <p>29. Jika <math>K_a \text{CH}_3\text{COOH} = 1,8 \times 10^{-5}</math> dan <math>K_b \text{NH}_4\text{OH} = 1,8 \times 10^{-5}</math>, maka pH 1 liter larutan ammonium asetat 0,1 mol/Liter adalah...</p> <p>a. 5 d. 8</p> <p>b. 6 e. 9</p> <p>c. 7</p> <p>30. Jika <math>K_a \text{HF} = 6,6 \times 10^{-4}</math> dan <math>K_b \text{NH}_4\text{OH} = 1,8 \times 10^{-5}</math>, maka pH 1 liter</p> |    |   |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | C3 | B |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | C3 | B |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | C3 | C |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | C3 | B |



**Appendix 17**

## TABULATION VALUE OF EXPERIMENT CLASS I

| No | Name                 | Pre-Test | Post-Test | Category | Spiritual Value Before | Spritual Value After |
|----|----------------------|----------|-----------|----------|------------------------|----------------------|
| 1  | Afrilia Nadita       | 35       | 100       | High     | 60                     | 94                   |
| 2  | Albila Rahajeng      | 25       | 95        | High     | 65                     | 88                   |
| 3  | Anna Syahfitri       | 20       | 100       | High     | 55                     | 94                   |
| 4  | Baihaqqi Imam        | 25       | 85        | High     | 70                     | 85                   |
| 5  | Chairani             | 20       | 90        | High     | 74                     | 81                   |
| 6  | Dina Arum            | 20       | 90        | High     | 67                     | 89                   |
| 7  | Donny Defrianto      | 25       | 70        | High     | 87                     | 97                   |
| 8  | Evi Erinda           | 15       | 85        | High     | 65                     | 75                   |
| 9  | Hijratul Fitria      | 20       | 95        | High     | 67                     | 90                   |
| 10 | Ilham Pangestu       | 30       | 95        | High     | 75                     | 95                   |
| 11 | Indah Permata Sari   | 20       | 80        | High     | 57                     | 83                   |
| 12 | Lahutri Dwi Kinanti  | 15       | 70        | High     | 55                     | 84                   |
| 13 | M. Akbar             | 20       | 95        | High     | 65                     | 93                   |
| 14 | M. Anshor Dermawan   | 15       | 95        | High     | 46                     | 98                   |
| 15 | M. Rasyid Nst        | 30       | 80        | Medium   | 67                     | 83                   |
| 16 | M. Rinaldi           | 35       | 80        | High     | 66                     | 84                   |
| 17 | M.Irza               | 15       | 95        | High     | 64                     | 93                   |
| 18 | Maulidina            | 25       | 90        | High     | 76                     | 90                   |
| 19 | Nuraida              | 15       | 70        | High     | 68                     | 92                   |
| 20 | Nurjannah Hrp        | 25       | 85        | High     | 78                     | 87                   |
| 21 | Nursyawal Herijensi  | 35       | 90        | High     | 85                     | 98                   |
| 22 | Pebrika Adha         | 15       | 90        | High     | 67                     | 92                   |
| 23 | Rendy Alfajar        | 30       | 85        | Medium   | 77                     | 76                   |
| 24 | Ridfanyka Alensi     | 35       | 75        | High     | 75                     | 75                   |
| 25 | Rifai Ahmad          | 30       | 90        | High     | 74                     | 87                   |
| 26 | Rizki Mahyuni Hsb    | 25       | 80        | High     | 56                     | 95                   |
| 27 | Wahyu Azhari         | 35       | 85        | High     | 65                     | 94                   |
| 28 | Yuliandini           | 25       | 90        | High     | 76                     | 93                   |
| 29 | Zeinandra Litundzira | 30       | 85        | High     | 78                     | 87                   |
| 30 | Zutiara              | 25       | 80        | High     | 77                     | 95                   |
| 31 | Adinda Rafitri       | 25       | 85        | High     | 67                     | 83                   |
| 32 | Agus Fitrianto       | 25       | 80        | High     | 63                     | 73                   |
| 33 | Anshori Purba        | 30       | 80        | High     | 58                     | 93                   |

