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Analysis of Science Literacy Teaching Book Class XI at SMA Negeri Surakarta on Acid-Base Material

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Analysis,
Textbooks,
Scientific Literacy

Abstract

This descriptive research aims to explain the scope of scientific literacy in chemistry textbooks used in Surakarta. This research data are in the form of quantity from 4 categories of scientific literacy with 26 subcategories as indicators of grouping text units in textbook analysis. The data sources in this study were five textbooks for class XI with different publishers. The technique of taking the object of research uses a purposive sampling technique. Based on the results of data analysis based on the category of scientific literacy, the average results of the proportion of scientific literacy are obtained as follows: (1) Science as a body of knowledge was 69.98% (2) Science as a way of an investigation by 14.43% (3) Science as a way of thinking by 10.63% (4) Interaction of science with technology and society by 4.98%. The results of the fulfillment of the scientific literacy category in book A have a ratio of the category of science as knowledge: science as a way of investigation: interaction of science, technology, and society: category of science as a way of thinking that is 9:1:1:1. The ratio in book B is 6:2:0:1, the ratio in book C is 4:2:0:1, the ratio in book D is 9:0:0:1, and the ratio in book E is 6:2:1: 1. Therefore, from the results of this study, the recommended textbook for use is the book E because it includes aspects of scientific literacy that are complete and more balanced than the other four books.

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Introduction

The provision of quality science education will have an impact on the government in development. Science education plays a role in students' success in living in the 21st century. Scientific literacy is one of the 16 skills needed in the 21st century, according to the 2015 World Economic Forum (Liu, 2009). The importance of scientific literacy for students is related to students understanding of the environment, economy, and other problems faced by public health-related to progress and technology, and the development of science (Toharudin et al., 2011)

PISA results in 2018 decreased compared to the previous year with an average score of 382, which ranked 71st out of 79 countries. Indonesia's score is still below the average standard determined by PISA, and the ideal score is 500. In the PISA study, Indonesia gets a low score, which means that Indonesian students' knowledge of science is limited. Indonesian students, in general, can only understand the dimensions of content and are weak for the other dimensions, namely the dimensions of context and skills (Ekohariadi, 2009).

From previous research on scientific literacy in Surakarta, it shows that the scientific literacy of students in the initial profile of scientific literacy of students in Surakarta is 47.82% at level 1; 33.82 at level 2; 42.93% at level 3; 26.50% at level 4; 21.73% at level 5. This shows that students' scientific literacy skills in Surakarta are still low (Nur'aini et al., 2017). Thus, students' literacy ability in Indonesia is still low, one of which in Surakarta impacts the low quality of human resources, technological advances, and science experience obstacles if not immediately addressed. Several factors that cause students' scientific literacy skills in Indonesia are still low: curriculum and learning systems, methods, models, teaching materials, learning resources, facilities, and infrastructure. Textbooks are the primary source of learning for students in schools, which is one of the factors causing students' scientific literacy in Indonesia to below. Books are a direct source of learning during the teaching and learning process in the classroom (Kurnia et al., 2014).

Following the applicable 2013 curriculum and 21st-century skills, a good chemistry textbook should contain and meet the balance of scientific literacy. However, chemistry textbooks used in Indonesia still do not provide proportional scientific literacy content. The results of previous research showed that the level of scientific literacy in the results of scientific literacy in textbooks was the highest indicator of scientific knowledge at 67.45%. In the investigation indicator, the nature of science appeared at 13.77%, and the indicator of science as a way of thinking appeared at 11.74%; The indicator of interaction between science, technology, and society appears at 7.03% (Wahyusari, 2017). This tendency shows that students have poor skills in applying their knowledge and are only good at remembering (Ardianto & Pursitasari, 2017). Therefore, textbooks that contain all aspects of science, including process aspects, content aspects, and context aspects, are expected to improve scientific literacy mastery. Previous research shows that the scientific literacy category is close to a balanced proportion, namely 42% of the science category as knowledge, 19% of science as a way of investigation, 20% of the interaction of science, technology, and society, and 19% of the science category as a way of thinking or in general, has a ratio 4:2:2:2 (Wilkinson, 1999).

One of the chemical materials that can analyze for scientific literacy is acid-base material. Acid-base chemistry in chemistry is a fundamental concept because most chemical reactions are acid-base reactions (Cetingul & Geban, 2005). The material that has a close relationship in everyday life is acid-base material. After understanding the concept, students expect to explain the symptoms and phenomena in everyday life with alkaline and acidic properties. Acid-base material is essential to study because acid-base helps understand other chemical concepts such as chemical equilibrium, solution concentration, hydrolysis-oxidation-reduction reactions, and buffer solution (Lin et al., 2004). Research that has been carried out class X high school chemistry textbook in Bener Meriah Regency (Anbiya et al., 2018), biology class XI in South Tangerang City (Lailatul et al., 2015), class XI high school chemistry textbook in Brebes Regency (Retno et al., 2017) and class XI chemistry textbook (Nur'aini et al., 2017) chemistry textbooks based on scientific literacy content, researchers analyzed the four aspects of scientific literacy in textbooks in different places and the results of data analysis showed that literacy content the most widely contained science in the subject matter is scientific knowledge and an unbalanced proportion. Based on research on scientific literacy in acid-base materials, no one has researched the level of scientific literacy in

chemistry textbooks. Acid-base material in textbooks has been analyzed related to misconceptions (Sugiyarto & Heru, 2013) and readability analysis (Akbari et al., 2017).

