CHAPTER I
INTRODUCTION

1.1. Background

The aim of K-13 is to prepare Indonesian having ability to be a devout, productive, creative, innovative, and affective person who can contribute to the nation and the world. Learning process in K-13 is based on student-centered learning in order to master basic and core competence, so the students can understand the whole concept. In K-13 implementation, students are involved actively to discover knowledge and teachers become facilitator in learning process. Students gain their creativity through observing, questioning, experimenting, associating, and networking.

Learning process is getting better through curriculum development but learning condition is not supportable enough due the lack of learning strategy applied by teachers and application of teacher-centered learning that was so boring to the student. Some teacher didn't ask the student to learn by themselves in understanding chemistry concept through teacher guidance planned. In chemistry learning, students are demanded to be active in developing their competence through discovery, so they can understanding the concept more properly than just being by teaches.

Discovery learning is a learning model which aims to train students to discover concepts independently. Students play an active role in the learning process by answering a variety of questions or problems and solve the problem of finding a concept. In the guided discovery learning, the teacher presents examples, to guide you to discover patterns in these examples, and provide conclusions when students have been able to describe the idea that has been taught by a teacher (Jacobson, et.al.2009). Discovery based learning requires students to take examples from daily life, to propose hypotheses, test them like scientists, and meanwhile, to gain advanced level cognitive skills (Matthews, 2002).

Implement the lesson by discovery learning approach need special preparation, such as a teaching material. Merrienboer (1997) stated that teaching materials play an important role in learning, it refers to the function of teaching materials as 1) guidelines for teachers to direct all of its activities in the learning process, as well as a substance competencies that should be controlled by students, 2) guidelines for learners who will direct all activities in the teaching learning process as well as a substance of competence

which should be learned and mastered, 3) an evaluation tool of learning outcomes achievement/mastery. Moreover, Chappell and Craft (2009) who stated that student worksheet is part of the teaching materials that can be used to develop thinking skills, asking and answering questions, making connections and assessing the improvement in learning outcomes of students.

Worksheets are materials by which students are given transaction steps regarding what they are supposed to learn. Also, they include activities which give the students main responsibility in their own learning. Worksheets in the classroom would provide the versatility and one-on-one attention to problem solving needed in the classroom. Thus worksheets are known to help students gain scientific process skills such as setting up experimental mechanism, recording data, interpreting the data, and so on so that they can conceptualize the concepts in their minds.

There are several studies showing that worksheets increase student interest in the lesson and affect their success in a positive way (Kurt & Ayas, 2010). Student worksheet can help students understand the material and provide wide opportunity to demonstrate their knowledge and develop process skills (Karsli & Sahin, 2009). Student worksheet can improve the learning success and make students more active and efficient in learning (Trewet et al., 2013; Kibar et al., 2010; Beauchamp et al., 1998). Student worksheet can develop creative thinking skills (Susantini et al., 2016; Bakirci et al., 2011).

Tomlinson (2012) states that the teaching material and worksheets that can develop learning experiences of learners is a device that: is informative (inform the learning objectives), there is a learning strategy (for face to face learning and practice), formulate a clear learning experience, the motivation, the exploration to help learners perform a new discovery in the study. Moreover, Richard (2001) and Tomlinson (2012) state that ideal teaching materials and worksheets are the device that can provide information and learning experience and developed with good design and features.

In Astra (2015), who have research and develop the student worksheet based on discovery learning approach, the results of this worksheet is significantly about 75.08% of student assessment of this worksheet, where it can make this worksheet proper to use in school and also can be developed by another researcher. Unfortunately, in the commonly school there is no student worksheet supporting students to discover concepts by themselves because student worksheet used generally in schools only consist of problems, lack of discovering concept.

In chemistry subject there seems to be a mystique about it. Many Students do not recognize the chemistry in their everyday lives, many students consider chemistry to be a challenging and difficult subject beyond their capabilities and many students fail to recognize the value of chemistry in their future careers, even for those students who are majoring in a science and especially those who are not majoring in a science.

One might causes of high school students studying chemistry difficulties due to the most abstract chemical concepts. This resulted in the concept it becomes difficult concept for students that occurs continuously (Consistent) with certain sources that may lead to the student experience misconceptions. Characteristics of chemistry among others, is largely abstract chemical concepts, concepts of chemistry in general is simplification of the real situation and the concept of inter-related chemical and sequentially (Middlecamp & Kean, 1985).

