

UNDERSTANDING STUDENTS' CONCEPT OF SALT HYDROLYSIS MATERIAL AT THREE LEVELS OF CHEMICAL REPRESENTATION AT SENIOR HIGH SCHOOL (SMAN) 2 PADANG PANJANG, WEST SUMATERA

Delpima Suhita¹

¹Mechanical Engineering Department, Faculty of Engineering, Krisnadwipayana University, Indonesia
Correspondence : sdelpima@gmail.com

ABSTRACT

The low understanding of students at SMAN 2 Padang Panjang about salt hydrolysis. This phenomenon affects their learning outcomes which can be seen in the incomplete KKM scores. They should be able to clearly explain the hydrolysis of salts in three levels of chemical representation which include the macroscopic level, the submicroscopic level and the symbolic level. To overcome this, it is necessary to conduct an analysis in order to know the disclosure of students' competence about the material. This study aims to analyze students' conceptions of salt formed from a strong acid and a strong base, a weak acid and a strong base, a strong acid and a weak base and the pH formed. This is a descriptive research. The data collection technique is by using tests. Open-ended questions were used in this study, which consisted of eight questions. Each question consists of three parts, namely the macroscopic level, the submicroscopic level, and the symbolic level. Students' answers from the test were classified into five categories: complete conception, incomplete conception, alternative conception, no conception and no response. The analysis shows that the percentage of students' understanding of the complete concept category at the submicroscopic level is the lowest. However, students' understanding at the macroscopic and symbolic levels is better than at the submicroscopic level.

Keywords: Hydrolysis, Salt, Chemical Representation Level, Students

INTRODUCTION

Currently, technological developments (Azis, Pribadi, and Nurcahya 2020) are growing rapidly. Chemistry is a branch of natural science (IPA) which has a parallel role with other science branches, such as physics, biology, geology, and astronomy (Subagia 2014). Based on this understanding, the study materials for chemistry include the properties of substances (Pancer et al. 2019) including the structure of substances, changes in substances (chemical reactions), the energy involved, laws, principles and theories. The main purpose of learning science is to help students understand natural phenomena, scientific principles and theories to describe them. Chemistry is an important branch of science, the science of studying the structure of matter and the changes that matter undergoes in natural processes and in planned experiments (Pusparini, Feronika, and Bahriah 2017).

One of the chemistry subjects studied in high school in class XI is the hydrolysis of salt. Based on the results of interviews with chemistry teachers at SMAN 2 Padang Panjang, students' understanding of chemistry is still low, as well as on the subject of salt hydrolysis. This can be

seen from the percentage of completeness of student learning outcomes for salt hydrolysis materials that have not reached the ideal percentage of completeness, which is 100%.

METHOD

This type of research is descriptive research with the research subjects of class XI IPA SMAN 2 Padang Panjang enrolled in the 2012/2013 academic year and the object of research is students' conceptions of the salt hydrolysis material contained in three levels of chemical representation. The research instrument used was an open-ended question, which consisted of 8 questions. Each question consists of three questions, namely macroscopic, submicroscopic and symbolic level questions that are related to one another. Meanwhile, to find out the causes of students' conceptual tendencies in the categories of incomplete concepts, alternative concepts, and no concepts, interviews were conducted.

Research data obtained through open ended questions were analyzed with reference to five categories of conception, namely the concept of

complete, incomplete concepts, alternative concepts, no concepts and no student responses as shown in Table 1. Furthermore, to obtain the percentage of students in each category of conception processed with the help of the SPSS 16 application. Meanwhile, the data obtained from the interviews were processed by describing and analyzing the data to obtain a conclusion.

