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Analysis of Students' Difficulties in Answering Questions on the Chemistry National Standardized School Exam in Kupang

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ABSTRACT
The purpose of this study is to describe the characteristics item questions of chemistry national standardized school exam and identify students' difficulties in answering questions. Data collection was carried out by documenting results of the exam in 2018 in Kupang city. The documentation was consisted of 35 multiple choice questions, keys answer and test results of 103 samples students. This research was a descriptive exploratory study. Data analysis was carried out quantitatively and qualitatively. Quantitative data analysis was performed using the classical test theory approach and item response theory with 1 logistical parameter. Qualitative data analysis was carried out to describe the items that were included in the category of difficult levels of distress and poor differentiation, by means of focus group discussion (FGD). The results showed that there were 8 difficult items out of 35 student test items. Base on the results of FGD, the students' difficulties in answering questions were caused by a lack of conceptual understanding in calculating and using complex formulas. The results of the estimated reliability of the questions amounted to 0.83 which showed that chemistry national standardized school exam questions were in the good reliability category.

Keywords: *item characteristics, difficult items, influencing factors, examination, chemistry*.

1. INTRODUCTION

Evaluation is an important factor in education. Through the evaluation obtained information in the form of data from the measurement results so that the achievement of educational goals can be known. Educational evaluation is the activity of controlling, guaranteeing, and determining the quality of education for various components of education in each path, level and type of education as the responsibility of providing education. Improving the quality of education should be done with a better evaluation system. The evaluation system (measurement, testing, assessment), in addition to the procedures that must be systematic, the implementation must also have high accountability, and the results are expected to be able to be used as a benchmark of the expected goals.

Chemistry national standardized school exam is a form of national-level learning evaluation that has been established by the government. The aims of assessment of learning outcomes is to assess the determine student learning outcomes. Assessment of learning outcomes by the government aims to assess the achievement of national competence of graduates in certain subjects in a group of subjects of science and technology and is carried out in the form of national examinations. Accuracy in the implementation of the assessment is determined by the benefit of the instrument used. If a test set has bad characteristics, the assessment results are invalid. This was also explained by [1] in her research which said that the management of the exam and the quality of the exam materials used needed attention so that the test results could reflect the true abilities of the students. The formulation of the assessment obtained from the measurement results based on the test kits used affects various educational decisions or policies. So it would be nice if the instrument used to measure the ability of students has good quality.

Chemistry national standardized school exam test was created by a group of chemistry teachers based on the grid set by national education standards department by the criteria for competency standards for graduates, content standards, and applicable curriculum.

Measurement is generally implemented through a test. Through these tests, it can be seen how the achievement or ability of the subject to be measured [2]. So that the measurement results truly illustrate the achievements or abilities of the actual subject, it takes a measuring instrument in the form of quality tests. To produce quality tests is certainly not an easy job. In addition to the special expertise required from the test maker, other measurement techniques are also needed that can help produce quality tests.

One way that can be done to produce quality tests is through the analysis of item characteristics. In general, the characteristic analysis of these items is knowing how to test the quality empirically [3]. In this case, after the test has been assembled, the test will be tested on several samples and the response of the number of trial samples is used to carry out the character analysis of the items [4]. According to [4], an analysis of item characteristics can be done using either the classical approach or using a modern approach (item response theory).

Two aspects used in good tests are validity and reliability [5], as well as according to [6], which mentions the characteristics of tests including reliability and validity. Reliability refers to the stability and consistency of the score, while validity refers to the accuracy of the interpretation of the test scores [6]. Reliability is a statement about the consistency and stability of an instrument's score. However, the score of a test may have the wrong consistency. Meanwhile, the validity of a statement of the suitability of the test and its components, the truth of the test results and their interpretation.

The results of education assessments in Indonesia, especially in chemical materials, have not satisfied many parties for years. This can be seen in situations that might be found both through the average grade of students in the National Chemistry Exams and the results given by international studies. These results indicate that many students still have difficulty in answering questions in chemistry exams. Difficulties in solving national exam questions become a reflection problem for both teachers and students. Teachers and students must learn from students' difficulties to identify the parts or indicators that students find difficult. As a result, there should be a study that will identify why the chemistry national standardized school exam test items become difficult for the students. Based on the problems above, this study aims to describe the characteristics of the chemistry national standardized school exam questions and identify difficult items that need to be discussed as suggestions for teachers.