|    |                     |    |    |      |    |    |
|----|---------------------|----|----|------|----|----|
| 34 | Ardi Tri Zahari Dlm | 35 | 80 | High | 67 | 84 |
|----|---------------------|----|----|------|----|----|

| <b>Appendix 18</b>                      |                         |          |           |          |
|-----------------------------------------|-------------------------|----------|-----------|----------|
| TABULATION VALUE OF EXPERIMENT CLASS II |                         |          |           |          |
| No                                      | Name                    | Pre-Test | Post-Test | Category |
| 1                                       | Adinda Rahayu           | 35       | 75        | Medium   |
| 2                                       | Arif Rinaldi Hsb        | 30       | 90        | High     |
| 3                                       | Dewi Hardinata          | 25       | 85        | High     |
| 4                                       | Dwi Fitriani            | 30       | 90        | High     |
| 5                                       | Eka Sri Lestari         | 25       | 70        | Medium   |
| 6                                       | Fatimah Qori Adelia     | 25       | 75        | Medium   |
| 7                                       | Febri Yansori Siregar   | 30       | 80        | High     |
| 8                                       | Fifi Regina Sari        | 25       | 80        | High     |
| 9                                       | Fitriany Sihombing      | 25       | 70        | High     |
| 10                                      | Hasnah Aulia            | 35       | 75        | Medium   |
| 11                                      | Jaka Andika             | 25       | 80        | High     |
| 12                                      | Khofifa Hsb             | 20       | 85        | High     |
| 13                                      | M. Aqsal Athala         | 20       | 90        | High     |
| 14                                      | M. Eral Ardofal         | 20       | 80        | High     |
| 15                                      | Maya Oktavia            | 35       | 75        | Medium   |
| 16                                      | Nazwa Meliati Hrp       | 40       | 85        | High     |
| 17                                      | Novira Dwi              | 20       | 75        | Medium   |
| 18                                      | Nurhalimah              | 30       | 85        | High     |
| 19                                      | Nursyahfitri Ritonga    | 30       | 80        | High     |
| 20                                      | Pd Multi Sari           | 30       | 85        | High     |
| 21                                      | Putri Anggi Handayani   | 40       | 90        | High     |
| 22                                      | Rio Tri Ananda          | 20       | 80        | High     |
| 23                                      | Riswanto Ridho          | 40       | 75        | Medium   |
| 24                                      | Rizky Wahyu Nugraha     | 35       | 80        | Medium   |
| 25                                      | Selly Afrilia           | 35       | 85        | High     |
| 26                                      | Shindy Novitasari       | 20       | 75        | Medium   |
| 27                                      | Suci lestari            | 35       | 95        | High     |
| 28                                      | Teslima Dewi            | 30       | 90        | High     |
| 29                                      | Yofi Septianda Sebayang | 35       | 95        | High     |
| 30                                      | Yulia Indriati Fadhila  | 30       | 85        | High     |
| 31                                      | Suryadi Putra           | 30       | 85        | High     |

|    |                   |    |    |        |
|----|-------------------|----|----|--------|
| 32 | Devi Mei Andriani | 40 | 95 | High   |
| 33 | Fany Lorenza      | 20 | 85 | High   |
| 34 | Seftiany          | 35 | 80 | Medium |



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## Appendix 19

### Normality Test for Sample Post-Test Data

Tests of Normality

| Class                     |                                                | Kolmogorov-Smirnov <sup>a</sup> |    |      | Shapiro-Wilk |    |      |
|---------------------------|------------------------------------------------|---------------------------------|----|------|--------------|----|------|
|                           |                                                | Statistic                       | df | Sig. | Statistic    | df | Sig. |
| Student Learning Outcomes | Post-Test Experiment Class I (Spiritual Value) | .135                            | 34 | .119 | .943         | 34 | .074 |
|                           | Post-Test Experiment Class II                  | .142                            | 34 | .081 | .940         | 34 | .063 |

