International Journal of Educational Research Excellence (IJERE)
https://ejournal.ipinternasional.com/index.php/ijere
Volume 03, Issue 02, July-December 2024
e-ISSN: 2830-7933
DOI: 10.55299/ijere.v3i2.1139

Development of Teaching Materials to Support Merdeka Curriculum Learning on Salt Hydrolysis for Phase F Senior High School

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Article history: received October 25, 2024; revised November 11, 2024; accepted December 04, 2024

Abstract. This aims of this research is to develop teaching materials that incorporate multiple representations of chemistry concepts, especially on the salt hydrolysis topic, to support the Merdeka Curriculum and improve students' mental models in the F phase of high school. Educational Research Development (EDR) is the method chosen, using Plomp's development model. The subject are three UNP chemistry lecturers, two chemistry teachers and nine SMAN 8 Padang students. The developed teaching material have been validated with a construct validity value of 0.89 which is classified as valid and. Then it has also been tested for practicality with a score of 96% from teachers and 94% from students, this shows that the development teaching materials are very practical, which indicates their ease of use and application in an educational environment. It concludes, that the developed teaching materials are for the topic of salt hydrolysis, which incorporate a comprehensive range of chemical representations proven to be valid and highly practical can effectively assist students in building mental models and improving their understanding of chemical concepts and support the goals of the Merdeka Curriculum in fostering deeper student understanding.

Keywords: *Salt Hydrolysis, Merdeka Curriculum, Teaching Material*

I. INTRODUCTION

One of the negative impacts after the pandemic of Covid-19 in Indonesia is the loss learning for students (Fani & Mawardi, 2022). Loss learning occurs when learners lose knowledge and skills in general or specially experience academic setback and gaps in educational process (Novia et al., 2023). The decline in learning abilities and skills of students as a result of the difficulty in adapting to changes that occur due to the pandemic (Siregar & Mawardi, 2022). In response this situation, the Indonesian government through the ministry of education, culture, research and technology developed a solution as part of an effort to improve the effectiveness and renewal of education in Indonesia by launched a new curricula, namely the Merdeka curriculum (Fadila et al., 2023). The Merdeka curriculum is a component of a diverse intracurricular curricula, where the subject matter is developed more broadly, giving learners sufficient time to explore various concepts and optimize their skills (Rizaldi & Fatimah, 2022). Merdeka curriculum contains the profile concept of the Pancasila student which is a representation of Indonesian students, who not only have a global competency, but also demonstrate behavior in accordance with the values of Pancasila (Januarita et al., 2023). Through Merdeka curriculum, students can also be helped to prepare themselves to face the challenges of current world, where skills like a critical thinking and problem solving are important (Fauzan & Mawardi, 2023). The hope of implementing this curriculum is that students can maximize their potential more optimally and independently, and are able to adapt well to an increasingly complex and diverse society (Lestari et al., 2023).

Through the Merdeka curriculum, educational institutions including teachers and students are given flexibility in developing competencies according to the abilities and achievements of students (Rani et al., 2023). The teachers has the flexibility to choose a variety of teaching tools, create a quality learning methods that refer to the circumstance and learning requirements of students (Alamanda & Mawardi, 2023), which means that the teacher is not the only source in the ongoing learning process. One component of teaching tools in education that can support the learning progress in the Merdeka curriculum is teaching materials (Fauzi et al., 2023).

The availability of teaching materials is very important in learning activities as a support for the use of textbook, because the preparation of the material is aligned with the needs, talent, interest of students (Susanti et al., 2024). Abduraimova (2022) explain that the preparation and the design of the teaching materials that will be used must refer to instructional guidelines, given their function as a means of supporting and assisting learning activities. Teaching material can be in the form written or unwritten (Camelia et al., 2023). The types can be audio, visual-audio like learning videos, and tapes, and then printed materials such as modules, textbooks, student worksheets, handouts, pictures and wall diagram (Rizal et al., 2024). The function of textbooks is to focus on the needs of students.

Chemistry is a subject that must be studied by senior high school students. One of the chemistry topics contained in the text book is salt hydrolysis (Sari & Mawardi, 2022). Salt hydrolysis is closely related to everyday life, so it is important for student to learn it. Although topic of salt hydrolysis is related to daily life, students often cosider this topic to be a difficult topic to understand because it is abstract and has a complex scope (Horvat et al., 2021). The abstract nature of this material is found in the microscopic aspects that exist in the solution (Hardiyanti et al., 2018).

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To help students understand the subject matter, especially salt hydrolysis material, it is necessary to understand three levels of chemical multi-representation, they are macroscopic, sub microscopic and symbolic (Mawardi et al., 2019). The three levels are interrelated and all three of them greatly contribute to the development of students' mental models of constructing meaning and understanding of concepts (Amanda & Mawardi, 2023). Mental models refer to the internal representations that learners have for learners in understanding various levels of chemical information, which are macroscopic (observable phenomena), submicroscopic (processes at the particle level that cannot be observed directly) and symbolic (formulas and symbols) (Trivic & Milanovic, 2018). Developing accurate mental models can have an impact on students in improving mastery of abstract chemical concepts and being able to do problem solving well (Mardatilla et al., 2023). With various representations can ease student to understanding and solving complex chemical problem (Fazira & Mawardi, 2023). Although the submicroscopic level is often less emphasized, understanding the submicroscopic aspect is key in improving mental models and in understanding abstract chemical concepts (Damiyanti et al., 2024), which will help students solve problems related to the topic of salt hydrolysis.

