

## ABSTRAK

HIRANDA WILDAYANI. **Pengembangan Media Pembelajaran Berbasis Kimia Komputasi Pada Pokok Bahasan Isomer Mata Kuliah Reaksi Kimia Organik.** Tesis, Medan: Program Studi Pendidikan Kimia, Pascasarjana Universitas Negeri Medan, 2021.

Pengembangan media pembelajaran berbasis kimia komputasi perlu dilakukan sesuai dengan perkembangan teknologi. Penelitian ini bertujuan untuk (1) mengetahui hasil analisis kebutuhan dan analisis bahan ajar, (2) Mengetahui kelayakan media pembelajaran berbasis kimia komputasi berdasarkan BSNP, (3) Mengetahui adanya peningkatan hasil belajar mahasiswa yang diajarkan berbasis kimia komputasi, serta (4) Mengetahui persepsi mahasiswa terhadap media pembelajaran berbasis kimia komputasi. Jenis penelitian ini adalah penelitian pengembangan yang meliputi: tahap (1) Analisis kebutuhan meliputi analisis kurikulum dan analisis bahan ajar, tahap (2) Pengembangan media pembelajaran berbasis kimia komputasi memodelkan senyawa isomer menggunakan perangkat lunak *Avogadro* versi 1.1.1, perhitungan komputasi menggunakan perangkat lunak *NWChem* versi 6.6 dengan metode DFT dengan fungsi hibrid B3LYP/basis set 6-31G(d), hasil perhitungan divisualisasikan menggunakan perangkat lunak *Jmol*. (3) Standarisasi media pembelajaran berbasis kimia komputasi sesuai BSNP dan kelayakan media pembelajaran berbasis kimia komputasi oleh validator ahli materi dan ahli media, tahap (4) Implementasi pada mahasiswa Prodi Pendidikan Kimia, FMIPA Unimed dan (5) Evaluasi seluruh kegiatan meliputi analisis data instrumen standarisasi media pembelajaran, instrumen tes, pretest, posttest dan angket persepsi mahasiswa. Populasi dalam penelitian ini yaitu mahasiswa Prodi Pendidikan Kimia UNIMED angkatan 2020 yang mengikuti matakuliah reaksi kimia organik berjumlah 31 orang. Instrumen penelitian berupa lembar penilaian BSNP, soal tes objektif yang telah valid dan angket persepsi mahasiswa. Hasil penelitian menunjukkan : 1) Kelayakan analisis kebutuhan dan analisis bahan ajar pada pembelajaran isomer mengintegrasikan kurikulum KKNI, 2) Kelayakan media pembelajaran berbasis kimia komputasi berdasarkan BSNP yang dilakukan oleh validator ahli diperoleh kelayakan isi rata-rata nilai 3,7 (sangat layak); kelayakan bahasa rata-rata nilai 3,9 (sangat layak); dan kelayakan penyajian rata-rata nilai 3,8 (sangat layak) dengan kategori dari semua kelayakan adalah layak dan tidak perlu revisi, 3) Peningkatan hasil belajar mahasiswa yang diajarkan dengan media pembelajaran berbasis kimia komputasi sebesar 0,72 (kategori tinggi), dan 4) Persepsi mahasiswa terhadap media pembelajaran berbasis kimia komputasi dikategorikan baik sekali dengan rata-rata 86%.

**Kata Kunci :** *NWChem, kimia komputasi, isomer, hasil belajar.*

## ABSTRACT

HIRANDA WILDAYANI. **Development of Computational Chemistry-Based Learning Media on Isomers Subject of Organic Chemical Reaction Course.** Thesis, Medan: Chemistry Education Study Program, Postgraduate Medan State University, 2021.

The development of computational chemistry-based learning media needs to be carried out in accordance with technological developments. This study aims to (1) determine the results of needs analysis and analysis of teaching materials, (2) determine the feasibility of computational chemistry-based learning media based on BSNP, (3) find out the increase in student learning outcomes taught based on computational chemistry, and (4) determine perceptions of students towards computational chemistry-based learning media. This type of research is development research which includes: stage (1) needs analysis includes curriculum analysis and analysis of teaching materials, stage (2) development of computational chemistry-based learning media modeling isomeric compounds using *Avogadro* software version 1.1.1, computational calculations using software *NWChem* version 6.6 using the DFT method with the B3LYP hybrid function/basis set 6-31G(d), the calculation results are visualized using *Jmol* software. (3) Standardization of computational chemistry-based learning media according to BSNP and feasibility of computational chemistry-based learning media by material expert validators and media experts, stage (4) Implementation for students of Chemistry Education Study Program, FMIPA Unimed and (5) Evaluation of all activities including instrument data analysis standardization of learning media, test instruments, pretest, posttest and student perception questionnaires. The population in this study were 31 students of UNIMED Chemistry Education Study Program who took the organic chemical reaction course. The research instrument was in the form of a BSNP assessment sheet, valid objective test questions and a student perception questionnaire. The results showed: 1) Feasibility of needs analysis and analysis of teaching materials in isomeric learning integrating the IQF curriculum, 2) Feasibility of computational chemistry-based learning media based on BSNP conducted by expert validators, obtained an average content feasibility of 3.7 (very feasible); language eligibility with an average score of 3.9 (very decent); and the feasibility of presenting an average value of 3.8 (very feasible) with the category of all eligibility is feasible and does not need revision, 3) Improved student learning outcomes taught with computational chemistry-based learning media by 0.72 (high category), and 4) Students' perceptions of computational chemistry-based learning media are categorized as very good with an average of 86%.

**Keywords:** *NWChem, computational chemistry, isomers, learning outcomes.*