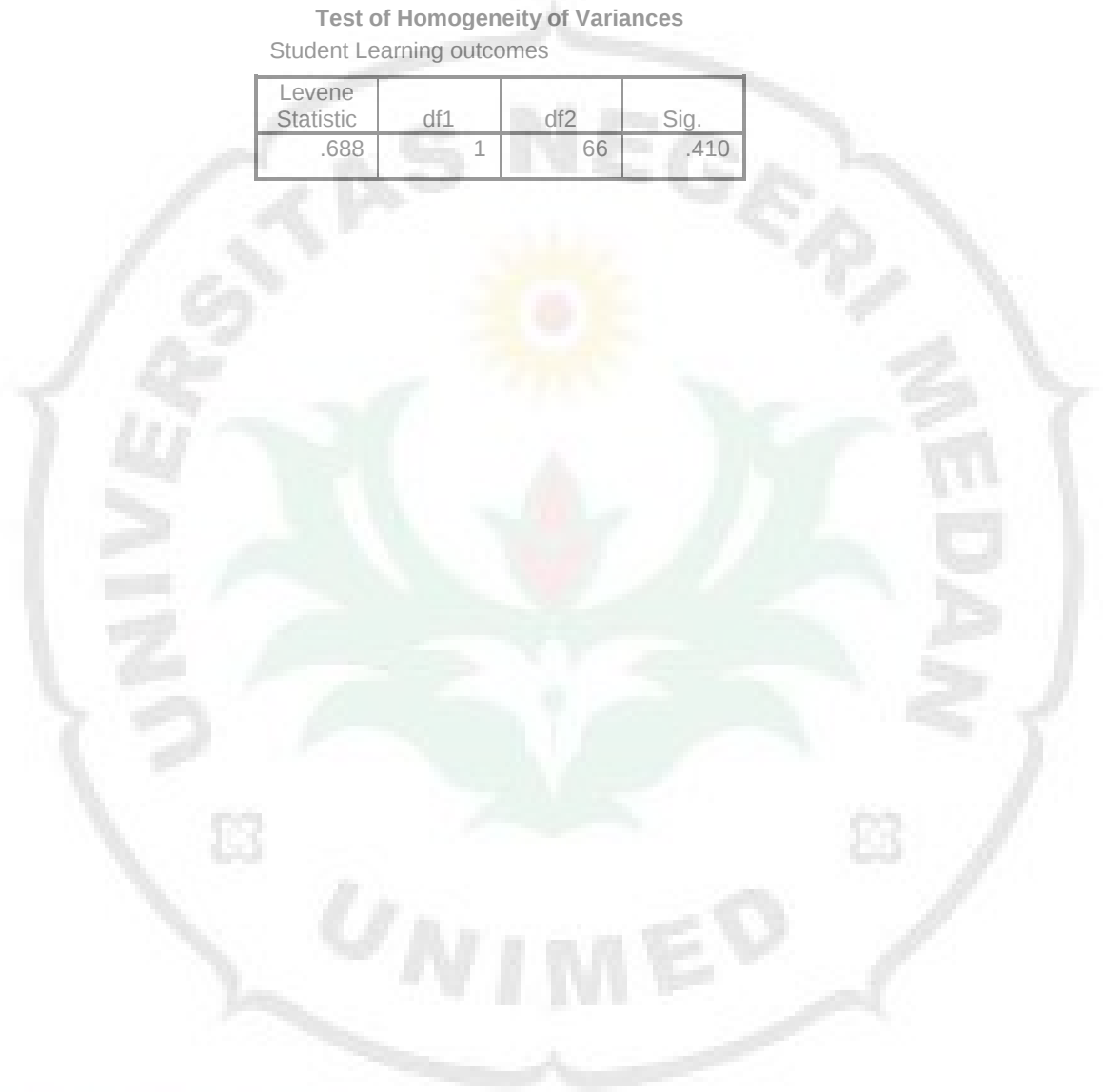
a. Lilliefors Significance Correction

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## Appendix 20

**Test of Homogeneity of Variances**  
Student Learning outcomes

| Levene Statistic | df1 | df2 | Sig. |
|------------------|-----|-----|------|
| .688             | 1   | 66  | .410 |