According to the results of interviews and questionnaires that were conducted in several schools, SMA Negeri 7 Padang, SMA Negeri 8 Padang and SMA Pertiwi 1 Padang, it is found that the teaching materials available in the textbook lack multiple representation which results in less than optimal understanding of concepts in students. Teachers also said that there is still a need for other supporting books that are more comprehensive and detailed that include representation of chemistry. The teaching materials developed are expected to overcome these problems and can also help students in grasping concept with the presentation of chemical multiple representation. Designed to support the Merdeka curriculum phase F senior high school. Teaching materials are arranged attractively and tailored to the needs of student, which are expected to encourage students' motivation to learn independently, as part of a learner-centered learning approach. Therefore, researchers developed teaching materials with the title "Development of Teaching Materials to Support Independent Curriculum Learning on Salt Hydrolysis Material Phase F Senior High School".

II. METHODS

This research uses a development research method with an educational design approach, known as Educational Design Research (EDR), which is conducted through several stages, which refer to the Plomp model of development. In the Plomp's model, there are three main stages: the preliminary research stage, the prototyping stage, and the assessment phase (Plomp & Nieveen, 2013; Insani et al., 2022).

The preliminary research stage aims to identify the need for developing teaching materials that support learning the Merdeka curriculum on salt hydrolysis material in high school. This stage includes needs analysis through interviews with chemistry teachers and filling out questionnaires by students, as well as context analysis to analyze the curriculum and evaluation of learning outcomes to design teaching materials. In addition, a literature study was conducted to find relevant sources as a basis for design. The result is the development of a conceptual framework that produces teaching material products to support independent curriculum learning of F phase salt hydrolysis material.

After preliminary research stage, the design of teaching materials continues at the development or prototyping stage by following a process that helps in product development and improvement. In this stage, there are four stages of formative evaluation: self-evaluation, expert review, one-to-one evaluation and small group evaluation. These stage are shown in this figure below.

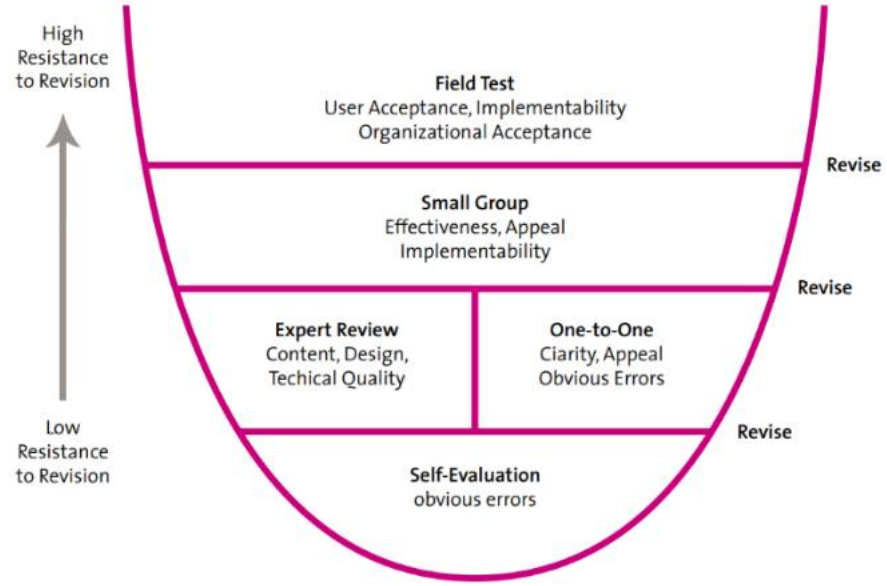

Figure 1. Layer of formative evaluation

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e-ISSN: 2830-7933
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The tools used for data collection in these research include validity data analysis and practicality data analysis. In analyzing the validity sheet that has been filled in by the validator, the Aiken's V scale is used which refers to the modified Boslaugh category assessment (Aiken, 1985). The Validators are asked to provide responses to the statements that have been listed in the vali dationsheet, the sheet provided is in questionnaire form. Which in the last section, validators have the opportunity to provide an assessment of the results of the evaluation they have done. The validators' assessment of each statement was analyzed using Aiken's V formula as shown in Eq. (1) and Eq. (2).

$$V = \frac{\Sigma s}{n(c-1)} \quad (1)$$

$$s = r - I_0 \quad (2)$$

Description:

V : Aiken's scale V

s : the score of the validator minus the lowest score in the applied category

r : validator's preferred score/category

n : number of validators

c : highest validity assessment number

I_0 : lowest validity assessment number

As the items used involved five validators and five selection categories, the scale used for Aiken's V validity index as shown in (Tabel.1)

Table 1. Number of students based early mathematical ability

Aiken's V Scale	Validity Categories
V ≥ 0,80	Valid
V < 0,80	Invalid

Source : (Aiken, 1985)

The technique used to analyze practicality data is based on the following formula, as shown in Eq. (3)

$$\text{Practicality Score} = \frac{\text{total score obtained}}{\text{highest possible score}} \times 100\% \quad (3)$$

Table 2. Percentage value obtained

Values	Practicality Categories
86% - 100%	Very Practical
76% - 85%	Practical
60% - 75%	Quite Practical
55% - 59%	Less Practical
≤ 54%	Not Practical

Source : (Purwanto, 2009)

III. RESULTS AND DISCUSSION

Preliminary Research

In the context analysis section, Form data collection through interviews with teacher and questionnarires filled out by students from several schools, information was obtained indicating that the main problem found was the limited learning resources, especially teaching materials to support the Merdeka Curriculum. Where the materials already available at the school do not include the three levels of chemical representation. This shows that students need additional reference materials or other learning resources to better support their chemistry learning at school.