So to find out the scope of scientific literacy, the researchers are interested in conducting research on chemistry textbooks for class XI in Surakarta to determine learning resources that contain proportional scientific literacy so that students' scientific literacy skills increase, especially in acid-base solution materials. Based on this, the analysis of acid-base material in student textbooks is essential to ensure the quality of education in Indonesia. Content analysis on scientific literacy in chemistry textbooks includes four categories: science as a body of knowledge; science as a path of inquiry; science as a way of thinking; and the interaction of science with technology and society (Chiappetta & Fillman, 2007).

Method

This research is qualitative research with a descriptive method. Descriptive research is research to investigate circumstances, conditions, and other things whose results are presented in the form of research reports (Arikunto, 2013). The data of this research are in the form of quantity from 4 categories of scientific literacy with 26 subcategories as indicators of grouping text units in textbook analysis. The sample books used as data sources in this study were five class XI textbooks at SMA N Surakarta with different publishers, namely Erlangga, Tiga Serangkai, Bumi Aksara, Intan Pariwara, and Simpati. The technique of taking the object of research uses a purposive sampling technique. Data collection techniques used research instruments in the form of scientific literacy indicator analysis sheets. The validity test in this study is the instrument validity test using the Gregory formula and the data validity test using triangulation between researchers, which involves researchers, raters, and expert judgment. The data analysis technique adds up and calculates the percentage of scientific literacy indicators and observer reliability occurrences.

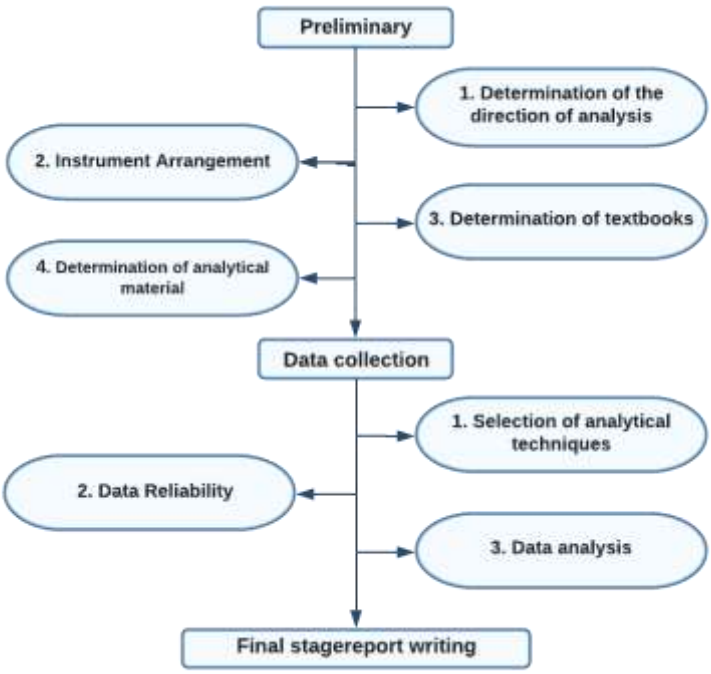


Figure 1. Research Procedure Chart

Results and Discussion

In this study, the analysis was carried out by two raters independently using the guidelines for the scientific literacy category, including science as a body of knowledge, science as a way of investigation, science as a way of thinking, and the interaction of science with technology and society. The four categories of scientific literacy are further elaborated into 26 subcategories. Each rater performs an analysis using a scientific literacy checklist sheet. The detail can be shown in Table 1.

Table 1. Science Literacy Indicator Analysis Sheet

Categories	Subcategories
Science as the body of knowledge	Presenting facts, Presenting concepts, Presenting principles, Presenting laws Presenting hypotheses, Presenting theories Presenting models Asking students to recall knowledge or information
Science as a path of inquiry	Ask students to answer questions using the material Ask students to answer questions using graphs, tables, etc. Ask students to answer questions using calculations Ask students to explain their answers Involve students in activities or experiments Provide sources of information from the internet
Science as a way of thinking	Describes how scientists experiment Shows the history of the development of ideas Emphasizes the empirical and objectivity of science Illustrate using assumptions Shows how science works with inductive and deductive reasoning Provide a cause and effect relationshi Discuss facts and evidence Presenting the scientific method and problem solving
The interaction of science with technology and society	Describe the use of science and technology in society Emphasize the negative effects of science and technology on society Discuss social issues related to technology Shows jobs in science and technology

The inter-rater agreement or agreement index between the two raters was measured using kappa statistics and the percentage of agreement. The results of the calculation of the percentage of agreement and statistics can see in Table 2.

Table 2. Agreement Value and Kappa Statistics between raters.

No	Book	% Deal	Kappa	Category
1	A	95,5	0,802	Almost perfect
2	B	95,2	0,807	Almost perfect
3	C	94,7	0,814	Almost perfect
4	D	95,0	0,803	Almost perfect
5	E	95,1	0,828	Almost perfect
Average		95,1	0,810	Almost perfect

Based on the results in table 1, the percentage of agreement between the two raters in the five books is above 94%, which means that the two raters value more than 94% of the same coding value (agree) on the unit analysis. Based on (Landis & Koch, 1977) , a kappa value of 0.81 to 1 indicates an almost perfect agreement value (Almost perfect). So the statistics of kappa books A, B, C, D, and E are in the range of 0.802 to 0.828, which means that the agreement between raters is almost perfect. The category data for the emergence of scientific literacy in class XI chemistry textbooks are presented in table 3.