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### Appendix 21

Independent Samples Test

|                           |                             | Levene's Test for Equality of Variances |      | t-test for Equality of Means |        |                 |                 |                       |                                           |       |
|---------------------------|-----------------------------|-----------------------------------------|------|------------------------------|--------|-----------------|-----------------|-----------------------|-------------------------------------------|-------|
|                           |                             | F                                       | Sig. | t                            | df     | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference |       |
|                           |                             |                                         |      |                              |        |                 |                 |                       | Lower                                     | Upper |
| Student Learning outcomes | Equal variances assumed     | .798                                    | .375 | 2.827                        | 66     | .006            | 4.265           | 1.509                 | 1.253                                     | 7.277 |
|                           | Equal variances not assumed |                                         |      | 2.827                        | 65.384 | .006            | 4.265           | 1.509                 | 1.252                                     | 7.277 |

## Appendix 22

**Correlations**

|                        |                     | Spiritual Value | Post-Test Experiment I |
|------------------------|---------------------|-----------------|------------------------|
| Spiritual Value        | Pearson Correlation | 1               | .500**                 |
|                        | Sig. (2-tailed)     |                 | .003                   |
|                        | N                   | 34              | 34                     |
| Post-Test Experiment I | Pearson Correlation | .500**          | 1                      |
|                        | Sig. (2-tailed)     | .003            |                        |
|                        | N                   | 34              | 34                     |

\*\* Correlation is significant at the 0.01 level (2-tailed).

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*Appendix 23*



## Appendix 24



**KEMENTERIAN RISET, TEKNOLOGI, DAN PENDIDIKAN TINGGI**  
(STATE UNIVERSITY OF MEDAN)

**FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM**  
(FACULTY OF MATHEMATICS AND NATURAL SCIENCES)

**KELAS BILINGUAL / KELAS BERSTANDAR INTERNASIONAL**

Jln Willem Iskandar, Psr V Medan 20221. Telp. (061)6613319-6614002

Kepada Yth. Dr. Ayi Darmana, M.Si  
Dosen Kelas Bilingual Berstandar Internasional  
FMIPA UNIMED  
di  
Medan

Nomor: 088/BIL/LK/VII/2017

Dengan hormat, kami meminta kesediaan Saudara untuk menjadi dosen Pembimbing dalam penyusunan Skripsi atas nama mahasiswa:

Nama : Angie Budiarty  
NIM : 4143332002  
Program Studi : Chemistry Education

Sebagai salah satu persyaratan untuk memperoleh gelar sesuai dengan Program Studinya. Demikian kami sampaikan, atas kerjasama yang baik kami ucapkan terima kasih.



Mengetahui,  
Men. Dekan  
Wakil Dekan Bidang Akademik,

Prof. Dr. Herbert Sipahutar, M.Sc  
NIP. 19610626 198710 1 001

Medan, 22 Agustus 2017  
Koordinator Kelas Bilingual

Dr. Iis Siti Jahro, M.Si  
NIP. 19651015 199203 2 003

**SURAT PERSETUJUAN**

Mahasiswa yang namanya tersebut di bawah ini:

Nama : Angie Budiarty  
NIM : 4143332002  
Program Studi : Chemistry Education

Dapat saya setuju untuk dibimbing dalam penyusunan Skripsinya dalam rangka memenuhi salah satu persyaratan untuk memperoleh gelar sesuai dengan program studinya.

