LAVOISIER: CHEMISTRY EDUCATION JOURNAL
Journal homepage: http://jurnal.iain-padangsidimpuan.ac.id/index.php/Lavoisier/index

The practicality of Guided Inquiry-Based Salt Hydrolysis E-module For Class IX SMA

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ABSTRACT

This research aims to analyze the practicality of a guided inquiry-based salt hydrolysis e-module for class XI high school students. This research is R&D research with the Plomp model. The research instrument used was a questionnaire to test students' practicality on the e-module. The subjects of this research consisted of two chemistry teachers and 26 class XII students at SMAN 14 Padang. Data were analyzed using the Moment Kappa (k) formula. The practicality test results show that the e-module is interesting, the letters are clear, and the language is easy to understand so that students can easily understand the material. The results of data analysis mean Moment kappa values at the teacher and student practicality test stage were 0.84 and 0.82 with both categories being high. This data is proven by the student's ability to answer questions on the e-module of 87% in the high category. Based on data analysis, it was concluded that the guided inquiry-based salt hydrolysis e-module for class

Keywords: E-Module, Salt Hydrolysis, Practicality.

1. Introduction

Salt hydrolysis is one of the chemistry subject materials studied in class XI SMA/MA semester 2. This material discusses salts that undergo hydrolysis as well as calculating the pH of salt solutions. Some concepts from this material are abstract, making it difficult to observe directly without modelling and visualization in submicroscopic form.

Based on the results of interviews with chemistry teachers in several high schools in Padang, it was concluded that chemistry learning in schools is as follows: 1) there are no teaching materials that integrate practical activities with classroom learning, 2) the teaching materials used do not fully enable students to discover their own concepts so that learning only confirms the concepts that have been given, 4) experimental/practicum activities are carried out at the end of the learning material. whose aim is only to confirm the concept, 5) the teaching materials used have not attracted the attention of students, and 6) the teacher only explains by involving 2 levels of multiple representations. If it is aligned with a learning process that is by the demands of the 2013 curriculum, then this learning process does not meet the demands of the 2013 curriculum.

Dynamics in the world of education are developing very rapidly. The most significant impact begins to be felt when we welcome 21st century learning which provides a new nuance in learning. One of them is developments in the curriculum. The curriculum is an important part of developing the education system. The 2013 curriculum

requires students to actively seek, process and construct their knowledge through a scientific approach. The scientific approach to learning needs to be strengthened by implementing the learning models suggested by the 2013 curriculum, one of which is the guided inquiry model (Permendikbud RI No. 5, 2014). Learning using the guided inquiry model can make students actively involved during the learning process (Hanson, 2005). Apart from that, learning using the guided inquiry learning model can improve student learning achievement because students are allowed to carry out investigations in learning (Matthew, 2013).

Inquiry learning is a learning activity that emphasizes the process of critical and analytical thinking to search for and find answers to a problem in question. In inquiry learning, the activities carried out by students are directed by the teacher to seek and find their answers to something that is being questioned so that the teacher acts as a facilitator and motivator of students' learning. Guided inquiry learning model that integrates experimental activities in learning which consists of 6 stages, namely orientation, exploration, interconnection, concept formation, application, and conclusion.

According to the Ministry of National Education (2008), in the learning process, there needs to be teaching materials that are per the demands of the 2013 curriculum. Based on the results of interviews with teachers in the three high schools above, it is known that as many as 67% of teachers have used the guided inquiry learning model in the salt hydrolysis learning process, however Teaching materials that support the learning process using the guided inquiry model are not yet available at the school. The teaching materials available in schools also do not fully help students to learn independently.

Current conditions, the COVID-19 pandemic have an impact on the education sector. The government decided that the implementation of learning in schools would be transferred to online learning. This online learning will remain effective even though educators and students are in different places (Verawardina, et al., 2020). Online learning is defined as the experience of transferring knowledge using video, audio, images, text communication, and software (Basilaia & Kvavadze, 2020), so electronic-based teaching materials such as electronic modules (e-modules) are needed.

E-module is a set of digital or non-print teaching media that is systematically arranged and used for independent learning purposes in electronic format (Fausih & T, 2015). E-module development has several advantages. First, the concepts contained in chemical equilibrium material can be visualized in the form of animations and video demonstrations. These two modules are presented in an attractive appearance, equipped with images, text, video, animation and websites (Hafsah, 2016 & Desviana, 2020).

In developing this e-module, the author used the professional Flip PDF application developed by Wonder Idea Technology Limited. Flip PDF Professional is a feature-rich flipbook maker that has page editing functionality. Flip PDF Professional has the advantage of being easy to use because it can be operated by beginners who don't know the HTML programming language. Create interactive book pages by inserting multimedia such as images, video, MP4, audio video, hyperlinks, quizzes, and flash in the PDF so that you don't have to open it elsewhere or in a separate place but directly input it into a PDF file, can be published online or offline, can displays feedback that shows the right or wrong answer and a score that can be known directly (Seruni et al., 2019).