2. METHOD

This research was a type of exploratory descriptive research with a quantitative approach combined with qualitative research to describe the characteristics characteristics item questions of chemistry national standardized school exam and identify students' difficulties in answering questions. Data collection was carried out by documenting national standardized school exam results for chemistry subjects in Kupang City. The results of the documentation in the form of national standardized school exam questions consist of 35 multiple choice questions, answer keys and student responses. The number of respondents that was used in this study was 103 students who took chemistry national standardized school exam in Kupang City.

Data analysis was carried out quantitatively and qualitatively. Quantitative analysis is carried out based on classical test theory and item response theory. Based on classical test theory, it is known the level of difficulty and differentiation of questions with the help of Anbuso 4.0 application. Whereas based on item response theory it is known the level of difficulty and reliability of the questions with the help of the Quest application. Qualitative data analysis was carried out to describe the items that were included in the category of difficult levels of distress and poor differentiation, by means of focus group discussion (FGD). Meanwhile, the results of the FGD were analysed by means of the qualitative analysis model of Miles and Hubberman [7]. The stages of the analysis were data reduction, data presentation, data verification and conclusion

3. RESULT AND DISCUSSION

Data from the analysis of the chemistry national standardized school exam questions in classical test theory is presented in Table 1 and table 2. The difficulty level is reflected in the difficulty level coefficient (p) where items are difficult if $p < 0.3$, medium items if $0.3 \leq p \leq 0.7$, and easy grains if $p > 0.7$ [8]. The results of the analysis of the level of difficulty have an average of 0.535, including the medium category. Of the 35 items, there were 26% of the items included in the easy category, 51% included in the moderate category and 23% included in the difficult category. Items that are included in the difficult category are number 3, 12, 13, 15, 18, 20, 21, 34. Whereas the distinguishing power is reflected from the differentiation coefficient (rpbis) where

items with distinguishing power items are good if rpbis> 0 and the distinguishing power items are not good if rpbis ≤ 0 [8]. Judging from the distinguishing power obtained an average distinguishing power of 0.386, including the good category, with details of 83% items, has good distinguishing power and 17% items with poor distinguishing power. The items included in the category of poor power are 7, 12, 13, 15, 20, 21.

Based on the results of the analysis of chemistry national standardized school exam questions in classical test theory and item response theory there are eight exam questions whose characteristics are not good and difficult for students, namely items 3, 12, 13, 15, 18, 20, 21, 34. Later, the finding was subjected to the FGD to determine the problems that the students encountered. Then, the findings will be described regarding the factors that might be causing the item to be difficult for students, presented starting

Table 1. Item Difficulty Coefficient Based on Classical Test Theory

No	p	No	p	No	p	No	P	No	p
1	0,592	**8**	0,650	**15**	0,097	**22**	0,680	**29**	0,777
2	0,699	**9**	0,660	**16**	0,777	**23**	0,670	**30**	0,757
3	0,194	**10**	0,816	**17**	0,728	**24**	0,398	**31**	0,621
4	0,573	**11**	0,417	**18**	0,087	**25**	0,650	**32**	0,563
5	0,563	**12**	0,223	**19**	0,660	**26**	0,631	**33**	0,728
6	0,340	**13**	0,165	**20**	0,126	**27**	0,738	**34**	0,291
7	0,466	**14**	0,835	**21**	0,107	**28**	0,660	**35**	0,786

Information:
p = Difficulty Level Coefficient

Table 2. Item Difficulty Coefficient Based on Classical Test Theory

No	rpbis	No	rpbis	No	rpbis	No	rpbis	No	rpbis
1	0,082	**8**	0,518	**15**	-0,170	**22**	0,760	**29**	0,568
2	0,724	**9**	0,299	**16**	0,640	**23**	0,593	**30**	0,669
3	0,313	**10**	0,504	**17**	0,760	**24**	0,449	**31**	0,648
4	0,734	**11**	0,119	**18**	0,026	**25**	0,584	**32**	0,341
5	0,643	**12**	-0,487	**19**	0,735	**26**	0,739	**33**	0,532
6	0,096	**13**	-0,110	**20**	-0,195	**27**	0,681	**34**	0,387
7	-0,046	**14**	0,467	**21**	-0,385	**28**	0,732	**35**	0,576