Table 3. Table of Repaitulation of the Percentage of Appearance of Scientific Literacy Indicators in Each Book

No	The aspect of Scientific Literacy	Percentage of Distribution in Books (%)					Average
		A	B	C	D	E	(%)
1.	Science as the body of knowledge	72,88	68,31	61,12	86,59	60,99	69,98
2.	Science as a path of inquiry	10,10	16,83	22,22	1,03	21,96	14,43
3.	Science as a way of thinking	9,32	10,89	13,90	9,27	9,76	10,63
4.	The interaction of science with technology and society	7,75	3,96	2,78	3,09	7,32	4,98
Amount		100	100	100	100	100	100

Based on Table 3, the emergence of aspects of scientific literacy in acid-base chemistry textbooks shows different amounts and percentages. Therefore, the average occurrence of scientific literacy aspects for the five textbooks analyzed can be more easily understood with the following figure:

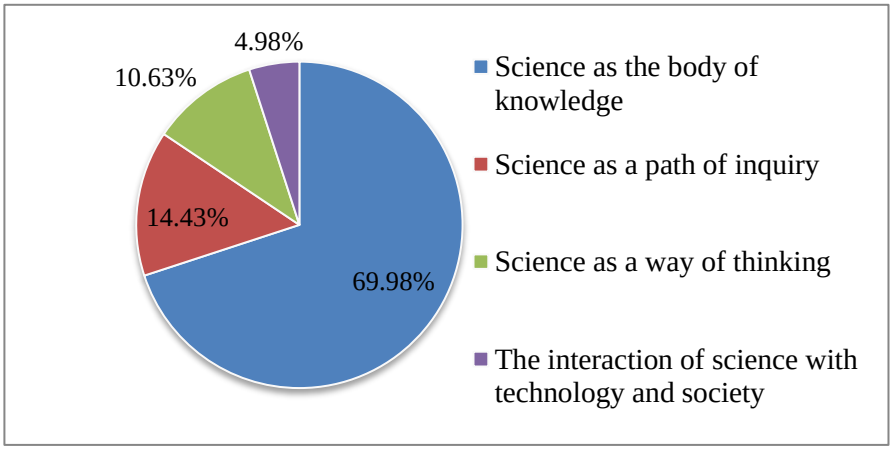


Figure 2. Present the average of the five textbooks in the four categories of scientific literacy

The average percentage of the scientific literacy category is dominated by science as the body of knowledge with an average of 69.98%. At the same time, the lowest category is the interaction of science with technology and society, with an average of 4.98%.

1. Science as the Body of Knowledge

Aspects of science as the body knowledge contains the subject matter of learning about acids and bases which include concepts, facts, principles, laws, and theories (Ummah et al., 2018). Thus, in the first scientific literacy category, science as the body of knowledge is the category that appears the most in the five books.

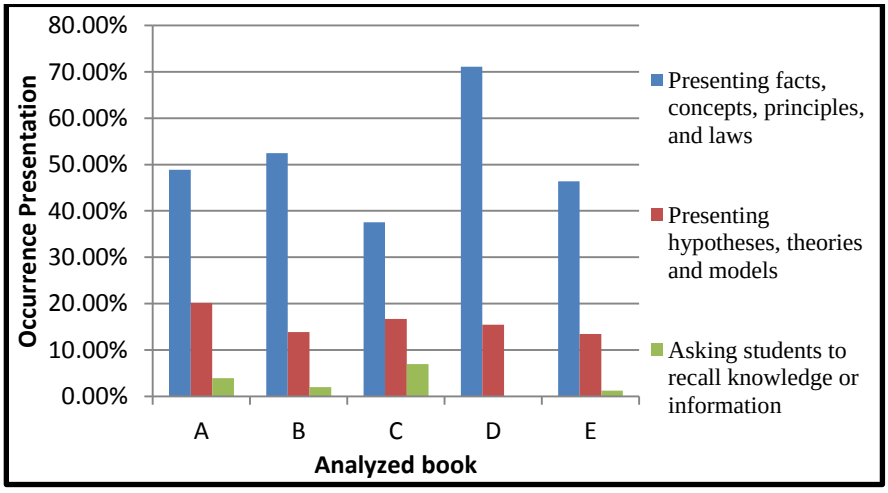


Figure 3. Graph of the Percentage of Science as the Body of Knowledge in the Five Books

The percentage of occurrences in this category is 72.88% in book A; 68.31% in book B; 61.12% in book C; 86.59% in book D; 60.99% in book E. Thus, if average, the percentage of occurrences of science indicators as the body of knowledge is 69.98%. This shows that the science category dominates high school chemistry textbooks as a body that mainly presents subject matter that contains principles, laws, facts, concepts, and questions that ask students to remember knowledge and information.

1) Facts are defined as all things in the form of reality and truth (Andi, 2014). For example, on page 182 of book C, there is a sentence about the dangers of CH-3COOH, which is a fact because it is true that CH3COOH solution based on experience will be harmful in contact with skin and eyes (Figure 4).

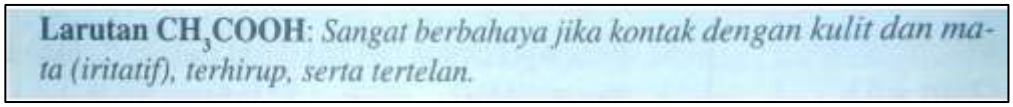
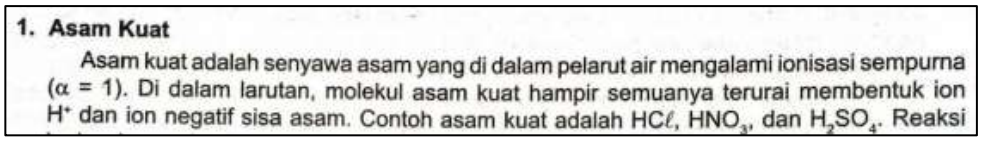


Figure 4. Example of the results of the fact sub-indicator analysis (Rahardjo & Ispriyanto, 2019)

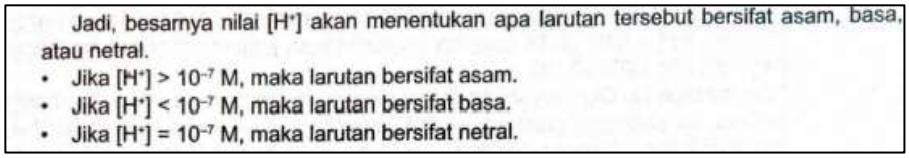
2) The concept is everything in the form of new understandings that can arise from thinking, including understanding, definition, core/content, unique characteristics, nature, etc. (Andi, 2014) So on page 10 paragraph, four book D is a concept because it contains the definition or definition of a strong acid (Figure 5).