Several studies that have been carried out related to the development of an integrated guided inquiry (IGI) learning model have been carried out by Andromeda that is valid and practical for use in chemistry learning in high school (Andromeda et al., 2018). Apart from that, Andromeda has developed modules based on integrated guided inquiry on colloid chemistry topics that are valid and practical for chemistry learning in high school (Andromeda et al., 2018)

Based on the problems described above, research will be carried out to develop teaching materials in the form of a module with the title: "Practicality of Guided Inquiry-Based Salt Hydrolysis E-module for Class XI SMA"

2. Research methods

This research method is a continuation of Research and Development (R&D) research using the Plomp development model up to the prototyping stage for expert review on prototype III. In this research, a practicality test was carried out, namely the continuation of the prototyping stage for field tests. This practicality test was carried out on two chemistry teachers and 26 students of class XII MIPA SMAN 14 Padang.

This sample selection was based on recommendations from chemistry teachers. The test was carried out using a practicality test questionnaire sheet. Students observe the appearance of the e-module and understand the material in the e-module which is arranged based on the guided inquiry stage by working on questions in the e-module. After students have filled in all the questions in the e-module, students fill out the practicality questionnaire.

In this research, the type of data obtained is primary data because it was obtained directly from the research subjects. Next, the data that has been obtained is analyzed using Cohen's Kappa formula, so that the kappa moment will be obtained.

$$\text{Moment kappa (k)} = \frac{P - P_e}{1 - P_e}$$

Information:

K: Moment Kappa
P: Proportion realized
Pe: Unrealized proportion

Table 1. Table of decision categories based on moment kappa (k)

Intervals	Category
0.81 – 1	very high
0.61 – 0.80	Tall
0.41 – 0.60	Currently
0.21 – 0.40	Low
0.01 – 0.20	Very low
0.00	invalid

3. Results and Discussion

E-modules have been widely developed as alternative teaching materials in chemistry learning based on various learning models. However, in the matter of salt hydrolysis, the presence of a salt hydrolysis e-module, especially based on IGI, is the first time. IGI can make students actively involved in getting concepts. Each e-module development must be tested for validity and practicality so that the resulting e-module is proven to be valid and practical for use in the learning process.

In this case, a practicality test was carried out on the IGI-based salt hydrolysis e-module, namely a field test. From the results of previous research, in the one-to-one evaluation test, it was obtained that the cover and colour design of the e-module display were good so it attracted students' interest in reading it. The existence of attractively designed e-modules will increase students' motivation to read learning materials (Perdana et al., 2017).

E-modules are interesting material for students so they make students enthusiastic about studying the subject matter (Rendra et al., 2018). Apart from that, the letters on the e-module are clear and easy to read and the language used in the e-module is also easy to understand. The existence of tables, pictures, models and videos in the e-module also really helps students find and understand the concepts of elemental chemistry. This follows previous research (Rendra et al., 2018) which states that students prefer learning accompanied by videos because it will make students interested in studying the material provided.

The results of the one-to-one evaluation test that has been carried out are under the characteristics of the e-module, namely using simple language, consistent use of fonts, easy to understand and being user friendly (Kemendikbud, 2017), namely that the e-module is helpful and makes it easier for users. Apart from that, the presentation of material in the e-module is easy for students to understand and is structured because it is explained in sequential stages from the IGI model which makes students able to discover material concepts independently. In IGI, educators only act as motivators, mentors and helpers to solve learning difficulties.

The next test carried out is a field test. The practicality of the e-module is known from the results of the practicality questionnaire analysis of teacher responses after viewing and using the guided inquiry-based salt

hydrolysis e-module. The results of practicality questionnaire data processing by teachers and students can be seen in Table 2.

Table 2. Table of Teacher and Student Practicality Test Results

Rated aspect	Teacher	Student	Average	Category
User convenience	0.85	0.85	0.85	Very high
Time efficiency	0.82	0.77	0.80	Tall
Utilization	0.87	0.85	0.86	Very high
Kappa moment	0.84	0.82	0.84	Very high

Based on the results of the practicality assessment analysis, the average moment kappa value for each aspect was obtained which included ease of use of 0.85, implementation time efficiency of 0.82 and the benefit aspect is 0.87 so that the total average value moment kappa for all aspects is 0.84 in the practicality category very high.

Even though e-modules have a very high practicality category, several items have a high category. This is due to the key questions asked, the letters used and the size of the e-module. The key questions given still need to be revised so that the key questions asked are clear, while the letters used are clear because the type and size are the standard Times New Roman type with font size 12. The resulting e-module is considered by the teacher to be less practical. because the size is slightly larger and thicker than the teaching materials usually used, namely textbooks or worksheets. In terms of learning time efficiency, the use of e-modules during learning is still considered not very efficient, because learning using the resulting e-modules still requires the same time as normal learning because students still need to be guided in doing it.