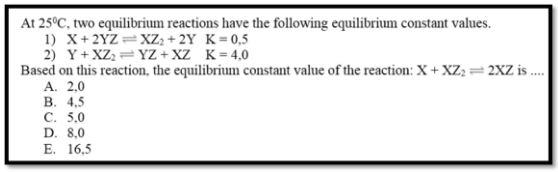
Information:
rpbis = Distinguishing Power Coefficient

Table 3. Item Difficulty Coefficient Based on Classical Test Theory

No	b	No	b	No	b	No	b	No	b
1	-0,32	**8**	-0,64	**15**	2,81	**22**	-0,81	**29**	-1,44
2	-0,97	**9**	-0,7	**16**	-1,44	**23**	-0,76	**30**	-1,31
3	1,91	**10**	-1,73	**17**	-1,11	**24**	0,7	**31**	-0,48
4	-0,22	**11**	0,57	**18**	2,93	**25**	-0,64	**32**	-0,16
5	-0,16	**12**	1,71	**19**	-0,7	**26**	-0,53	**33**	-1,11
6	1,01	**13**	2,14	**20**	2,49	**27**	-1,18	**34**	1,29
7	0,34	**14**	-1,89	**21**	2,69	**28**	-0,73	**35**	-1,54

Information:
b = Difficulty Level Coefficient

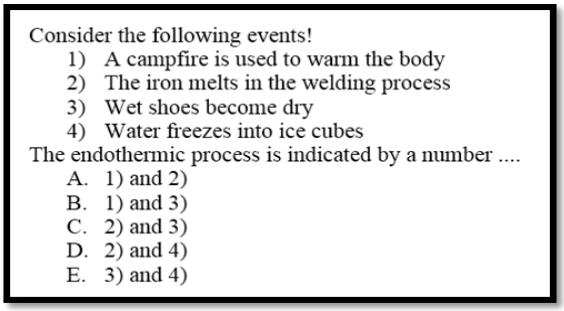
from the most difficult item.


At 25^{0}C, two equilibrium reactions have the following equilibrium constant values.
1) $X + 2YZ \rightleftharpoons XZ_2 + 2Y \quad K = 0,5$
2) $Y + XZ_2 \rightleftharpoons YZ + XZ \quad K = 4,0$

Based on this reaction, the equilibrium constant value of the reaction: $X + XZ_2 \rightleftharpoons 2XZ$ is ....
A. 2,0
B. 4,5
C. 5,0
D. 8,0
E. 16,5

Figure 1 Item No.18

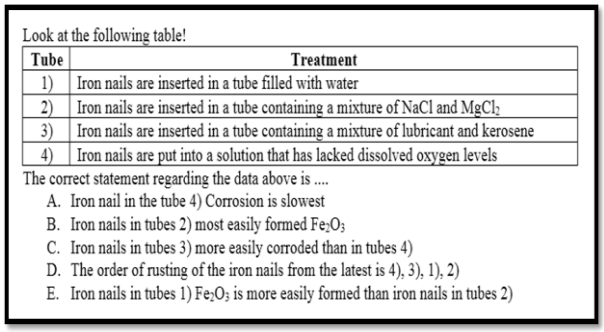
Item No.18 included in the difficult category with good distinguishing features. Item no.18 is a chemical equilibrium. This type of problem is similar to the enthalpy determination based on Hess's law, but both of them have different rules in their calculations. To be able to determine the value of the equilibrium constant based on the reaction, students need to condition the reaction given to match the requested reaction, namely $X + XZ_2$ $2XZ$. The reaction given (1) $X + 2YZ$ $XZ_2 + 2Y$ $K = 0,5$ (2) $Y + XZ_2$ $YZ + XZ$ $K=4,0$. The 2nd reaction must be multiplied by 2 to match the reaction requested and according to the rules, the value of K must be squared (K^2). Some operating rules must be understood and students are required to be able to match the reaction given with the reaction requested.