1. **Asam Kuat**

Asam kuat adalah senyawa asam yang di dalam pelarut air mengalami ionisasi sempurna ($\alpha = 1$). Di dalam larutan, molekul asam kuat hampir semuanya terurai membentuk ion H^+ dan ion negatif sisa asam. Contoh asam kuat adalah $HC\ell$, HNO_3, dan H_2SO_4. Reaksi

Figure 5. Example of the results of the analysis of concept sub-indicators (Sariyanto, 2020)

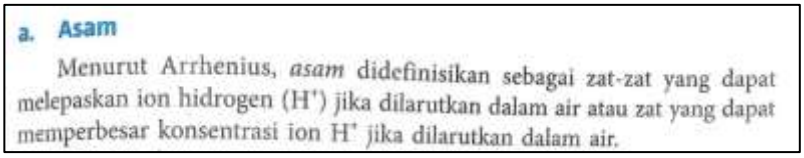
3) The principle is also a relationship between concepts that describe "if....then....(Zulfiani et al., 2009). Book D, page 13, contains a paragraph explaining the principle of the nature of the solution in terms of the value [H^+] (Figure 6.).


Jadi, besarnya nilai [H^+] akan menentukan apa larutan tersebut bersifat asam, basa, atau netral.

- Jika [H^+] > 10^{-7} M, maka larutan bersifat asam.
- Jika [H^+] < 10^{-7} M, maka larutan bersifat basa.
- Jika [H^+] = 10^{-7} M, maka larutan bersifat netral.

Figure 6. Example of the results of the principle sub-indicator analysis (Sariyanto, 2020)

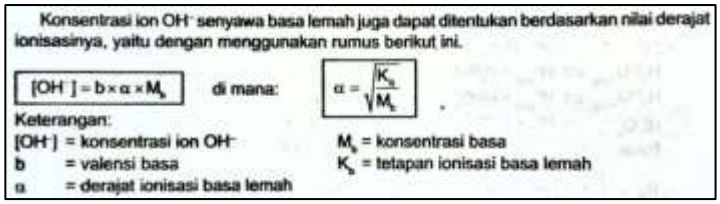
4) Law is also a statement of the relationship between variables that are so high, and the possible occurrence of the relationship is so high that it can be it is said that the variables are mutually believed, and approach empirical truth (Zulfiani et al., 2009) For example, on page 151, paragraph 3 of book A, Arrhenius states law regarding the definition of an acid (Figure 7.).


a. **Asam**

Menurut Arrhenius, *asam* didefinisikan sebagai zat-zat yang dapat melepaskan ion hidrogen (H^+) jika dilarutkan dalam air atau zat yang dapat memperbesar konsentrasi ion H^+ jika dilarutkan dalam air.

Figure 7. Example of legal sub-indicator analysis results(Nasution, 2018)

5) The theory is a set of concepts, definitions, and propositions that presents a systematic description of a phenomenon and the relationship between its variables, to explain or predict the phenomenon (Sudradjat, 2020). On page 12 of book D, there is a theory about the formula for determining the concentration of OH^-.


Konsentrasi ion OH^- senyawa basa lemah juga dapat ditentukan berdasarkan nilai derajat ionisasinya, yaitu dengan menggunakan rumus berikut ini.

$[OH^-] = b \times \alpha \times M_b$ di mana: $\alpha = \sqrt{\frac{K_b}{M_b}}$

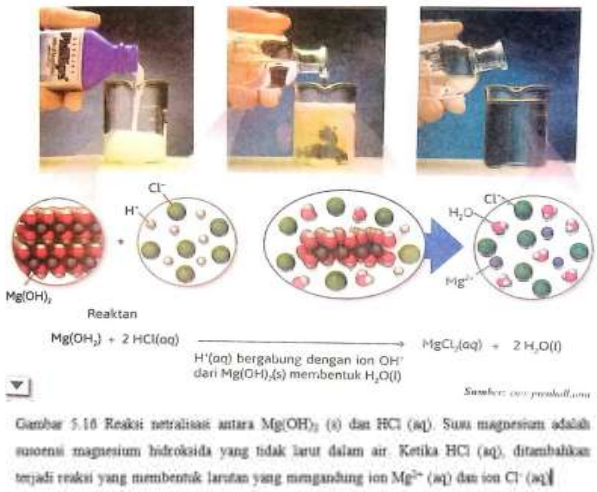
Keterangan:

$[OH^-]$ = konsentrasi ion OH^-
b = valensi basa
α = derajat ionisasi basa lemah
M_b = konsentrasi basa
K_b = tetapan ionisasi basa lemah

Figure 8. Example of the analysis of sub-indicator theory (Sariyanto, 2020)

6) The model can also be interpreted as a pattern (e.g., reference, variety, etc.) of something made or produced (Qodratillah, 2011). For example, illustrating the chemical molecular structure found on page 171 of book A provides an overview of the molecular arrangement in the reaction of acids and bases. This illustration is given because, in actual conditions, chemical reactions that cannot see with the eye tend to be different from their physical appearance (macroscopic). So to be able to understand the

submicroscopic aspect requires a concretization model (Kirna, 2007). So we need a model to describe it so that it is easy to learn. On page 171 of book A, a model is showing the process of the neutralization reaction between $Mg(OH)_2$(s) and HCl (aq), which is modeled by depicting ion particles. The modeling uses spheres with different sizes and colors showing different ions to clear the formation of $MgCl_2$ (aq) and H_2O (l) molecules (Figure 9.).