Table 1. Categories of Student Conceptions

No	Student Conception	Remarks	
		Answer	Reason
1	Complete Concept	True	True
2	Incomplete Concept	True	No response
		No response	Benar
		True	False
		False	False
3	Alternative Concept	True	Alternative Concept
		Alternative Concept	True
		Alternative Concept	Alternative Concept
		False	Alternative Concept
		Alternative Concept	False
4	No Concept	False	False
		False	No reason
		No response	False
5	No Answer	No response	No response

DISCUSSION

Students' conceptions of salt formed from a strong acid and a strong base are revealed by two questions. So students' conceptions of salt whose constituent components come from strong acids and weak bases, weak acids and strong bases, and weak acids and weak bases. Each

question consists of questions at the macroscopic, submicroscopic and symbolic levels. Students are asked to choose the correct answer option to the question and students are also asked to give their opinion. Students' conceptions are grouped into five categories, namely complete concepts, incomplete concepts, alternative concepts, no concepts and no response. The following is the result of an analysis of students' conceptions.

1. A salt formed from a strong acid and a strong base.

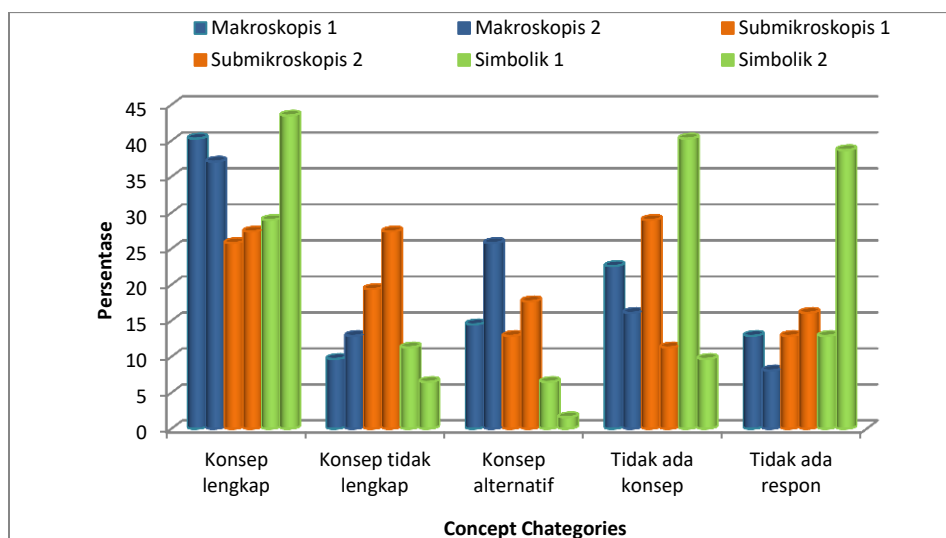


Figure 1. Percentage of students' conceptions of salt formed from a strong acid and a strong base.

2. A salt formed from a weak acid and a strong base.

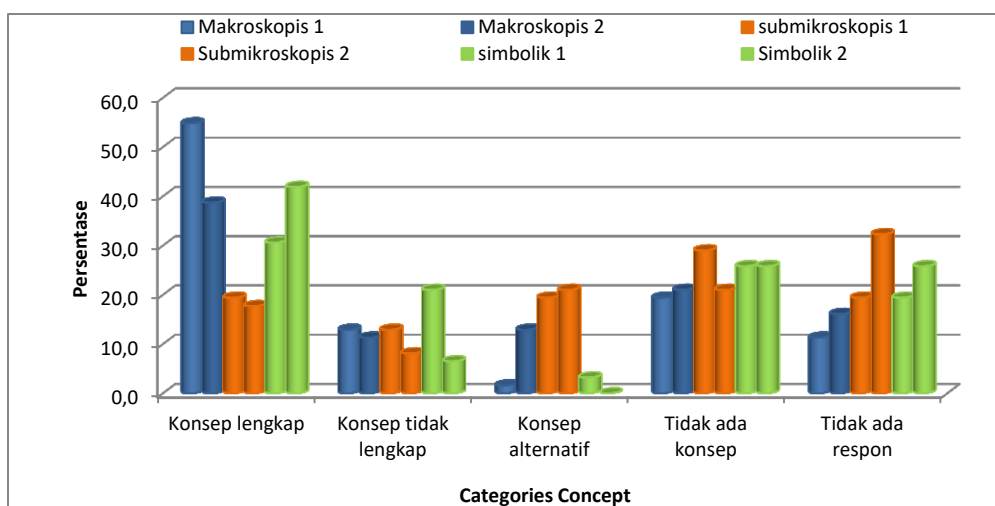


Figure 2. Percentage of students' conceptions of salt formed from a weak acid and a strong base

