

**ANALYZING THE CHEMISTRY MISCONCEPTIONS OF MIDDLE-
SCHOOL STUDENTS RELATED TO ACIDS AND BASES USING A
FOUR-TIER DIAGNOSTIC TEST**

RESEARCH PAPER

Submitted as Requirement to Obtain Degree of *Sarjana Pendidikan* in
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Analyzing the Chemistry Misconceptions of Middle School Students Related to Acids and Bases Using a Four-Tier Diagnostic Test

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Sebuah skripsi yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Sarjana Pendidikan pada Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam

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DECLARATION

I do hereby declare that every aspect was written in this research paper entitled “**Analyzing the Chemistry Misconceptions of Middle-School Students Related to Acids and Bases Using a Four-Tier Diagnostic Test**” is the original result of my idea, efforts, and works without copying or plagiarizing from other papers. The theories, opinions, and others that are contained in this paper have been quoted or referenced based on scientific code from UPI and under scientific ethics that applies in scholarly society. This declaration is created truthfully and mindfully. Unless it eventually considered to be a violation of scientific ethics, or whether there is a statement by the other to the authenticity of this research paper. I can accept the authorization of scholars or copyright that are found. Hence, I am willing to take responsibility and accept academic sanctions corresponds to the rules.

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ANALYZING THE CHEMISTRY MISCONCEPTIONS OF MIDDLE-SCHOOL STUDENTS RELATED TO ACIDS AND BASES USING A FOUR-TIER DIAGNOSTIC TEST

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ABSTRACT

Students' conception has a crucial role in the learning process as it allows teachers to assess student comprehension and prevent misconceptions. One example science topic that students' have trouble in learning is chemistry such as acids and bases. Misconceptions occur when students hold alternative explanations or ideas that do not align with established scientific knowledge. The researchers focused on the topic of acids and bases properties are an important topic in middle school, yet there are many recurring misconceptions about it. To identify and address such misconceptions, the four-tier diagnostic test was developed as an improvement over the three-tier test. Instrument administered to 121 7th-grade students (51 male and 70 female). Data analysis was conducted using Excel to calculate percentages and frequencies. The findings revealed that, overall, students had more misconceptions (33.4%) than conceptions identified as scientific knowledge (19.9%), false positive (16.2%), false negative (15.9%), and lack of knowledge (14.7%). Their strongest performance was in understanding the characteristics of acids and bases, while they struggled the most with identifying acid and base solutions also determination scale acidity and alkalinity. The main causes of these misconceptions were identified as unfronted misconceptions and unfamiliarity. As a result, the study highlights the importance for teachers to address common misconceptions in the classroom, by use the suitable teaching strategies for the students' conception.

Keywords: Acid and Base, Four-Tier Diagnostic Test, Misconception

**MENGANALISIS MISKONSEPSI KIMIA SISWA SEKOLAH
MENENGAH TERKAIT DENGAN ASAM DAN BASA MENGGUNAKAN
TES DIAGNOSTIK EMPAT TINGKAT**

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ABSTRAK

Konsepsi siswa mempunyai peranan penting dalam proses pembelajaran karena memungkinkan guru menilai pemahaman siswa dan mencegah terjadinya miskonsepsi. Salah satu contoh topik sains yang sulit dipelajari siswa adalah kimia seperti asam dan basa. Miskonsepsi terjadi ketika siswa mempunyai penjelasan atau gagasan alternatif yang tidak sejalan dengan pengetahuan ilmiah yang sudah ada. Para peneliti fokus pada topik sifat asam dan basa yang merupakan topik penting di sekolah menengah, namun masih banyak kesalahpahaman yang berulang mengenai hal tersebut. Untuk mengidentifikasi dan mengatasi kesalahpahaman tersebut, tes diagnostik empat tingkat dikembangkan sebagai penyempurnaan dari tes tiga tingkat. Instrumen diberikan kepada 121 siswa kelas 7 (51 laki-laki dan 70 perempuan). Analisis data dilakukan menggunakan Excel untuk menghitung persentase dan frekuensi. Temuan menunjukkan bahwa, secara keseluruhan, siswa memiliki lebih banyak miskonsepsi (33,4%) dibandingkan konsepsi yang diidentifikasi sebagai pengetahuan ilmiah (19,9%), positif palsu (16,2%), negatif palsu (15,9%), dan kurang pengetahuan (14,7%). Konsep siswa terkuat mereka adalah dalam memahami karakteristik asam dan basa, sementara mereka paling kesulitan dalam mengidentifikasi larutan asam dan basa dan skala penentuan asam dan basa. Penyebab utama dari miskonsepsi ini diidentifikasi sebagai miskonsepsi yang tidak dikonfrontasi dan ketidaktahuan. Hasilnya, penelitian ini menyoroti pentingnya bagi guru untuk mengatasi kesalahpahaman umum di kelas dengan menggunakan metode mengajar yang sesuai dengan konsepsi para siswa.

Kata Kunci: Asam dan Basa, Miskonsepsi, Tes 4 Tingkat

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