Gambar 5.16 Reaksi netralisasi antara $Mg(OH)_2$ (s) dan HCl (aq). Susu magnesium adalah suspensi magnesium hidroksida yang tidak larut dalam air. Ketika HCl (aq), ditambahkan terjadi reaksi yang membentuk larutan yang mengandung ion Mg^{2+} (aq) dan ion Cl^- (aq).

Figure 9. Example of model sub-indicator analysis results (Nasution, 2018)

7) Indicators asking students to recall information or knowledge are usually contained in text units in the form of questions that only ask students to recall information or answer in a text. This third indicator is mainly found in book C. An example of the analysis results in this subcategory shown on page 169 can see in Figure 10. There is a question regarding the determination of conjugate bases that asks students to recall the material they have learned.

Tulislah basa konjugat dari:
A. H_2S, C. HSO_4^-, E. HCO_3^-.
B. HCN, D. HOCl, dan

Figure 10. Example of indicator analysis results asking students to recall knowledge or information (Sariyanto, 2020)

This category is a container dimension that refers to understanding a natural phenomenon and change by human activities (Toharudin et al., 2011). Students need to emerge from the five books in this category to know the basics of the studied knowledge. In the five textbooks analyzed, the most frequently appearing statements on indicators present principles, facts, laws, and concepts. The statement refers to the theory that students must memorize to master science, not think about mastering science, especially in chemistry lessons. When viewed from the facts, students in Indonesia are less skilled in applying their knowledge. On the other hand, they tend to be more competent in memorizing (Prastiwi & Laksono, 2018).

Books that present science as a body of knowledge are also crucial because they can make students decide to solve problems as a foundation for students. Still, if the presentation is too much, it causes students' interest in the learning process to decrease (Retno et al., 2017). So that it will have a destructive impact on the chemistry learning process at school because it only provides material that emphasizes the dimensions of content or science as the body of science, which causes a lack of motivation for students to learn chemistry, making it difficult for students to develop in conducting investigations of scientific phenomena and building his knowledge (Retno et al., 2017).

2. Science as a Path of Investigation

Science comes from an ongoing process of inquiry. Science as scientific knowledge is formed through the sharpness of everyone's attention to natural phenomena marked through scientific processes, such as experiments, observations, measurements, and other scientific procedures.

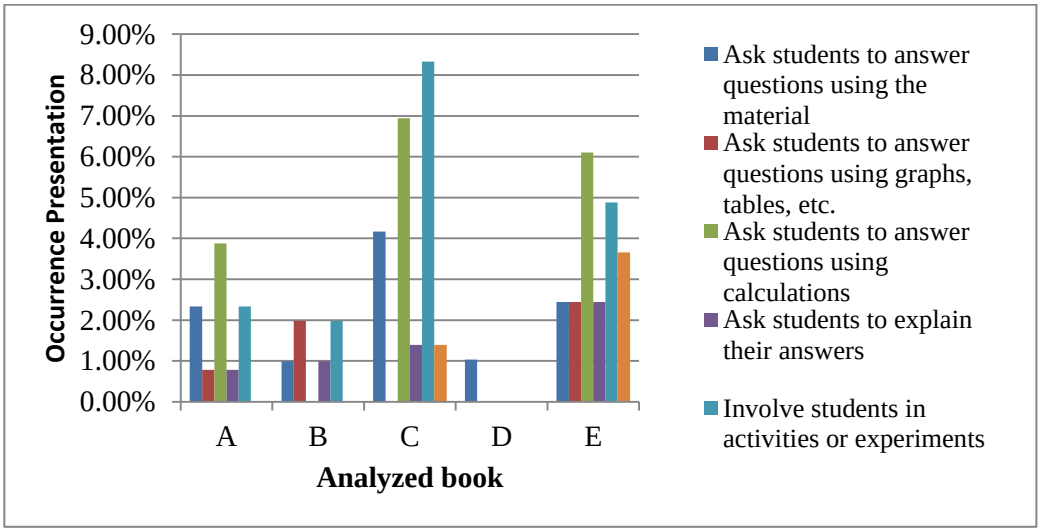
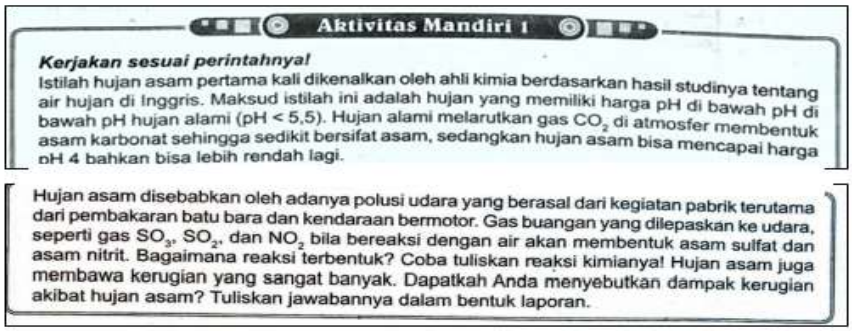


Figure 11. The percentage of occurrences in the science category as a way of investigation in the five books

The percentage of occurrences in this category is 10.10% in book A; 16.83% in book B; 22.22% in book C; 1.03% in book D; 21.96% in book E with an average of 14.43%. In addition, some examples of analysis results which are indicators of science as a way of investigation, are found on several pages, including:

1) Page 16 on book D, an independent activity rubric 1, contains instructions for students to carry out activities to answer questions using the material. For example, in the independent activity column1 page 16, the unit of text that asks students to write down the reactions and effects of losses caused by acid rain shows the students activities to answer questions using the material.