Consider the following events!
1) A campfire is used to warm the body
2) The iron melts in the welding process
3) Wet shoes become dry
4) Water freezes into ice cubes

The endothermic process is indicated by a number ....
A. 1) and 2)
B. 1) and 3)
C. 2) and 3)
D. 2) and 4)
E. 3) and 4)

Figure 2 Item No.15

Item No. 15 is included in the difficult category with poor differentiation. Item No. 15 is included in the thermochemical material. To be able to answer item number 15 correctly, students must distinguish systems and environments and connect the concepts of energy transfer to exothermic and endothermic reactions if illustrated using events in everyday life. Example in the case, "campfire is used to warm the body" which is the system is a campfire and the body is the environment. The transfer of energy takes place from the system to the environment so that these events include exothermic reactions. In the process of learning thermochemical material, students must be trained to connect the concepts of exothermic and endothermic reactions to daily life, not just limited to events that occur in the laboratory.

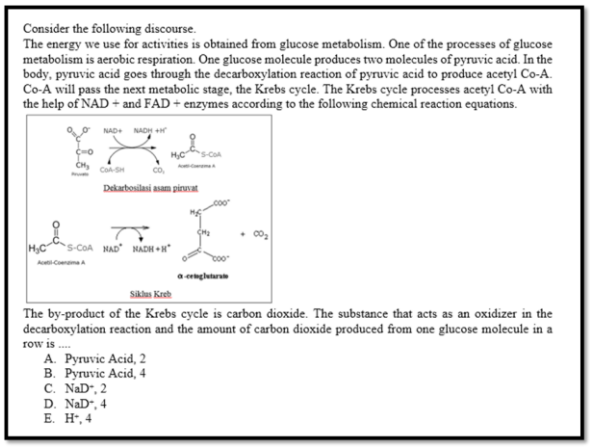

Look at the following table!

Tube	Treatment
1)	Iron nails are inserted in a tube filled with water
2)	Iron nails are inserted in a tube containing a mixture of NaCl and $MgCl_2$
3)	Iron nails are inserted in a tube containing a mixture of lubricant and kerosene
4)	Iron nails are put into a solution that has lacked dissolved oxygen levels

The correct statement regarding the data above is ....
A. Iron nail in the tube 4) Corrosion is slowest
B. Iron nails in tubes 2) most easily formed Fe_2O_3
C. Iron nails in tubes 3) more easily corroded than in tubes 4)
D. The order of rusting of the iron nails from the latest is 4), 3), 1), 2)
E. Iron nails in tubes 1) Fe_2O_3 is more easily formed than iron nails in tubes 2)

Figure 3 Item No.21

Item no. 21 is included in the difficult category with poor differentiation. Item no. 21 is included in the corrosion material. To be able to answer item number 21 correctly, students must understand the concept of factors that influence the occurrence of corrosion and compare which treatment accelerates the corrosion. Students can answer this type of problem if they master the concept of corrosion and make direct observations. The low number of students who answer correctly can be caused by the lack of providing illustrative examples of corrosion events in the surrounding environment. The solution to learning corrosion material needs to be done with a simple experimental method that students can do at home so students can observe the changes directly.

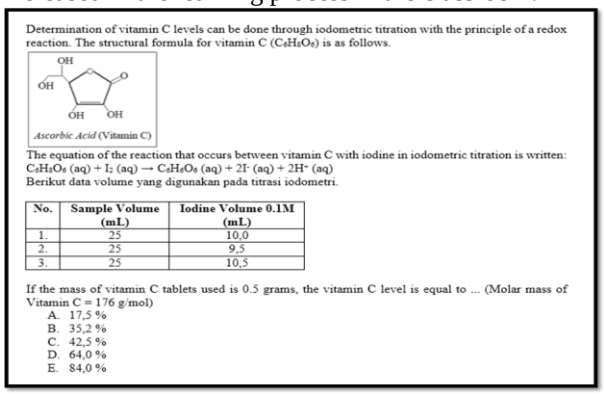

Consider the following discourse.
The energy we use for activities is obtained from glucose metabolism. One of the processes of glucose metabolism is aerobic respiration. One glucose molecule produces two molecules of pyruvic acid. In the body, pyruvic acid goes through the decarboxylation reaction of pyruvic acid to produce acetyl Co-A. Co-A will pass the next metabolic stage, the Krebs cycle. The Krebs cycle processes acetyl Co-A with the help of NAD + and FAD + enzymes according to the following chemical reaction equations.