Even though some items do not have very high value, the resulting e-module is very practical to use in terms of ease of use, and time efficiency. learning and benefits.

Furthermore, the practicality assessment/test of prototype IV was carried out by 26 class XII students at SMAN 14 Padang. Based on the results of the practicality assessment analysis of prototype IV, the average moment kappa value of the three aspects assessed was 0.82 with a very high practicality category. These data show that the resulting prototype IV is practical for use by students, both in terms of ease of use, efficiency of learning time and benefits, but there is one item that has a high category with The average moment kappa is 0.77, which is related to the efficiency of learning time.

Based on the results of the assessments given by students, the e-modules used are not very appropriate to students' learning speed. Apart from the student questionnaire scores, the practicality of the e-module can also be seen from the results of the analysis of student answers on the resulting module. Based on the results of the analysis of student answers in Table 3, the final scores for each group were obtained, namely:

Table 3. Student E-module scores

No.	Group	Mark
1	I	93.3
2	II	85
3	III	89.3
4	IV	86.7
5	V	80.7
Average		87

Based on the results of the analysis of students' answers to the hydrolysis e-module Guided inquiry-based salt obtained an average score of 5 The group of students tested was 87. This proves that the module developed is good, where the score obtained by each group is above the KKM (greater than 80). This also proves that there is a relevant relationship between student answers on the e-module and student assessments on the student

response questionnaire, namely in the good category. Based on these data, the e-module produced is valid and practical, but several revisions are still being made to produce a better e-module. Below are some of the revised sections.