Most chemistry built by abstract concepts such as emblem of elements and molecules, atomic theory and chemical bonding. One of the concepts required in studying the chemical is included in the concept stoichiometric it concept of the equation, this concept is a bridge to studied the entire concept of chemistry (Gabel, Samuel, & Hunn, 1987).

The chemical reaction is attention center of the chemistry, it can be stated that the chemical reaction is a process whereby new substances which is the reaction results, the original form of some substances, called reagents. Usually a chemical reaction is accompanied by physical events, such as discoloration, the formation of sedimentation, or the emergence of gas (Petrruci & Ralph, 1985).

Stoichiometric material is material taught in the first grade of high school. this material covers the equation is simple, the implementation of the conservation of mass equation, the law of Gay Lussac, Avogadro's law, and chemical calculations. Equation (chemical equation) using the chemical symbol for shows what happens when the reaction takes place. Substances that will do the reaction change the reactants written on the left side, and the substances that form of product, written on the right side of the arrow. Chemical equations must be equal and follow the law of conservation of mass. The number of atoms of each type of element in the reactants and the product must be the same (Chang, 2003).

Considering the fact that stoichiometric topic has some difficulties to comprehend, it is quite suitable to develop specific teaching-learning materials that could make them easier to understand. In this study we will make and use a learning

media which is student worksheet to make that problem stated before is solved, by combining with a discovery learning approach where it can increasing the student comprehends at the topic. This worksheet used to know how the properly and how the effectively of it's using in stoichiometry learning.

From the description set forth above, the authors intend to conduct research with the title: "DEVELOPMENT OF STUDENT WORKSHEET BASED ON DISCOVERY LEARNING APPROACH IN STOICHIOMETRY LEARNING AT SENIOR HIGH SCHOOL"

1.2. Problem Identification

From the background of the problems mentioned above, the identified problems as follows:

1. Learning process in K-13 is based on student-centered learning.
2. The chemistry topic of stoichiometry is categories as a difficult subject matter because there are so many concepts and laws in stoichiometry where it can make them difficult to understand.
3. The students need learning model that could develop their active attitude and the creativity in solving the problem.
4. Student worksheet used generally in schools only consists of problems, lack of discovering concept.

1.3. Problem Limitation

For that problems are examined in more focused study and depth, this study is limited to:

1. Learning Method

   The learning method used in this research is the discovery learning combined with the student worksheet as a media.
2. Subject of the study

   Subjects in this study were students of senior high school first grade at range second half year.
3. Topic

   Subject matter which is chosen in this study is stoichiometric, especially in mole concept and it calculation.

4. Assessment

   Assessment method used in this study includes cognitive aspect by using test.

1.4. Problem Formulation

Based on the background of the problem, problem statement and problem limitation, so the problem can be formulated as:

1. Is the student worksheet based on discovery learning approach proper to use in stoichiometry learning at senior high school?
2. How does the effectively of the using of student worksheet based on discovery learning approach to student achievement in stoichiometry learning at senior high school?

1.5. Research Objectives

Consistent with the formulation of the problem, the study aims to:

1. Make the proper student worksheet based on discovery learning approach in stoichiometry learning at senior high school.
2. To perform the effectiveness of student worksheet based on discovery learning approach to the student achievement in stoichiometry learning at senior high school.

1.6. Research Benefits

The result is expected to provide benefits as following:

1. Students: Helping the students understanding the subject matter stoichiometry also make them more developing of their creativity and active in learning.
2. Teacher: Donations for teachers to help improve the quality of education through the selection of instructional methods in the learning process by using the student worksheet.
3. Schools: As an insert for schools in developing the guidance of learning and a good instructional media in teaching and learning activities in other subjects.
4. Researchers: To conducting advanced research which has done on this research and developed it also as a repertoire of knowledge for readers and other reference material.

1.7.Operational Definition

1. Student Worksheet is the sheet that contains guidelines for students to engage in activities that programmed. Each worksheet contains among others: a brief description of the material, destination activities, tools / materials needed in activities, work step questions - questions to discuss, the conclusion of the discussion, and retraining (Dhari, 1988).
2. Discovery Learning Approach is a method that encourages students to arrive at a conclusion based upon their own activities and observations. Discovery based learning requires students to take examples from daily life, to propose hypotheses, test them like scientists, and meanwhile, to gain advanced level cognitive skills (Matthews, 2002).
3. Stoichiometry Learning is process that conducting stoichiometry topic at teaching and learning process in school while most of the stoichiometry concept is built from basic laws of chemistry and mole concept also its calculations.