The by-product of the Krebs cycle is carbon dioxide. The substance that acts as an oxidizer in the decarboxylation reaction and the amount of carbon dioxide produced from one glucose molecule in a row is ....
A. Pyruvic Acid, 2
B. Pyruvic Acid, 4
C. NaD^+, 2
D. NaD^+, 4
E. H^+, 4

Figure 4 Item No.20

Item No. 20 is included in the difficult category with poor differentiation. Item No. 20 is the material of redox and electrochemical reactions. To understand complex reactions one must be able to distinguish the compounds involved in the reaction and the compounds which only act as oxidizing agents. Calculations in determining the number of substances produced must also be considered. In the given reaction it appears that 1 molecule of pyruvic acid produces 2 molecules of CO_2 and in the discourse, it is said that 1 molecule of glucose produces 2 molecules of pyruvic acid so that the

amount of CO_2 produced from 1 glucose molecule is 4 molecules. The determination of substances that act as oxidizing agents can be determined if students understand the principle of reduction-oxidation reactions. The concept of a redox reaction used in the Kreb cycle is the process of releasing hydrogen (oxidation) and the process of capturing hydrogen (reduction). Oxidizers are substances that oxidize other substances or in other words, oxidizers are substances that have been reduced. If seen from the reaction given the substance that acts as is NAD+. The gradual reaction in the creative cycle and a large number of substances involved causes students to assume that this type of problem is difficult to understand. In other words, students' assumptions about the complexity of the reactions given caused many students who did not answer this problem correctly. In general, in the process of completion students only need to analyze the amount of a given substance and calculate the amount of substance produced according to the reaction given. Students' interest in reading complex reactions must be increased in the learning process in the classroom.



Determination of vitamin C levels can be done through iodometric titration with the principle of a redox reaction. The structural formula for vitamin C ($C_6H_8O_6$) is as follows.

Ascorbic Acid (Vitamin C)

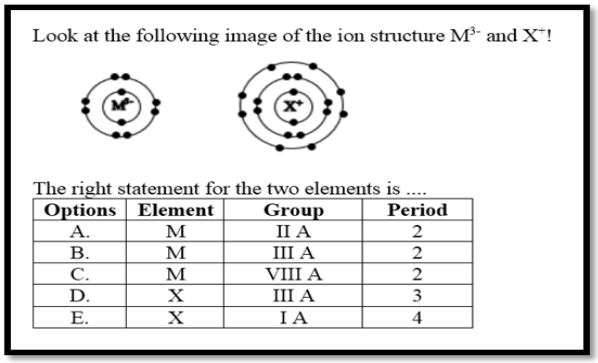
The equation of the reaction that occurs between vitamin C with iodine in iodometric titration is written:
$C_6H_8O_6$ (aq) + I_2 (aq) → $C_6H_6O_6$ (aq) + $2I^-$ (aq) + $2H^+$ (aq)
Berikut data volume yang digunakan pada titrasi iodometri.

No.	Sample Volume (mL)	Iodine Volume 0.1M (mL)
1.	25	10,0
2.	25	9,5
3.	25	10,5

If the mass of vitamin C tablets used is 0.5 grams, the vitamin C level is equal to ... (Molar mass of Vitamin C = 176 g/mol)
A. 17,5 %
B. 35,2 %
C. 42,5 %
D. 64,0 %
E. 84,0 %

Figure 5 Item No.13

Item no 13 is included in the difficult category with poor differentiation. Item no 13 is acid-base titration material. To be able to answer item 13 correctly, there are several procedures students must carry out. Vitamin C levels can be searched using a formula $\%\ mass = \frac{\text{mass of calculated substances}}{\text{sample mass}}\ x\ 100\%$. The mass of the count is obtained from the formula M = $\frac{gr}{Mr}\ x \frac{1000}{V}$ and the molarity value of the substance (M) is obtained from the iodometric titration formula M1V1 x valence 1 = M2V2 x valence 2. The lack of students' ability to connect several formulas makes this type of problem difficult to do. Besides, a large amount of data provided and the lengthy computation process caused students to assume that this problem was included as a complex and difficult problem. This situation causes students to decrease interest in answering the questions given. The solution requires practice in class using HOTS (Higher Order Thinking-Skill) questions on the titration material and not just using questions that calculate the concentration of one compound.