3. A salt formed from a strong acid and a weak base.

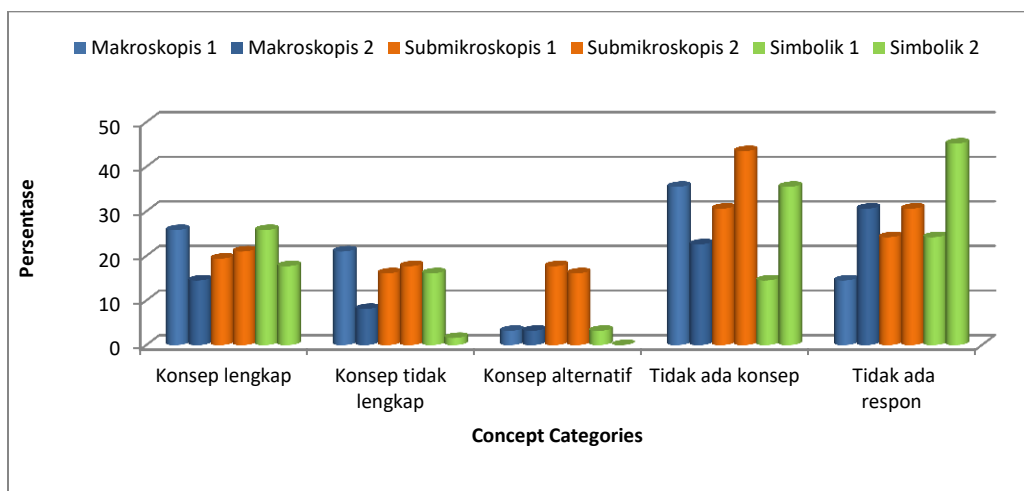


Figure 3. Percentage of students' conceptions of salt formed from a weak acid and a strong base

4. A salt formed from a weak acid and a weak base.

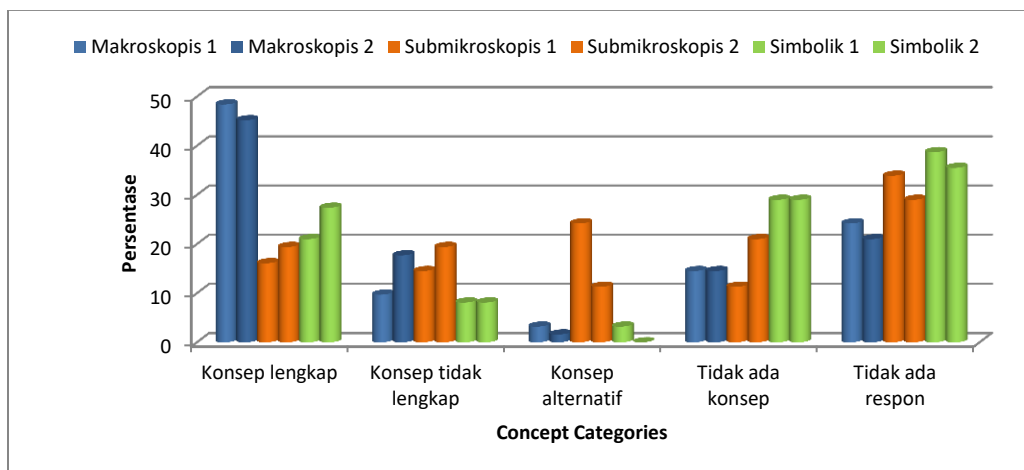


Figure 4. Percentage of students' conceptions of salt formed from a strong acid and a strong base