Medan, 22 Agustus 2017  
Dosen Pembimbing Skripsi

Dr. Ayi Darmana, M.Si  
NIP. 19660807 199010 1 001

Dibuat rangkap 4 (empat):

1. Kuning untuk Fakultas
2. Merah untuk Bilingual
3. Hijau untuk Dosen Pembimbing
4. Putih untuk Yang Bersangkutan

## Appendix 25

**SURAT PERNYATAAN**

Saya yang bertanda tangan dibawah ini :

Nama : Dr. Ajat Sudrajat, M. Si  
NIP : 196406251990031003  
Jabatan : Dosen Kimia  
Jurusan : Kimia

Telah menjadi validator instrument test untuk penelitian yang berjudul **"The Implementation of Chemistry Learning Material Integrated Spiritual Values with Discovery Learning Model for Senior High School Students"** dari mahasiswa :

Nama : Angie Budiarty  
NIM : 4143332003  
Jurusan : Chemistry  
Program studi : Chemistry Education Study Program  
Fakultas : MIPA

Demikianlah surat pernyataan ini saya perbuat dengan sebenar – benarnya, sekian dan terimakasih.

Medan, 03 April 2018  
Validator,



**Dr. Ajat Sudrajat, M. Si**  
**NIP. 196406251990031003**

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## Appendix 26



KEMENTERIAN RISET, TEKNOLOGI, DAN PENDIDIKAN TINGGI  
UNIVERSITAS NEGERI MEDAN  
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM  
Jl. Willem Iskandar Psr V – Kotak Pos No.1589 Medan 20221 Telp.(061) 6625970  
Laman : www.fmipa.unimed.ac.id

Nomor : 3954/UN33.4.1/LT/2018  
Lampiran : 1 (satu) eksemplar instrument validasi  
Perihal : Izin Validasi Instrument

Medan, 27 April 2018

Kepada Yth. : Sdr. Kepala SMA Negeri 3 Medan  
di  
Tempat

Dengan hormat, kami memohon bantuan Saudara agar dapat memberikan izin melaksanakan validasi instrument di instansi yang Saudara pimpin kepada mahasiswa kami tersebut di bawah ini :

Nama : Anggie Budiarty  
NIM : 4143332003  
Jurusan : Kimia  
Program Studi : S-1 Pendidikan Kimia Bilingual  
Dosen Pembimbing : Dr. Ayi Darmana, M.Si  
Judul Penelitian : The Implementation of Chemistry Learning Materi Integrated Spiritual Values With Discovery Learning Model For Senior High School Students.

Perlu diketahui bahwa kegiatan ini dilaksanakan untuk memperoleh keabsahan data dalam pelaksanaan kegiatan penelitian yang telah dilakukan guna memenuhi salah satu syarat memperoleh gelar Sarjana Pendidikan (S.Pd) di FMIPA Unimed.

Demikian kami sampaikan, atas perhatian dan kerja sama yang baik diucapkan terima kasih.

a.n. Dekan  
Wakil Dekan Bidang Akademik

Prof. Dr. Herbert Sipahutar, M.S., M.Sc  
NIP. 19610626198710 1 001

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## Appendix 27



**PEMERINTAH PROVINSI SUMATERA UTARA  
DINAS PENDIDIKAN  
SEKOLAH MENENGAH ATAS NEGERI 3 MEDAN**

Jl. Budi Kemasyarakatan No. 3 Kecamatan Medan Barat, Medan - 20116  
Telp. 061-6619128 e-mail : [info@smn3medan.net](mailto:info@smn3medan.net) – website : [www.sman3medan.net](http://www.sman3medan.net)

Medan, 26 Mei 2018

Nomor : 070/313 / SMAN.3 / 2018  
Lamp : --  
Hal : Izin Validasi Instrument

Kepada Yth :  
**Wakil Dekan Bidang Akademik  
FMIPA, UNIMED  
UNIMED**  
Di -

Tempat

Dengan hormat, berdasarkan Surat dari Wakil Dekan Bidang Akademik, Fakultas Matematika dan Ilmu Pengetahuan Alam Universitas Negeri Medan, Nomor : 3954/UN33.4.1/LT/2018, tanggal 27 April 2018, perihal : Izin Validasi Instrumen, Kepala SMA Negeri 3 Medan, Kecamatan Medan Barat Kota Medan, Propinsi Sumatera Utara dengan ini menerangkan bahwa Nama yang tersebut di bawah ini ;