One of the topics studied in chemistry is salt hydrolysis. Salt hydrolysis involves the phenomenon of salt ions interacting with water molecules, which requires an understanding of the three levels of chemical representation: macroscopic, submicroscopic, and symbolic. These levels are very important for developing accurate mental models in students. However, the

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Merdeka Curriculum teaching materials that have been available in schools do not yet cover these three levels of chemical representation. According to the needs analysis above, salt hydrolysis teaching materials were developed by including content that includes the three levels of chemical representation to support the Merdeka Curriculum in schools.

Then, in the context analysis, an analysis of the curricula used in schools is carried out (Delfianza et al., 2023). At this stage, the analysis is focused on the competencies that students must master, namely examining the Chemistry Learning Outcomes for phase F, which are then elaborated into Learning Objectives for salt hydrolysis. This is done to ensure that the developed teaching materials are arraged systematically in line with the learning objectives that have been formulated.

The literature review aims to connect the problems encountered by teachers and students in the learning process of the Merdeka Curriculum, by identifying solutions through analyzing scientific articles from various journals. Based on the problems obtained, it is necessary to design a product, namely the development of teaching materials to support Merdeka Curriculum learning on the topic of phase F salt hydrolysis for SMA/MA using the Plomp development model through validity testing and practicality testing.

At the literature study stage in this study, several supporting references were collected, including teaching materials, Merdeka Curriculum, and salt hydrolysis. material on salt hydrolysis in the developed teaching materials comes from various textbooks, includingChemistry by Chang (2010), Chemistry A Molecular Approach by Nivaldo J. Tro, (2011), Chemistry The Molecular Nature of Matter and Change with Advanced Topics Silberberg (2018)

Then, a conceptual framework was developed with an overview derived from the needs analysis, context analysis, and literature review to identify problems and find solutions to the research being conducted. The results of the conceptual framework development are shown in the following figure.

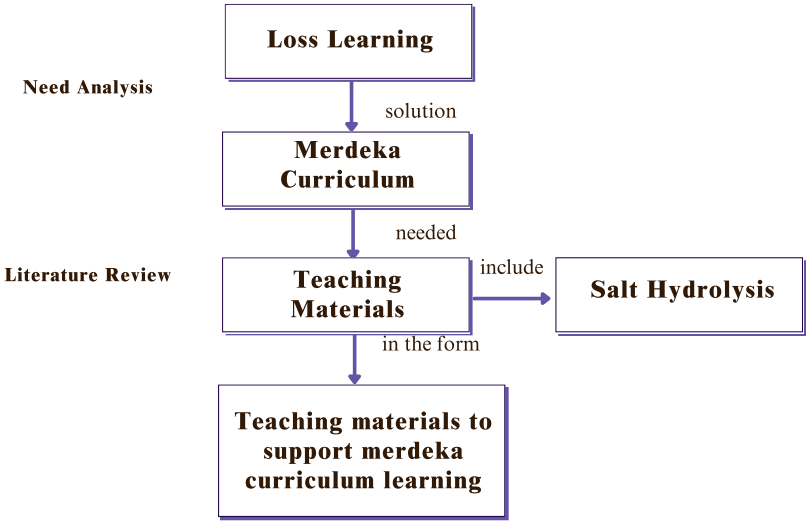

Figure 2. Conceptual framework

Development and Prototyping Stage

Prototyping consists of four steps: self-evaluation, expert review, one-on-one evaluation, and small group evaluation. This process will lead multiple stage, specially prototype I, II, III, and IV which the result of a formative evaluation, and reflects the steps taken during the development or formation of the prototype. This stage of development includes the use of a checklist or list of design specifications for self-evaluation; expert review including evaluation and recommendations for the developed items; individual evaluation; feedback given on the items through interviews in the one-on-one evaluation and administration of a practicality questionnaire to students as part of the small group evaluation.

Prototipe I

Prototype I is the prototype that result from the design and development of preliminary research result. The results of Prototype I are teaching materials to support the Merdeka Curriculum with the components contained in the developed teaching materials are covers, introduction, table of contents, instructions for using the book, achievement of learning, map of concepts, chapter covers, Pancasila student profiles, keyword, example problems and their solutions, exercises, comprehension test, summaries, end-of-chapter exercises, activities, reflections, bibliography, answer keys, glossary and index. Below are some of the components include in the developed teaching materials.

