# STUDI KONSEPSI, *TROUBLESOME KNOWLEDGE*, DAN *THRESHOLD CONCEPT* PADA KONSEP FAKTOR-FAKTOR YANG MEMPENGARUHI LAJU REAKSI BERDASARKAN TES DIAGNOSTIK MODEL MENTAL *INTERVIEW ABOUT EVENT* (TDM-IAE)

**TESIS**

diajukan untuk memenuhi sebagian syarat untuk memperoleh gelar Magister Pendidikan Kimia


oleh

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**PROGRAM STUDI PENDIDIKAN KIMIA**

**FAKULTAS PENDIDIKAN MATEMATIKA DAN ILMU PENGETAHUAN ALAM**

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Sebuah tesis yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Magister Pendidikan Program Studi Pendidikan Kimia Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam


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**ABSTRAK**

Penelitian ini bertujuan untuk memperoleh konsepsi siswa, *troublesome knowledge*, dan *threshold concept* pada konsep faktor-faktor yang mempengaruhi laju reaksi. Metode penelitian yang digunakan adalah penelitian kualitatif dengan desain penelitian studi kasus. Instrumen yang digunakan yaitu tes diagnostik model mental *Interview About Event* (TDM-IAE). Responden penelitian ini sebanyak 21 yang terdiri dari 7 siswa kelas XI, 7 siswa kelas XII, dan 7 mahasiswa tingkat pertama. Hasil penelitian ini menunjukkan bahwa tipe model mental pada konsep pengaruh konsentrasi dan luas permukaan yaitu *complete mental model* dan *partial mental model.* Pada konsep pengaruh struktur, siswa memiliki tipe *partially mental model* dan *inconsistent mental model.* Pada konsep pengaruh energi ionisasi *complete mental model* dan *mental model with misconception.* Pada pengaruh suhu model mental tipe *complete mental model*, *partial mental model*, *mental model with misconception*. Pada konsep katalis tipe *partial mental model* dan *mental model with misconception*. Konsepsi siswa terbagi atas konsepsi yang benar, konsepsi salah atau miskonsepsi, dan konsepsi inkonsisten. Konsepsi yang benar terdiri dari semakin besar konsentrasi reaktan maka jumlah molekul reaktan semakin banyak dan kerapaatan antar molekul semakin besar sehingga frekuensi tumbukan semakin besar. Semakin tinggi suhu maka energi kinetik partikel semakin tinggi. Penambahan katalis dalam reaksi kimia dapat memberikan mekanisme reaksi baru dengan energi aktivasi lebih rendah. Semakin besar frekuensi tumbukan maka semakin banyak tumbukan efektif. Semakin besar peluang terjadinya tumbukan efektif maka laju reaksi akan berlangsung lebih cepat. Miskonsepsi terdiri dari pada suhu yang lebih tinggi, energi aktivasi tinggi. Reaksi dengan katalis dapat meningkatkan energi aktivasi dan energi kinetik. Katalis tidak terlibat dalam reaksi dan tidak dihasilkan kembali di akhir reaksi. Semakin tinggi suhu maka semakin rendah energi aktivasinya. Tumbukan yang lebih sering akan menghasilkan tumbukan efektif yang lebih sering, sehingga dihasilkan energi aktif yang lebih banyak. Semakin besar energi ionisasi maka semakin banyak elektron dan ion dikeluarkan sehingga tumbukannya lebih banyak serta dalam satu golongan, dari atas ke bawah energi ionisasinya semakin besar. Katalis heterogen adalah katalis yang berfasa liquid dan solid sedangkan katalis homogen yaitu katalis yang berfasa liquid dan liquid. Konsepsi yang inkonsisten yaitu menggambar struktur molekul posfor merah. *Troublesome knowledge* terdiri dari teori tumbukan, energi aktivasi, energi kinetik, dan struktur molekul. *Threshold concept* terdiri dari teori tumbukan, energi aktivasi, dan energi kinetik.

Kata Kunci: Konsepsi, *threshold concept*, *troublesome knowledge*, TDM-IAE, faktor-faktor yang mempengaruhi laju reaksi

## ABSTRACT

This study aims to obtain students' conceptions, troublesome knowledge, and threshold concepts on the concepts of factors that affect reaction rates. The research method used is qualitative research with a case study research design. The instrument used is a diagnostic test of the Interview About Event (TDM-IAE) mental model. The respondents of this study were 21 consisting of 7 students of class XI, 7 students of class XII, and 7 first year students. The results of this study indicate that the types of mental models on the concept of the influence of concentration and surface area are complete mental models and partial mental models. In the concept of structural influence, students have a partially mental model and an inconsistent mental model. On the concept of the influence of ionization energy, complete mental models and mental models with misconceptions. On the effect of temperature, mental models are complete mental models, partial mental models, mental models with misconceptions. In the concept of catalyst type partial mental model and mental model with misconceptions. Students' conceptions are correct conceptions, wrong conceptions or misconceptions, and inconsistent conceptions. The correct conception consists in that the greater the concentration of reactants, the greater the number of reactant molecules and the greater the density between molecules, so the collision frequency is greater. The higher the temperature, the higher the kinetic energy of the particles. The addition of a catalyst in a chemical reaction can provide a new reaction mechanism with a lower activation energy. The greater the frequency of collisions, the more effective collisions. The greater the chance of an effective collision, the faster the reaction rate will take place. The misconception consists in at higher temperatures, higher activation energies. Reaction with a catalyst can increase the activation energy and kinetic energy. The catalyst is not involved in the reaction and is not regenerated at the end of the reaction. The higher the temperature, the lower the activation energy. The more collisions, the more effective collisions, so that more active energy is produced. The greater the ionization energy, the more electrons and ions are released so that there are more collisions and in one group, from top to bottom the ionization energy is greater. Heterogeneous catalysts are catalysts that are in liquid and solid phases, while homogeneous catalysts are catalysts that are in liquid and liquid phases. The inconsistent conception is to draw the molecular structure of red phosphorus. Troublesome knowledge consists of collision theory, activation energy, kinetic energy, and molecular structure. Threshold concept consists of collision theory, activation energy, and kinetic energy.



Keywords: conception, threshold concept, troublesome knowledge, TDM-IAE, factors that affect reaction rate

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