Nama : **ANGGIE BUDIARTY**  
N I M : 4143332003  
Jurusan : Kimia  
Program Studi : Pendidikan Kimia Bilingual  
Judul Penelitian : *" The Implementation of Chemistry Learning Materi Integrated Spiritual Values with Discovery Learning Model for Senior High School Students. "*

Benar telah selesai melakukan Validasi Instrumen di Lingkungan SMA Negeri 3 Medan pada tanggal 14 April 2018.

Demikian Surat Keterangan Izin Penelitian ini diperbuat, agar dapat dipergunakan seperlunya.



Kepala SMA Negeri 3 Medan

**ELIYAHARA, S.Pd, M.Si**  
Pembina Tingkat I  
NIP. 19720312 199702 2 002

## Appendix 28



KEMENTERIAN RISET, TEKNOLOGI, DAN PENDIDIKAN TINGGI  
 UNIVERSITAS NEGERI MEDAN  
 FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM  
 Jl. Willem Iskandar Psr V – Kotak Pos No.1589 Medan 20221 Telp.(061) 6625970  
 Laman : www.fmipa.unimed.ac.id

Nomor : 3383/UN33.4.1/LT/2018 Medan, 13 April 2018  
 Lampiran : 1 (satu) berkas Proposal Penelitian  
 Perihal : Izin Melaksanakan Penelitian

Kepada Yth. : Sdr. Kepala SMA Negeri 1 Rantau Selatan  
 di  
 Tempat

Dengan hormat, kami memohon bantuan Saudara agar dapat memberikan izin melaksanakan penelitian di instansi yang Saudara pimpin kepada mahasiswa kami tersebut di bawah ini :

Nama : Anggie Budiarty  
 NIM : 4143332003  
 Jurusan : Kimia  
 Program Studi : S-1 Pendidikan Kimia Bilingual  
 Dosen Pembimbing : Dr. Ayi Darmana, M.Si  
 Judul Penelitian : The Implementation of Chemistry Learning Materi Integrated Spiritual Values With Discovery Learning Model For Senior High School Students.

Perlu diketahui bahwa kegiatan ini dilaksanakan untuk memperoleh data yang akan digunakan dalam penyusunan skripsi mahasiswa tersebut guna memenuhi salah satu syarat memperoleh gelar Sarjana Pendidikan (S.Pd) di FMIPA Unimed.

Demikian kami sampaikan, atas perhatian dan kerja sama yang baik diucapkan terima kasih.

a.n. Dekan  
 Wakil Dekan Bidang Akademik



Prof. Dr. Herbert Sipahutar, M.S., M.Sc  
 NIP. 19610626198710 1 001

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## Appendix 29



## PEMERINTAH PROVINSI SUMATERA UTARA DINAS PENDIDIKAN

Jalan Teuku Cik Ditiro No. 1-D Telepon (061) 4537828, Fax (061) 4537828

Website : <http://www.disdik.sumutprov.go.id>

M E D A N

Medan, 08 Mei 2018

Nomor : 071/4737/Subbag Umum/V/2018  
Sifat : Biasa  
Lampiran : -  
Hal : Izin Penelitian

Kepada Yth :  
Wakil Dekan Bidang Akademik  
FMIPA Universitas Negeri Medan  
Jl. Willem Iskandar Psr V  
Medan

Menindaklanjuti surat Wakil Dekan Bidang Akademik Fakultas Matematika dan Ilmu Pengetahuan Alam Universitas Negeri Medan Nomor : 3383/UN33.4.1/LT/2018 tanggal 13 April 2018 tentang Izin Penelitian, dengan ini kami sampaikan bahwa pada prinsipnya kami memberikan izin kepada Mahasiswa/i dibawah ini :

Nama : **ANGGIE BUDIARTY**  
NIM : 4143332003  
Jurusan : Kimia  
Program Studi : Pendidikan Kimia Bilingual  
Tujuan : SMA Negeri 1 Rantau Selatan  
Judul Penelitian : The Implementation of Chemistry Learning Materi Integrated Spiritual Values with Discovery Learning Model for Senior High Scholl Students.