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Figure 3. The cover of teaching materials and Guide's of the book

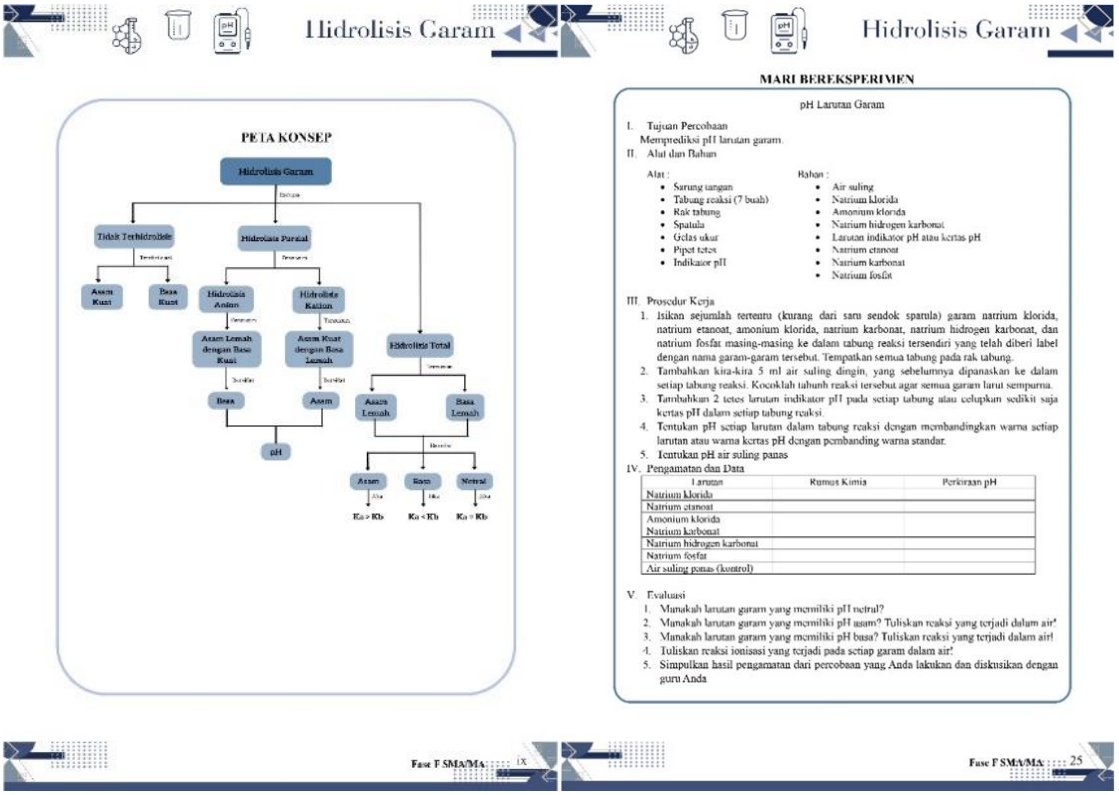

Figure 4. Map of concepts and Let do Experiment

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e-ISSN: 2830-7933
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Prototipe II

Prototype II was the result of revision of Prototype I. After developing teaching materials in the form of Prototype I, a formative evaluation was conducted, consisting of a self-evaluation using a checklist questionnaire. At this stage, researchers review and re-evaluate the completeness of the components of teaching materials. The results of the self-evaluation, one missing component was identified, namely the let's practice component. Therefore, researchers revised the teaching materials by adding the missing component. let's practice can be seen in Figure 5.

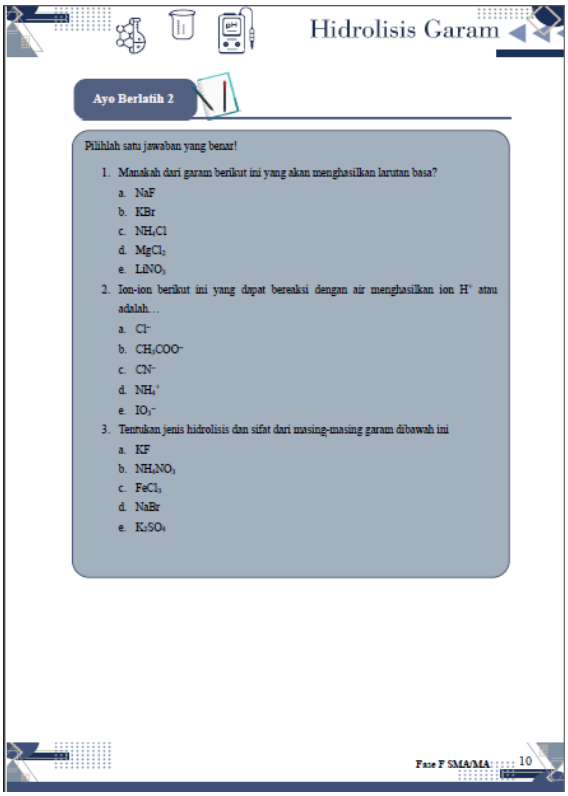

Figure 5. Let's practice test

Prototipe III

Prototype III is the result of revision of the Prototype II. At this phase, formative evaluation was carried out, including expert review by five validators, consisting of three chemistry lecturers from UNP and two chemistry teachers from SMA Negeri 8 Padang, as well as one-on-one evaluation conducted through interviews with three students. There were two types of questionnaires used in the validation process. The first is the construct validation questionnaire, which consists of 16 statements and is divided into four aspects: content component, presentation component, language component, and graphic component. The second is a content validation questionnaire, which assesses the suitability of the developed teaching materials with Merdeka Curriculum. Content validation received a score of 0.89, which indicates that the teaching materials are valid. However, there are several suggestions and improvements from the validation in certain parts. The following are some of the revisions made after the validation stage