Aktivitas Mandiri 1

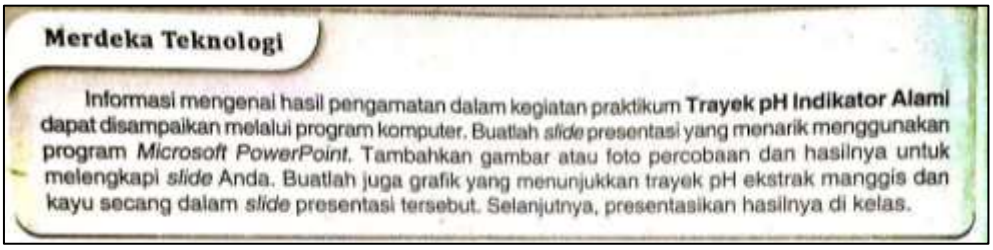
Kerjakan sesuai perintahnya!

Istilah hujan asam pertama kali dikenalkan oleh ahli kimia berdasarkan hasil studinya tentang air hujan di Inggris. Maksud istilah ini adalah hujan yang memiliki harga pH di bawah pH di bawah pH hujan alami (pH < 5,5). Hujan alami melarutkan gas CO_2 di atmosfer membentuk asam karbonat sehingga sedikit bersifat asam, sedangkan hujan asam bisa mencapai harga pH 4 bahkan bisa lebih rendah lagi.

Hujan asam disebabkan oleh adanya polusi udara yang berasal dari kegiatan pabrik terutama dari pembakaran batu bara dan kendaraan bermotor. Gas buangan yang dilepaskan ke udara, seperti gas SO_3, SO_2, dan NO_2 bila bereaksi dengan air akan membentuk asam sulfat dan asam nitrit. Bagaimana reaksi terbentuk? Coba tuliskan reaksi kimianya! Hujan asam juga membawa kerugian yang sangat banyak. Dapatkah Anda menyebutkan dampak kerugian akibat hujan asam? Tuliskan jawabannya dalam bentuk laporan.

Figure 12. Example of indicator analysis results asking students to answer questions using material (Sariyanto, 2020)

2) Page 12 of Book E contains an independent technology rubric containing directions for using technology and computer programs in learning that develops skills in using technology and computer programs. The basis of the analysis used is the command that asks students, "also make a graph showing the pH trajectory of mangosteen extract and sappan wood." From the sentence, it is known that the text unit being analyzed asks students to complete the task through graphics so that the text unit is included in the category.



Merdeka Teknologi

Informasi mengenai hasil pengamatan dalam kegiatan praktikum **Trayek pH Indikator Alami** dapat disampaikan melalui program komputer. Buatlah *slide* presentasi yang menarik menggunakan program *Microsoft PowerPoint*. Tambahkan gambar atau foto percobaan dan hasilnya untuk melengkapi *slide* Anda. Buatlah juga grafik yang menunjukkan trayek pH ekstrak manggis dan kayu secang dalam *slide* presentasi tersebut. Selanjutnya, presentasikan hasilnya di kelas.

Figure 13. Example of indicator analysis results asking students to answer questions using tables, graphs, and others (Wulandari et al., 2020)

3) Page 172 of Book A, there is a challenge rubric containing questions with a relatively high level of difficulty that require analysis and understanding of complex knowledge both on the material being discussed and the material studied. For example, in the challenging column, the sentence "calculate the concentration of H_3O^+ and OH^- in rainwater with a pH of 3.3 at a temperature of 25^0C" shows an indicator asking students to answer questions using calculations.

Tantangan

pH hujan asam turun sampai 3 atau bahkan lebih rendah untuk daerah-daerah yang sangat tercemar. Hitung konsentrasi H_3O^+ dan OH^- dalam air hujan dengan pH 3,3 pada temperatur 25 °C.

Figure 14. Example of indicator analysis results asking students to answer questions using calculations (Nasution, 2018)

4) Page 169 on book C and understanding test column 6.1 contains questions to determine students understanding of the material studied during the learning process, namely acid-base material. For example, one question asks students to explain the answer from several questions, namely by explaining the answers to the questions given and solving problems.

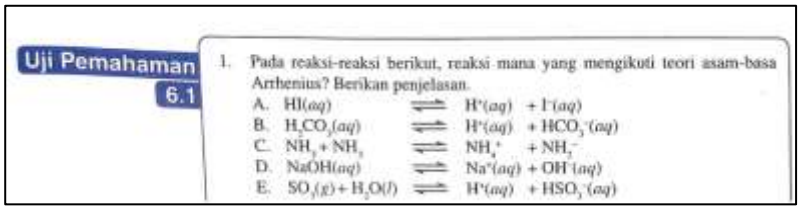


Figure 15. Example of indicator analysis results asking students to explain their answers (Rahardjo & Ispriyanto, 2019)

5) Page 157 Book A, there is an activity column that contains activities that involve students and require students to think more in learning by using the experimental method Activity 5.1 is an experimental activity that in its stages asks students to make natural indicators based on research procedures so that This is included in the indicator involving students doing activities or experiments