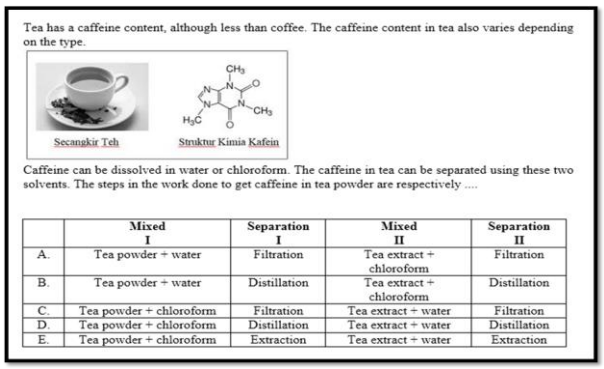
Look at the following image of the ion structure M^{3-} and X^+!

The right statement for the two elements is ....

Options	Element	Group	Period
A.	M	II A	2
B.	M	III A	2
C.	M	VIII A	2
D.	X	III A	3
E.	X	I A	4

Figure 6 Item No.3

Item no. 3 is included in the difficult category with good distinguishing features. Item no. 3 is included in the electron configuration material. To be able to answer point no 3 correctly, students must first determine the electron configuration based on the ion structure M^{3-} and X^+ based on the picture given. For M^{3-} several electrons based on the image there are 10 electrons with a $1S^2\ 2S^2\ 2P^6$ configuration. Determination of class and period of elements is based on the number of valence electrons and the period of an element is determined based on the largest shell number in the electron configuration of an element, so the correct configuration of the M element is $1S^2\ 2S^2\ 2P^3$ with a valence electron of 5 ($2S^2\ 2P^3$) and the largest shell number 2. The M element occupies the VA group and period 2. For the ion X^+ electron configuration is $1S^2\ 2S^2\ 2P^6\ 3S^2\ 3P^6$ the correct X element configuration $1S^2\ 2S^2\ 2P^6\ 3S^2\ 3P^6\ 4S^1$ with a valence electron of 1 ($4S^1$) and the largest shell number 4. Element X occupies group 1A Period 4. The lack of understanding when determining the configuration of the elements M and X is one of the reasons students solve this problem. Students assume that the electron configuration of the M^{3-} ion and the M element will be the same in determining the class and period so that the location of the M element in the periodic table is also wrong. The same goes for X^+ ions and the X element. This error can be said to be an error in understanding the essential concepts. The concept referred to is the concept in determining the location of elements in the periodic table which must be based on the electron configuration of the elements rather than based on the ion-electron configuration.


Tea has a caffeine content, although less than coffee. The caffeine content in tea also varies depending on the type.

Secangkir Teh | Struktur Kimia Kafein

Caffeine can be dissolved in water or chloroform. The caffeine in tea can be separated using these two solvents. The steps in the work done to get caffeine in tea powder are respectively ....

	Mixed I	Separation I	Mixed II	Separation II
A.	Tea powder + water	Filtration	Tea extract + chloroform	Filtration
B.	Tea powder + water	Distillation	Tea extract + chloroform	Distillation
C.	Tea powder + chloroform	Filtration	Tea extract + water	Filtration
D.	Tea powder + chloroform	Distillation	Tea extract + water	Distillation
E.	Tea powder + chloroform	Extraction	Tea extract + water	Extraction