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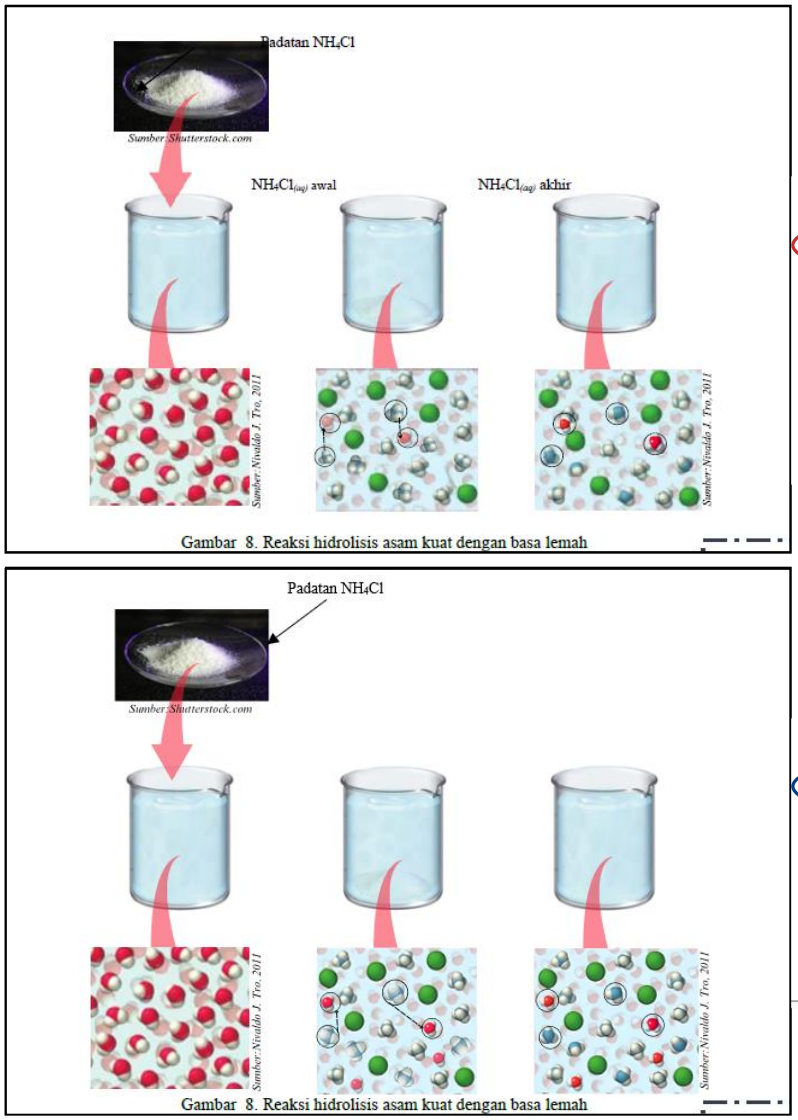

Image

Image ID	
Dimensions	686 x 496
Width	686 pixels
Height	496 pixels
Horizontal resolution	96 dpi
Vertical resolution	96 dpi
Bit depth	24
Compression	
Resolution unit	
Color representation	

Image

Image ID	
Dimensions	1280 x 925
Width	1280 pixels
Height	925 pixels
Horizontal resolution	96 dpi
Vertical resolution	96 dpi
Bit depth	24
Compression	
Resolution unit	

Figure 6. Resolution picture before and after revision

Revisions were made to increase the resolution of the images so that the images presented could be seen clearly related to the hydrolysis reaction.

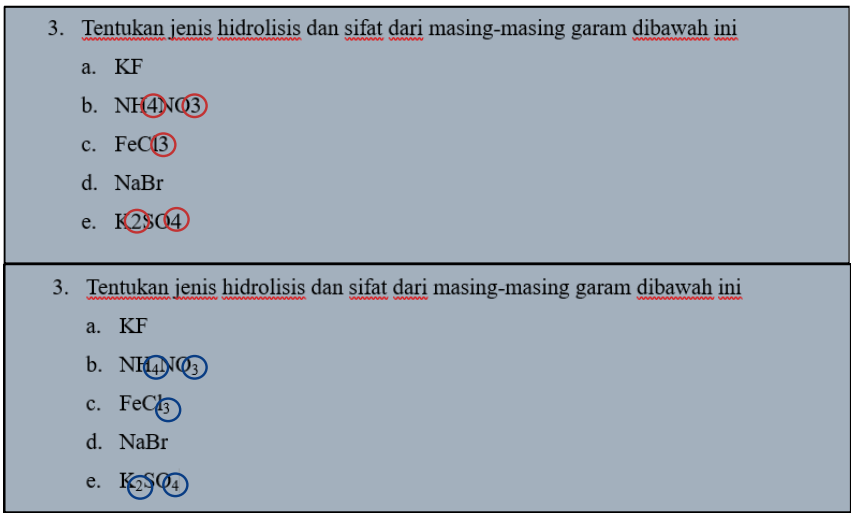

Figure 7. The writing of the index before and after revision

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e-ISSN: 2830-7933
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Improvements were made to the writing of the index as it related to compliance with the rules of chemical writing and to ensure that the information presented was accurate and not confusing.