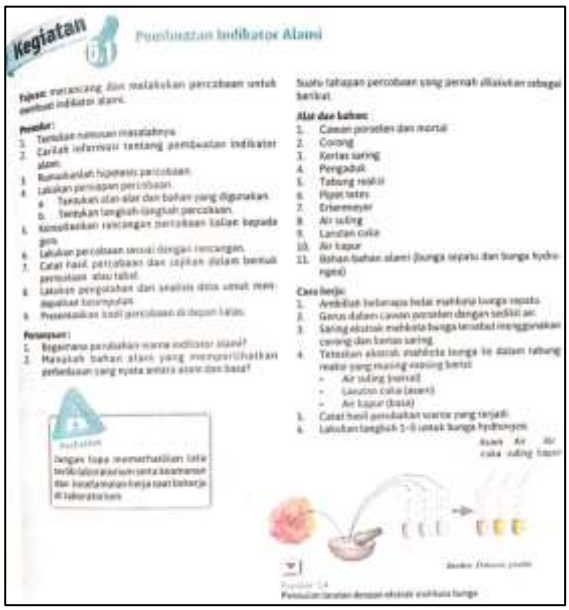


Figure 16. Example of indicator analysis results involving students in activities or experiments(Nasution, 2018)

6) Page 173 of book C, there is an E-Learning column containing a website address to allow students to learn further by opening an internet site that is provided with topics on acids, bases, and indicators to increase students' curiosity about the material.

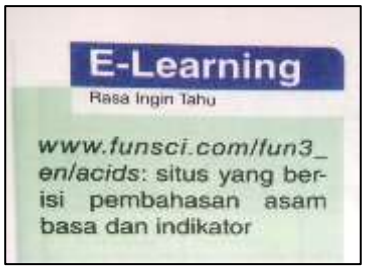


Figure 17. Example of indicator analysis results providing a valid source of information from the internet(Rahardjo & Ispriyanto, 2019)

The category of science as a path of investigation is used to take advantage of several approaches used to build knowledge. The category of investigation of the nature of science is the central part of the scientific process, which emphasizes the presentation of questions, experimental activities, and discussions that support students' understanding of concepts. The scientific process in this category is in the form of experiments and direct activities carried out by students to understand concepts.

The research results on the five textbooks show that there is still a lack of content in this category of chemistry textbooks. They encourage students' activities to develop procedural knowledge very little. Because each textbook contains the content of scientific inquiry indicators that can be used as a benchmark for understanding the nature of student's science (Septia Marisa et al., 2021), the books used by teachers during the learning process are expected to be a forum for achieving students understanding of the nature of science.

3. Science as a way of thinking

Science is synonymous with thinking activities. Science itself is a human activity characterized by a thought process that occurs in the minds of anyone involved in the process. Activities carried out by scientists related to reason describe human curiosity and their desire to understand natural phenomena (Wahyusari, 2017).

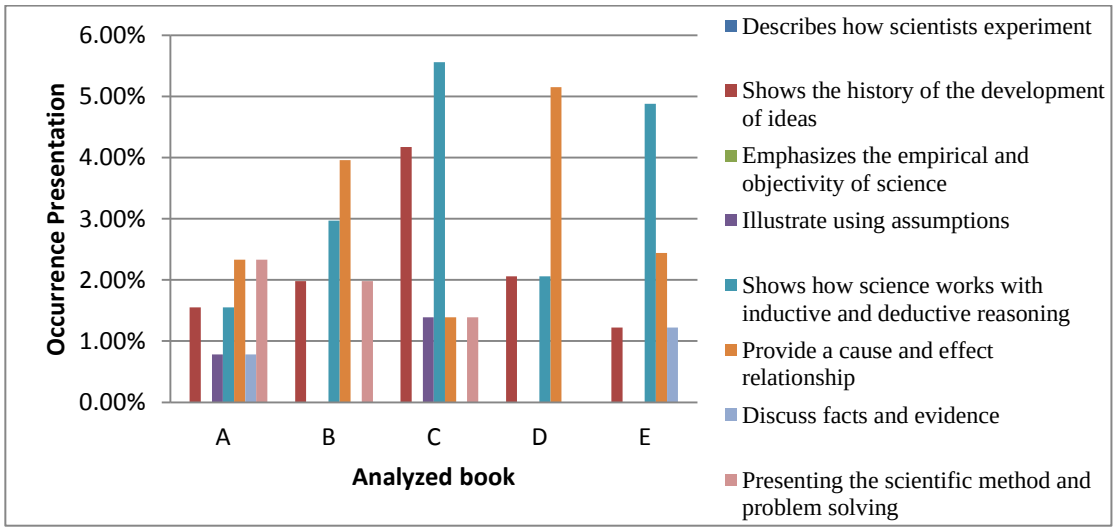


Figure 18. The percentage of occurrences in the category of science as a way of thinking in the five books

On science as a way of thinking is found in all the books analyzed, but not as many science categories as the body and science as a way of investigation. Some indicators are not found in the pages of the books analyzed. The textbooks analyzed lacked emphasis on lessons included in the aspect of science as a way of thinking. In developing scientific literacy, which has an important role, science is a way of thinking about it because science has a causal relationship with the observed phenomena. Science textbooks, especially chemistry, must develop students' thinking skills so that they are broad-minded and can see the relationship of science and relate it to students' knowledge and stimulate students to think scientifically.

According to (Ngertini et al., 2013), students will have good scientific literacy skills if they have logical thinking skills, critical thinking, initiative, and adaptive to change and development. The presentation of science as a way of thinking in the five C textbooks is higher than books A, B, D, and E because it presents a lot of the history of the development of ideas and how science works with inductive and deductive considerations. Therefore, chemistry textbooks should develop high-level thinking and learning skills to have broad insight and link chemistry with knowledge. In addition, textbooks that develop science as a way of thinking will stimulate students to think scientifically.

4. The Interaction of Science With Technology And Society

Science, society, and technology are forms of interaction that cannot separate. Where technological development is based on science, technology becomes a support for the development of science used to meet society's needs (Lailatul et al., 2015).