Figure 7 Item No.12

Item no. 12 is included in a difficult category with poor differentiation. Item no. 12 is the compound separation material. To be able to answer item number 12 correctly, students must be able to distinguish the concepts of separation by filtration, distillation, and extraction, as well as the stages of work steps and types of solvents that must be used. To get caffeine in tea powder is done by a distillation system. The basis of the separation by the distillation technique is the difference in the boiling points of two or more liquids. The stages of the work steps to get caffeine in tea powder are done by mixing tea powder with water then distilled. The result is a tea extract which is then dissolved with chloroform and distilled again so that the caffeine compound is obtained. The difficulty of this problem is due to the lack of students' understanding of the work steps in separation and the type of solvent that must be used. To answer the problem, a proper analysis is needed between the type of separation and the correct solvent in accordance with the compound to be separated. Classroom learning should be able to improve students' understanding of separating compounds by conducting simple labs or demonstrations or using a virtual lab so that students can determine the type of separation and the appropriate work steps in separating compounds.

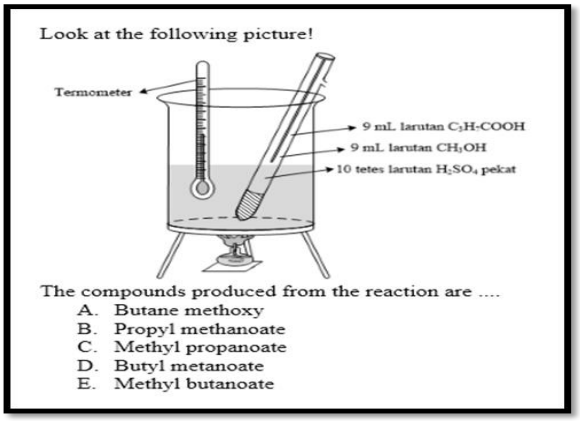


Figure 8 Item No.34

Item no. 34 is included in the difficult category with good differentiation. Item no. 34 is an alkane-derived material. To determine the compounds produced from the given experimental images can use the concept of an esterification reaction that reacts carboxylic acids and alcohols with the aid of concentrated sulfuric acid catalysts to produce ester compounds. The carboxylic acid in the problem is in the form of C_3H_7COOH solution and Alcohol in the form of CH3OH solution, then the reaction that occurs is $C_3H_7COOH + CH_3OH \xrightarrow{H2504} C_3H_7 - COO - CH_3$ (Methyl Butanoate). The low ability of students to work on problems because the reaction is not given in full as the questions in general but in the form of experimental images that make it difficult for students to change the information/data provided in the picture into a whole reaction and identify the reacting compounds and compounds that only act as catalysts.

Based on the results of the focus group discussion, the students' difficulties can be summarized. Then the participants of FGD describe the causes, as well as strategies, that can be implemented to improve them. The results are presented in Table 4 below.

Based on the results of the analysis of the chemistry national standardized school exam question, the difficulty of students in answering questions lies in the material of electron configuration, compound separation, acid-base titration, thermochemistry, chemical equilibrium, redox and electrochemical reactions, corrosion, and alkane derivatives. Student difficulties may be caused by several factors, namely: (1) lack of conceptual understanding, (2) difficulty in calculating and using complex formulas, (3) difficulty in choosing information, (4) not accustomed to solving complex questions, (5) not accustomed to solving problems of reasoning level, (6) low interest and motivation of students in reading complex reactions and reading illustrations of chemical events in everyday life.

Table 4. Item Difficulty Coefficient Based on Classical Test Theory

The Students' Difficulties	The Cause of Students' Difficulties	Teachers' Strategies to Overcome Students' Difficulties
Lack of conceptual understanding	The lack of fundamental understanding of chemistry and using complex formulas	The teacher must strengthen students' understanding, equip students with question models especially those related to real contexts, give them various exercises to answer contextual test questions presented in the form of pictures and narrative text, familiarize students with answering test questions through several completion steps instead of operating these steps directly through basic concepts, and familiarize them with solving test questions whose alternatives are in the narrative text, increase students' motivation to learn chemistry, then Optimize school and support parents
Difficulty in calculating and using complex formulas	Factors of students: of interest and motivation of students makes them less understand the concept of chemistry	
Difficulty in choosing information	Factors of teachers: The chemistry teaching and learning was not effective	
Not accustomed to solving complex questions	Factors of school: The lack of support from school	
Not accustomed to solving problems of reasoning level	Factors of parents: The lack of support from parents and not all parents remind students to practice and learn chemistry	
Low interest and motivation of students in reading complex reactions and reading illustrations of chemical events in everyday life		