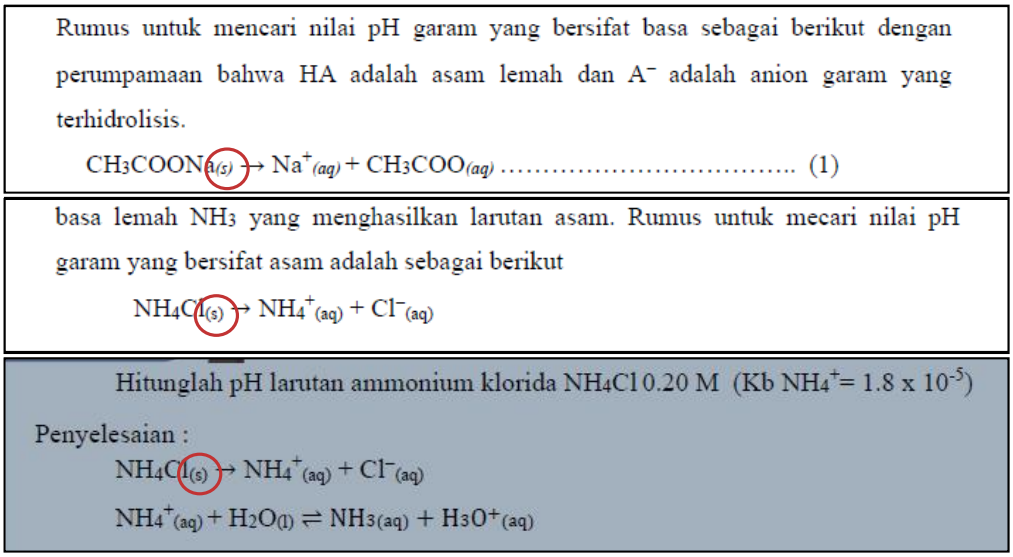

Figure 8. Phase of each reaction before and after revision

Improvement to the phase (form of substance) of each reaction, which can be seen in Figure, there is an error in writing the phase so that corrections are made so as not to cause confusion to students.

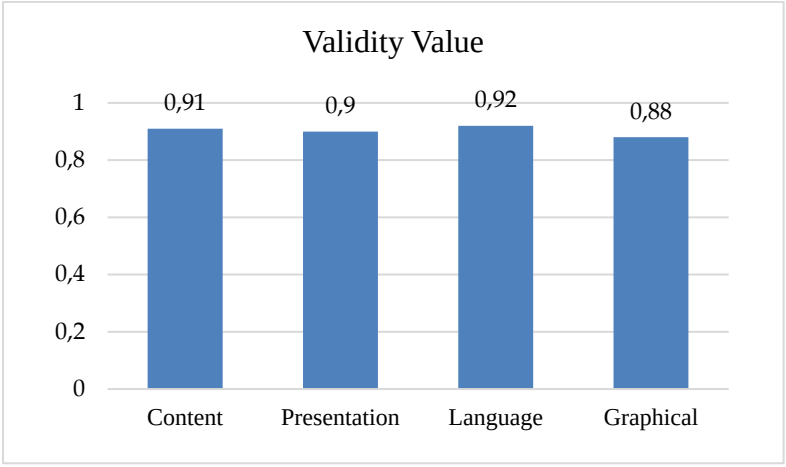

Figure 9. Construct validity value

Based on Figure 9 above, the content component aspect obtained a value of 0.91 is obtained with a valid category. This shows that the teaching materials developed come from relevant sources. Next, component of presentation, it has a value of 0.90 with the valid category, it means that the teaching materials developed are presented neatly, orderly, not mixed with unnecessary content and attractive image presentations in increasing motivation, attractiveness of students. Futhermore, the component of language obtained a value of 0.92 is obtained with the valid category. It shows the language used in teaching materials is effective, efficient, easily understood and does not cause confusion in understanding the concept. Then the graphical component gets a value of 0.88 with the valid category.

Prototipe IV

Whether the product developed is easy and practical to use (Novia et al., 2023). The practicality test results will be derived from a small group test involving nine students who have learned salt hydrolysis material and 2 chemistry teachers. The research instrument used in the practicality test is a practicality questionnaire for two chemistry teachers and nine students of class XII phase F SMAN 8 Padang. The average result obtained from the small group test of the teacher is 96% with the category Very Practical. And the average result of the small group test of the students is 94% with the category Very Practical. The practicality level of the developed teaching materials will be assessed based on the aspects of user-friendliness, interface, efficiency of learning, and benefits. Results of this stage are shown in the diagram below.

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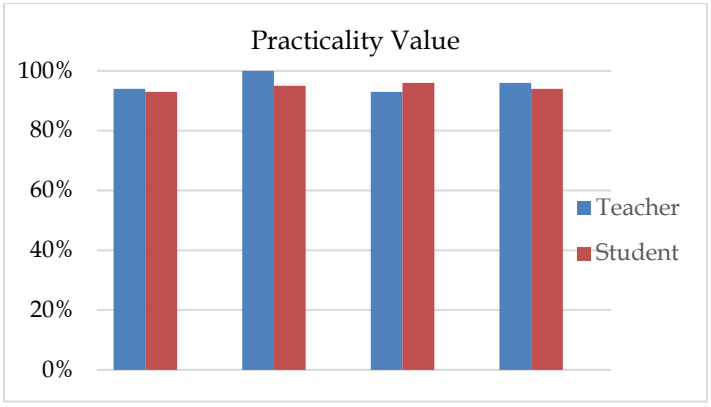

Figure 10. Construct practicality value

During the practicality stage, students are also asked to solve the problems presented using multiple chemical representations. the goal is to show that the multiple chemical representations provided in the developed teaching materials can assist students in finding and understanding the concepts of salt hydrolysis. The following is an image of the multiple chemical representations presented in the problem given to students