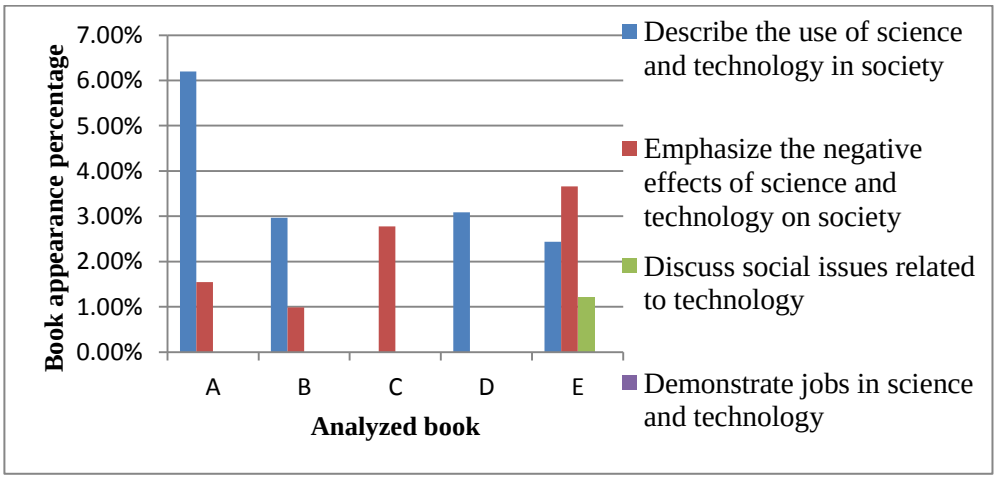


Figure 19. The five books are the percentage of occurrences in the interaction between science, technology, and society.

The interaction of science with technology and society is included in science, which includes providing information related to technology and science in everyday life. Thus, PISA's context dimension emphasizes everyday life than in the laboratory or classroom (Retno et al., 2017).

Of the five textbooks, book A gives the highest percentage value than the other four books. Because book A emphasizes the usefulness of science and the adverse effects presented in the chemistry class rubric in book A, a good textbook must link the material with science, technology, and society and highlight its role in everyday life. A good textbook displays career and social problems related to the material so that later students will have an outlook on careers related to the material being studied. In addition, a good textbook should not only highlight the positive impact but also bring out the negative impact of chemistry itself. Who aims to help students appreciate chemistry itself and know its limitations so that students' chemistry is not misused. As a result, students are more careful and wise in using their chemical knowledge.

The class XI chemistry textbook analyzed has integrated all aspects of scientific literacy. It has described scientific literacy but with an unbalanced ratio of scientific literacy categories. Only one category of scientific literacy dominates, namely the science category as the body of knowledge. The results of the fulfillment of the scientific literacy category in book A have a ratio of the category of science as knowledge: science as a way of investigation: interaction of science, technology, and society: category of science as a way of thinking that is 9:1:1:1. The ratio in book B is 6:2:0:1, the ratio in book C is 4:2:0:1, the ratio in book D is 9:0:0:1, and the ratio in book E is 6:2:1:1. Of the five textbooks that have nearly balanced proportions is the book E.

This imbalance in the proportion of scientific literacy aspects will result in students' mastery of each category of scientific literacy being unbalanced as it should be. Suppose the composition of the presentation of the science category as a body of knowledge (scientific content) dominates more than the other categories. In that case, students will tend to be less developed in investigating scientific phenomena due to their lack of developing their knowledge and tend to use memorization in mastering science and notability thought (Yuliyanti & Rusilowati, 2014). Improving the ability of the four categories of scientific literacy, which is included in the dimensions of process, content, and context, is very important by developing quality chemistry teaching materials. It aims to provide a complete picture of chemistry and scientific literacy to students. Suitable teaching materials have qualities that not only increase the motivation and enthusiasm of participants in learning chemistry but also have an effect on improving students' scientific literacy skills (Retno et al., 2017). According to (Mochamad Irsyan et al., 2013) if students' science processes are low, students will have difficulty applying science in real life, which causes the ability to understand the interaction of science and technology with society will not develop optimally. In science learning, it is expected to be more in the form of student activities and skills most of the students' time is spent in the laboratory or the field of work (Maturradiyah & Rusilowati, 2015). Textbooks that include good scientific literacy are expected to be applied in learning to help students be able to be literate in science and technology, think logically, critically, creatively, and be able to argue correctly and be able to collaborate (Pertiwi et al., 2018), by utilizing science. and technology mastered by students can appreciate nature (Wenning, 2007).

Conclusion

After analyzing the data and discussing it, it is concluded that from the five textbooks that have been analyzed based on the category of scientific literacy, the average results of the proportion of scientific literacy are as follows: (1) Science as a body of knowledge is 69.98% (2) Science as a way of an investigation by 14.43% (3) Science as a way of thinking by 10.63% (4) Interaction of science with technology and society by 4.98%. And the average kappa statistic is 0.810 with an almost perfect category, and the average percentage of agreement between raters is 95.1 %.

The research results on acid-base chemistry in class XI high school chemistry textbooks used in public high schools in Surakarta have a scientific literacy scope that is more oriented to the science category as the body of knowledge. Therefore, based on the results of the analysis do not present the interaction of science, technology, and society. But overall, the five high school chemistry textbooks for class XI have described scientific literacy as a whole with almost perfect categories in terms of the reliability of observations and the percentage of agreement. The research results can be used as study material and references for further research and development related to scientific literacy in chemistry learning books. And the results of this study can be used to improve and improve textbooks that have been published. Become a guide for teachers in choosing textbooks that will be used as learning resources that refer to science to encourage students to actively participate in the learning process. By the 2013 curriculum and scientific literacy, it is recommended to use the Intan Pariwara (Book E) textbook because the book contains the scientific literacy category as a whole and with a better portion. The results of this study are used by publishers or chemistry textbooks to balance each existing scientific literacy category.

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