a) Adding a substance phase to key question no. 2

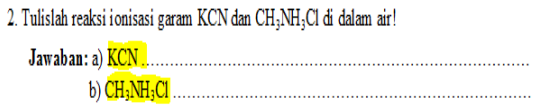


Figure 1(a). Display Key Questions Before Revision

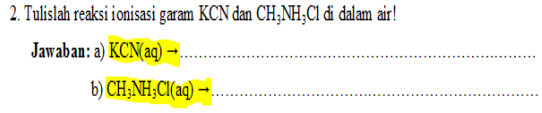


Figure 1(b). Display of Key Questions After Revision

b) Changing the practical video

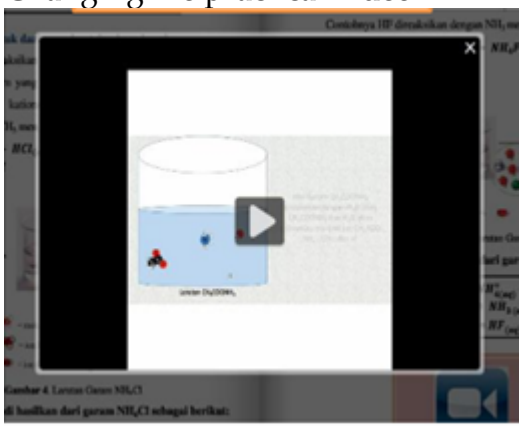


Figure 2(a). Video display before revision

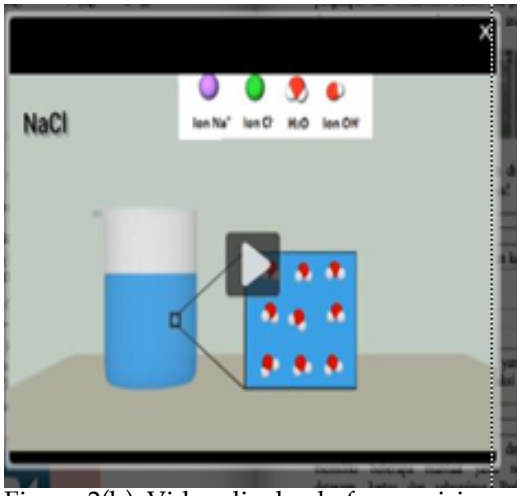


Figure 2(b). Video display before revision

c) Changing the editorial of essay question no. 3 and 4 on the test sheet

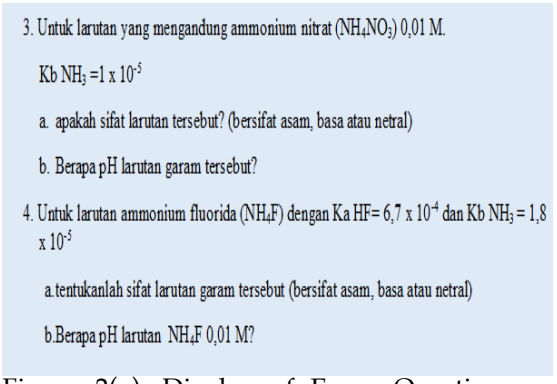


Figure 2(a). Display of Essay Questions on Previous Test Sheet Revision

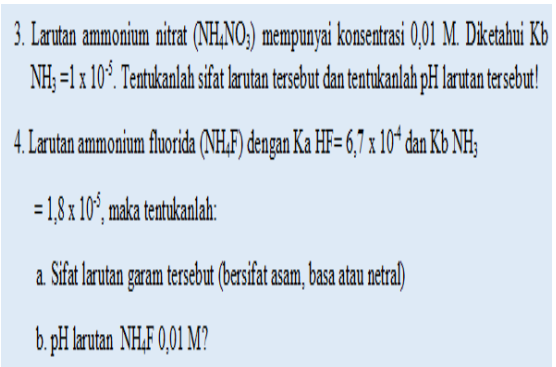
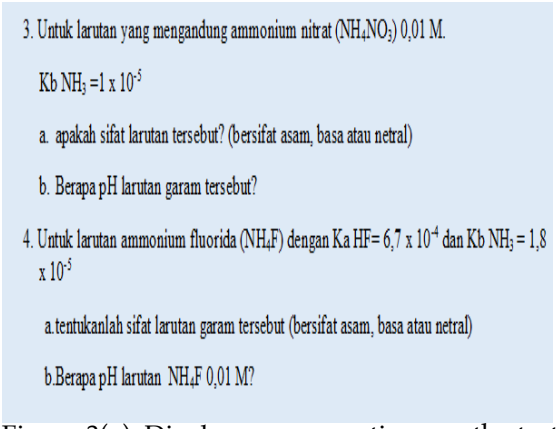


Figure 2(b). Display of essay questions on the test sheet after revision

d) Add essay questions about salt solutions of weak acids and weak bases that are alkaline to the test sheet


3. Untuk larutan yang mengandung ammonium nitrat (NH_4NO_3) 0,01 M.

Kb NH_3 =1 x 10^{-5}

a. apakah sifat larutan tersebut? (bersifat asam, basa atau netral)

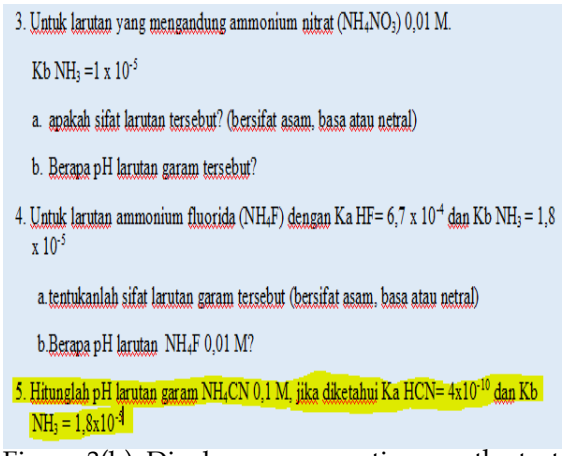
b. Berapa pH larutan garam tersebut?

4. Untuk larutan ammonium fluorida (NH_4F) dengan Ka HF= 6,7 x 10^{-4} dan Kb NH_3 = 1,8 x 10^{-5}

a.tentukanlah sifat larutan garam tersebut (bersifat asam, basa atau netral)

b.Berapa pH larutan NH_4F 0,01 M?

Figure 3(a). Display essay questions on the test sheet with Addition of Test Questions Before Revision


3. Untuk larutan yang mengandung ammonium nitrat (NH_4NO_3) 0,01 M.

Kb NH_3 =1 x 10^{-5}

a. apakah sifat larutan tersebut? (bersifat asam, basa atau netral)

b. Berapa pH larutan garam tersebut?

4. Untuk larutan ammonium fluorida (NH_4F) dengan Ka HF= 6,7 x 10^{-4} dan Kb NH_3 = 1,8 x 10^{-5}

a.tentukanlah sifat larutan garam tersebut (bersifat asam, basa atau netral)

b.Berapa pH larutan NH_4F 0,01 M?

5. Hitunglah pH larutan garam NH_4CN 0,1 M, jika diketahui Ka HCN= 4x10^{-10} dan Kb NH_3 = 1,8x10^{-5}

Figure 3(b). Display essay questions on the test sheet with Addition of Test Questions After Revision

The revisions made to the field test based on suggestions from the teacher were about adding substance phases to the reaction equations in the key questions. Apart from that, the addition of essay questions to the test sheet and changes to the editing of the question sentences to make them better.

4. Conclusion

Based on the objectives, results of data analysis and discussion, it can be concluded that the guided inquiry-based salt hydrolysis e-module has been practically used with a very high practicality category so that it can be used in the high school chemistry learning process so that it can be used as an alternative teaching material in learning salt hydrolysis.

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