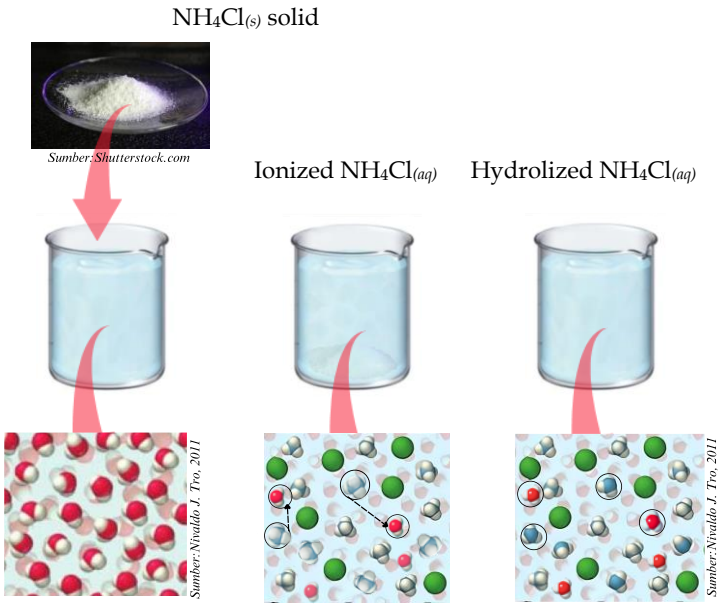

Figure 11. A sample of model in the developed learning material

The results base of the practicality test stage, indicate that the instructions and questions given can help students understand the concept and respond effectively. As previously explained, this teaching material is equipped with multiple representations of chemistry as seen in Figure 10 can minimize the occurrence of misconceptions about concepts and help students' understanding in improving the construction of their mental models in understanding the concept of salt hydrolysis. Then this teaching material was easily used and does not hinder the learning process so that the teaching material developed is considered practical.

IV. CONCLUSIONS

According to the results of this research and discussion is that teaching materials for the Merdeka Curriculum on the topic of salt hydrolysis could be developed using the Plomp development model. The teaching materials developed have been validated with a construct validity value of 0.89 which is classified as valid. Then, the teaching materials received a high practicality value, with a value of 96% from teachers and 94% from students. This shows that the materials are well developed and suitable to support the Merdeka Curriculum, especially in the topic of salt hydrolysis. Moreover, the teaching materials feature comprehensive representations of chemistry that can effectively assist students in building mental models and improving their understanding of chemical concepts, especially in the topic of salt hydrolysis.

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ACKNOWLEDGEMENTS

This development research project was supported by various people, both directly and indirectly. The researcher would like to thank the following people: Desy Kurniawati, M.Si; Hesty Parbuntari, S.Pd., M.Si; and Bali Yana Fitri, M.Pd who acted as content validators as well as Dra. Asra, M.Pd and Elvi Yanti, S.Pd as chemistry teachers who also acted as content validators. Thanks also go to the students of class phase F SMA Negeri 8 Padang who have helped in the implementation of this research.

REFERENCES

Abduraimova, Y. (2022). Designing Teaching Materials . *International Journal on Integrated Education*, *5*(2).

Aiken, L. R. (1985). *Educational and Psychological Measurement*. Pearson.

Alamanda, A., & Mawardi. (2023). Development of Teaching Material Based on Plomp Development Model to Support Indonesian Merdeka Curriculum on Chemical Bonding Topic in Phase E. *Jurnal Pijar MIPA*, *18*(4), 564–571.

Amanda, F., & Mawardi. (2023). Development of Textbooks to Support Merdeka Curriculum Learning on Green Chemistry Material in Phase E. *Jurnal Paedagogy: Jurnal Penelitian Dan Pengembangan Pendidikan*, *10*(3), 635–645.

Camelia, S., Mawardi, & Suryani, O. (2023). Pengembangan Bahan Ajar untuk Menunjang Pembelajaran Kurikulum Merdeka pada Materi Konsep dan Dampak Pemanasan Global Fase E SMA/MA. *Jurnal Pendidikan MIPA*, *13*(2).

Chang, R. (n.d.). *CHEMISTRY*.

Damiyanti, Mawardi, & Suryani, O. (2024). Development Of Teaching Material To Support Merdeka Curriculum On Stoichiometry For Phase F. *Jurnal Kependidikan Kimia*, *12*(3).

Delfianza, E., Mawardi, & Suryani, O. (2023). Developmentof FlippedClassroom Based Guided Inquiry Learning System with Digital Literacy Using Discord Application on Thermochemistry. *Jurnal Penelitian Pendidikan IPA*, *9*(7).

Fadila, R., Mawardi, & Okta Suryani. (2023). Development of Teaching Material to Support Merdeka Curriculum on the Acid-Base of Phase F. *Edunesia; Jurnal Ilmiah Pendidikan*, *Vol 4*.

Fani, V. G., & Mawardi. (2022). Flipped Classroom Learning System Based on Guide Inquiry Using Moodle On Acid-Base Solution. *Jurnal Pijar MIPA*, *17*, 361–368.

Fauzan, F., & Mawardi. (2023). Development of Teaching Materials to Support Merdeka Curriculum Learning on Basic Law of Chemistry Phase E. *Prisma Sains: Jurnal Pengkajian Ilmu Dan Pembelajaran Matematika Dan IPA IKIP Mataram*, *11*(3), 743–755.