Adapun ketentuan untuk melaksanakan penelitian dimaksud adalah sebagai berikut :

1. **Tidak mengganggu** proses belajar mengajar di sekolah;
2. **Tidak membebankan biaya apapun** kepada Sekolah dan Siswa;
3. Setelah selesai melaksanakan penelitian, diharapkan melaporkan hasil penelitian tersebut kepada Dinas Pendidikan Provinsi Sumatera Utara u.p Kepala Bidang Pembinaan Sekolah Menengah Atas.

Demikian disampaikan atas perhatian dan kerjasama yang baik diucapkan terima kasih.

a.n. KEPALA DINAS PENDIDIKAN  
PROVINSI SUMATERA UTARA  
Sekretaris

**Drs. H. RIFAI BAKRI TANJUNG, M.AP**  
PEMBINA UTAMA MUDA  
NIP. 196405041986021002

Tembusan :

1. Kepala Dinas Pendidikan Provinsi Sumatera Utara (sebagai laporan).
2. Kepala SMA Tujuan

## Appendix 30



# PEMERINTAH PROVINSI SUMATERA UTARA

## DINAS PENDIDIKAN

Jalan Teuku Cik Ditiro No. 1-D Telepon (061) 4537828, Fax (061) 4537828

Website : <http://www.disdik.sumutprov.go.id>

M E D A N

Medan, 08 Mei 2018

Nomor : 071/4737/Subbag Umum/V/2018  
 Sifat : Biasa  
 Lampiran : -  
 Hal : Izin Penelitian

Kepada Yth :  
 Wakil Dekan Bidang Akademik  
 FMIPA Universitas Negeri Medan  
 Jl. Willem Iskandar Psr V  
 Medan

Menindaklanjuti surat Wakil Dekan Bidang Akademik Fakultas Matematika dan Ilmu Pengetahuan Alam Universitas Negeri Medan Nomor : 3383/UN33.4.1/LT/2018 tanggal 13 April 2018 tentang Izin Penelitian, dengan ini kami sampaikan bahwa pada prinsipnya kami memberikan izin kepada Mahasiswa/i dibawah ini :

Nama : **ANGGIE BUDIARTY**  
 NIM : 4143332003  
 Jurusan : Kimia  
 Program Studi : Pendidikan Kimia Bilingual  
 Tujuan : SMA Negeri 1 Rantau Selatan  
 Judul Penelitian : The Implementation of Chemistry Learning Materi Integrated Spiritual Values with Discovery Learning Model for Senior High Scholl Students.

Adapun ketentuan untuk melaksanakan penelitian dimaksud adalah sebagai berikut :

1. **Tidak mengganggu** proses belajar mengajar di sekolah;
2. **Tidak membebankan biaya apapun** kepada Sekolah dan Siswa;
3. Setelah selesai melaksanakan penelitian, diharapkan melaporkan hasil penelitian tersebut kepada Dinas Pendidikan Provinsi Sumatera Utara u.p Kepala Bidang Pembinaan Sekolah Menengah Atas.

Demikian disampaikan atas perhatian dan kerjasama yang baik diucapkan terima kasih.

a.n. KEPALA DINAS PENDIDIKAN  
 PROVINSI SUMATERA UTARA  
 Sekretaris

**Drs. H. RIFAI BAKRI TANJUNG, M.AP**  
 PEMBINA UTAMA MUDA  
 NIP. 196405041986021002

Tembusan :

1. Kepala Dinas Pendidikan Provinsi Sumatera Utara (sebagai laporan).
2. Kepala SMA Tujuan



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