In the analysis of students' answers about the salt formed from a strong acid and a strong base, it shows that the largest percentage at the macroscopic level is in the complete concept category. At the submicroscopic level, the percentage of students is almost evenly distributed in each category of conception. At the symbolic level the percentage of students who have alternative concepts and incomplete concepts is smaller. The smallest percentage of students' conceptions in the complete concept category of salts formed from strong acids and strong bases is at the submicroscopic level, while for the macroscopic and symbolic levels of students who have complete concepts, the percentage is greater than the submicroscopic level. This happens

because students cannot imagine the particles contained in the solution. This is in accordance with what Nelson said that the submicroscopic level is the most difficult level because it explains the atomic theory of a material, including matter particles such as electrons, atoms and molecules. The submicroscopic level cannot be seen directly, its components are difficult to accept as real

The results of the analysis of the two questions about salt derived from strong acids and weak bases showed that the dominant students had complete concepts at the macroscopic level. This is because students can observe directly what is happening so that students can remember concepts at the macroscopic level well. At the submicroscopic level, students are more likely to have no concept and not respond to the question. This is because the particles in the solution are difficult to accept as real. At the symbolic level, the percentage of students who have complete concepts is quite large compared to other categories. At this level the percentage of students experiencing alternative concepts is very small. Students' complete conception at the submicroscopic level is lower than the macroscopic and symbolic levels.

Two questions used to analyze students' conceptions of salt formed from a weak acid and a strong base indicate that the percentage of students in the complete concept category is still low at the macroscopic, submicroscopic and symbolic levels. Of the three levels of chemical representation, the submicroscopic level has a low percentage. This is because the state of the particles contained in the solution is difficult to imagine as something real.

The results of the analysis of student answers about the salt formed from a weak acid and a weak base also showed the same results as the others. The submicroscopic level is the most difficult level for students to understand, while students' understanding at the macroscopic and symbolic levels is better than the submicroscopic level.

The main problem that students have in understanding salt hydrolysis material is that students cannot remember acids and bases and the strength of acids and bases that make up the salt, as a result students are unable to determine the salt ions that undergo hydrolysis and students are unable to make reaction equations. At the submicroscopic level, students have more alternative concepts, this happens assuming that the salt ions undergoing hydrolysis react with H^+ or OH^- ions present in solution. Salt hydrolysis is the reaction of anions or cations of a salt or both with water (Chang, 2005: 116). Another problem that occurs is that students are unable to complete the stoichiometry of the solution, as a result students are unable to determine the pH of the salt solution formed.

CONCLUSION

Based on the analysis conducted on the results of the open-ended question test given to students of class XI IPA SMAN 2 Padang Panjang, it can be concluded that (1). Students' understanding of salts derived from strong acids and strong bases is better at the macroscopic and symbolic levels than at the submicroscopic level. The submicroscopic level is the most difficult level for students to understand. This happens because students do not understand the meaning of salt hydrolysis and the conditions for salt hydrolysis and the submicroscopic level is difficult to accept as something real, (2). Students' understanding of salts formed from strong acids and weak bases tends to be better at the symbolic and macroscopic levels. The submicroscopic level is a level where the percentage is lower for students to understand. The

cause of the low understanding of students is that students cannot remember the acids and bases that make up a salt and the strength of these acids and bases, (3). Students' understanding of the salt formed from a weak acid and a strong base is the weakest at the submicroscopic level compared to the symbolic and macroscopic levels. This is because students do not understand the conditions for hydrolysis and students cannot explain the hydrolysis process that occurs, (3). Students' understanding of salts formed from weak acids and weak bases shows that the submicroscopic level is the lowest percentage in the complete concept category compared to the macroscopic and symbolic levels. This happens because students cannot imagine the particles in the solution.

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