Fauzi, I., Mawardi, & Suryani, O. (2023). Development Of teaching Materials for Making Simple ebergy-Producing Devices in revewable Energy Topic. *Jurnal Pijar MIPA*, *18*(4), 586–591.

Fazira, I., & Mawardi. (2023). Development of Textbook to Support Merdeka Curriculum Learning on Nanotechnology Material for Phase E. *Jurnal Pijar MIPA*, *18*(4).

Hardiyanti, P. C., Sumarni, W., & Kurniawan, C. (2018). The Effect of Application of Problem Based Learning Model Learning on Salt Hydrolysis Material Learning Outcomes. *International Journal of Evaluation and Research in Education*.

Horvat, S. A., Mihajlović, , Jovana, Rončević, T. N., & Rodić, D. D. (2021). PROCEDURE FOR THE ASSESSMENT OF COGNITIVE COMPLEXITY: DEVELOPMENT AND IMPLEMENTATION IN THE TOPIC “HYDROLYSIS OF SALTS.” *Macedonian Journal of Chemistry and Chemical Engineering*, *40*(1), 119–130.

Insani, M., Mawardi, & Ismail, I. A. (2022). The System of Flipped Classroom Based on Guided Inquiry Learning on Redox Reactions and Electrochemistry Using Moodle. *International Journal of Academic Pedagogical Research (IJAPR)*, *6*(5), 53–56.

Januarita, R., Mawardi, & Suryani Okta. (2023). Development of Teaching Material to Support Indonesian Merdeka Curriculum on Periodic System Materials for Phase E. *Jurnal Pijar MIPA*, *18*(4), 486–492.

Lestari, N. A. P., Wahyuni, L. T. S., Lasmawan, I. W., Suastra, I. W., Dewi, M. S. A., & Astuti, N. M. I. P. (2023). KURIKULUM MERDEKA SEBAGAI INOVASI MENJAWAB TANTANGAN ERA SOCIETY5.0 DI SEKOLAH DASAR. *Jurnal Ilmiah Pendidikan Citra Bakti*, *10*(4).

Mardatilla, A., Mawardi, & Suryani, O. (2023). Pengembangan Buku Ajar untuk Kurikulum Merdeka pada Materi Pengenalan Ilmu Kimia fase E SMA/MA. *Jurnal Pendidikan Kimia*, *8*(2).

Mawardi, Bahrizal, & Fitriza, Z. (2019). Guided Inquiry Learning Materials Based on Multiple Chemical Representations As One of Chemistry Learning Strategies Centered on Students . *Pelita Eksakta*, *2*(2), 140–147.

Nivaldo J. Tro. (2011). Chemistry A Molecuar Approach. In *Prentice Hall: Vol. 2nd ed*.

Volume 03, Issue 02, July-December 2024
e-ISSN: 2830-7933
DOI: 10.55299/ijere.v3i2.1139

Novia, K., Mawardi, & Suryani, O. (2023). Development of Teaching Materials to Support MerdekaCurriculum Learning on Solubility and Solubility Product in F Phase. *Jurnal Penelitian Pendidikan IPA*, *9*(7).

Plomp, T., & Nieveen, N. (2013). *An Introduction to Educational Design research* (T. Plomp & N. Nieveen, Eds.). SLO. Netherlands institute for curriculum development.

Purwanto. (2009). *Evaluasi Hasil Belajar*. Pustaka Pelajar.

Rani, P. R. P. N., Asbari, M., Ananta, V. D., & Alim, I. (2023). Kurikulum Merdeka: TransformasiPembelajaran yang Relevan, Sederhana, dan Fleksibel. *JOURNAL OF INFORMATION SYSTEMS AND MANAGEMENT*, *Vol*, *02*.

Rizal, P. N., Mawardi, & Suryani, O. (2024). Development of Teaching Materials to Support Learning of the Merdeka Curriculum on Chemical Equilibrium. *Edunesia : Jurnal Ilmiah Pendidikan*, *5*(1).

Rizaldi, D. R., & Fatimah, Z. (2022). Merdeka Curriculum: Characteristics and Potential in Education Recovery after the COVID-19 Pandemic. *International Journal of Curriculum and Instruction*, *15*(1), 260–271.

Sari, M. U., & Mawardi. (2022). Development of a Guided Inquiry-Based Moodle E-Learning System on the Topic of Salt Hydrolysis. *Jurnal Pendidikan MIPA*, *23*(1), 244–255.

Silberberg, M. S. (2018). *CHEMISTRY: THE MOLECULAR NATURE OF MATTER AND CHANGE WITH ADVANCED TOPICS* (8th Edition). McGraw-Hill Education.

Siregar, F. R., & Mawardi. (2022). Development of the Learning System of Flipped-Guided Inquiry-Based Learning (FGIL) Using Moodle on Chemical Equilibrium material. *INDONESIAN JOURNAL OF EDUCATIONAL STUDIES (IJES)*.

Susanti, A., Mawardi, & Suryani, O. (2024). Development of TextBook to Support Merdeka Curriculum on the Atomic Structure of Phase E. *Edunesia: Jurnal Ilmiah Pendidikan*, *5*(1).

Trivic, D. D., & Milanovic, V. D. (2018). The macroscopic, submicroscopic and symbolic level in explanations of a chemical reaction provided by thirteen-year olds . *Joirnal of Serbian Chemical Society*, *83*(10), 1177–1192.