To overcome students 'difficulties, it can be done by strengthening students' understanding of chemistry about chemical concepts. Understanding concepts can be achieved through learning by utilizing the context that students face every day. According to [9] the teacher's way of overcoming students 'difficulties in answering items by strengthening students' understanding, giving questions to students with problem-based models is mainly related to real contexts. This is supported by the results of research [10] in which understanding of the concept is done by providing training to students through activities and real things that are around students. Meanwhile, according to [11] the need to connect concepts and symbols with things that are already known to students. Further understanding of the factors that cause difficulties for students themselves is the lack of interest and motivation of students.

The lack of interest and motivation of students makes them less understand the concept of chemistry and then they have difficulty when answering problems about chemistry. Most students think that chemistry is a difficult subject. Poor perception can affect students' interest in chemistry. According to [12] students are interested in experimental activities in learning chemistry, but they consider chemistry as a complex science lesson with abstract symbols and terms that must be memorized. Teacher skills in conveying abstract concepts influence student interests. Poor perception of chemistry makes students not interested in learning chemistry because they do not feel curious. Therefore, teachers are advised to create a good first impression in learning chemistry and try to increase students' interest and motivation to learn. According to [10] efforts to increase students, motivation can be done by utilizing the quality of learning and giving rewards to students.

To be able to improve student understanding teachers must be able to optimize learning. However, chemistry teachers in schools have a variety of tasks that can burden teachers in learning, such as developing learning plans, conducting assessments and improving learning using assessment results. This certainly causes the effectiveness of learning to be not good, thus affecting students' understanding of the concept of chemistry. This is in line with the opinion of [13] that teacher behavior in learning affects student achievement.

Another factor that causes student difficulties is the lack of support from schools and parents. The difficulty of students in answering chemistry national standardized school exam questions can be increased

through communication from teacher to school and from teacher to parent. With the support of schools and parents, the learning process will be more effectively carried out by chemistry teachers. Schools must have availability in supporting learning resources and teaching equipment. Schools and parents must continue to monitor and make a positive impact on student achievement.

Overall, the chemistry national standardized school exam high school device is quite good in quality. This can be seen from the value of the reliability of reliability obtained by 0.83. Reliability or reliability is a coefficient that shows the level of constancy or consistency of the results of the measurement of a test. Reliability is a translation of the word reliability which has the word rely and ability. Measurements that have high reliability are called reliable measurements. The main idea contained in the concept of reliability is the extent to which the results of a measurement can be trusted [14]. [15] suggest that reliability is expressed by the reliability coefficient whose numbers are in the range from 0 to 1.00. The higher the reliability coefficient close to 1.00 means the higher the reliability. Conversely, the lower the coefficient approaching 0 means the lower the reliability. So it can be concluded that the reliability of the chemical national standardized school exam problem in the good category is 0.83.

4. CONCLUSION

The results of the analysis of chemistry national standardized school exam questions in classical test theory and item response theory there are nine exam questions whose characteristics are not good and difficult for students, namely items 3, 12, 13, 15, 18, 20, 21, 34 with the results of the estimated reliability amounted to 0.83 (reliable). Student difficulties in answering questions are caused by several factors, namely the lack of essential conceptual understanding and the difficulty of students in solving problems using complex formulas. Factors of learning also affect the difficulty of students in answering questions, such as students are not used to working on questions at the level of reasoning. Students' interest and motivation towards chemistry also influence student results in answering chemistry national standardized school exam questions.

There needs to be involvement from various parties such as schools, teachers, families and especially students themselves to contribute to overcoming students' difficulties in answering chemistry national standardized school exam questions. Teachers must pay attention to the process of learning chemistry seriously. Chemistry has many concepts that students must understand so that they can associatechemistry concepts with the surrounding environment and in everyday life. Moreover, schools should prepare structured planning and have a strategy that can support teachers in the learning process so that student understanding can be obtained in-depth. Finally, parents are also an important factor in monitoring student academic development, so parents should also contribute in paying attention to the student learning process in chemistry subjects.

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