



## Analysis of Chemical Teaching Materials for Class X SMA/MA on The Discussion of The Role of Chemistry in Daily Life

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**Abstract:** Analysis of chemical teaching materials for class X SMA/ MA on the discussion of the role of chemistry in daily life. The purpose of this study was to analyze the concept labels and the suitability of teaching materials to the K13 curriculum on the role of chemistry in everyday life and identify those that would cause misconceptions in chemistry books. The method used in this research is descriptive qualitative method. The instrument used to obtain the data is the Concept Analysis Table which is adapted to the KD in the K13 curriculum syllabus and reviews that will lead to conceptual errors. The results showed that the number of concept labels analyzed was 20 concept labels in total, the concept labels in book A and book B which corresponded to the 2013 curriculum syllabus were 14 and 18 respectively. The same concept labels between book A and book B amounted to 12, and the concept labels that are only found in book B are 5 and all are in accordance with the K13 curriculum syllabus. Reviews that give rise to conceptual errors in book A contained in the concept label The Nature of Chemistry. While in book B, there are no errors that have the potential to cause misconceptions. This also affects students who will cause misconceptions if the teaching materials used are incomplete in explaining the concepts even though the teacher can explain in detail.

**Keywords:** analysis, textbook, the role of chemistry in life

**Abstrak:** Analisis bahan ajar kimia kelas X SMA/MA pada pembahasan peran kimia dalam kehidupan sehari-hari. Tujuan Penelitian ini untuk menganalisa label konsep dan kesesuaian materi ajar terhadap kurikulum K13 pada materi peran kimia dalam kehidupan sehari-hari dan mengidentifikasi yang akan menimbulkan kesalahan konsep pada buku kimia. Metode yang digunakan dalam penelitian ini adalah metode kualitatif deskriptif. Instrumen yang digunakan untuk memperoleh data adalah Tabel Analisis Konsep yang disesuaikan dengan KD pada Silabus kurikulum k13 dan ulasan yang akan menimbulkan kesalahan konsep. Hasil penelitian menunjukkan Jumlah label konsep yang dianalisis berjumlah 20 label konsep secara keseluruhan, label konsep pada buku A dan buku B yang sesuai terhadap silabus kurikulum 2013 masing-masing berjumlah 14 dan 18. Label konsep yang sama antara buku A dan buku B berjumlah 12, dan label konsep yang hanya terdapat pada buku B berjumlah 5 dan semua sesuai terhadap silabus kurikulum K13. Ulasan yang menimbulkan kesalahan konsep pada buku A yang terdapat pada label konsep Hakikat Ilmu kimia. Sedangkan pada buku B tidak ditemukan adanya kesalahan yang berpotensi mengakibatkan miskonsepsi. Hal ini juga berpengaruh pada siswa yang akan menimbulkan miskonsepsi jika bahan ajar yang digunakan kurang lengkap dalam menjelaskan konsep-konsepnya walaupun guru bisa saja menjelaskan secara detail.

**Kata Kunci:** analisis, buku teks, peran kimia dalam kehidupan

## ▪ INTRODUCTION

The quality of learning is determined by the quality of each of the main components involved in it, namely teachers (teachers), learners (students), and teaching materials. In this process there is a transformation of knowledge (teaching materials) from teachers to learners (Anwar, 2018). Teaching materials are one of the most important components in the learning process to help students achieve basic competencies and are a set of materials to be taught, which have been packaged in such a way that they are in accordance with the demands of the curriculum and student development (Anwar, 2018; Mudlofir, 2011). Therefore, teaching materials must receive special attention so that the optimal teaching and learning process can be achieved (Anwar, 2018).

The most widely used forms of teaching materials are printed teaching materials and one example is textbooks (Irawati, 2015; Directorate of High School Development, 2010). Textbooks or textbooks have an important role in the national education system (Muslich, 2010). As the results of Kantao's research (in Muslich, 2010) show that groups of students who use good quality textbooks get higher learning achievements than groups of students who use low quality textbooks. However, the fact is that textbooks circulating in Indonesia are still subject to criticism, have weaknesses, and problems have been found regarding the contents of the textbooks (Anwar, 2018 and Muslich, 2010).

In essence, the curriculum is a tool to achieve the goals of national education. A good textbook must be relevant and support the implementation of the curriculum. Facts in the field show that many teachers do not refer to the curriculum in planning the implementation of their learning, but refer to and rely fully on the textbooks used. Thus, the suitability of the content of textbooks with the curriculum is very important because if not, it can cause the level of student competence that must be met in an educational unit within a certain level and type of education cannot be achieved (Muslich, 2010; Sitepu, 2012; Abraham, 2012). et al., 1992). Research that supports this statement is research on Chemistry textbooks for SMA/MA, author A, publisher B, which shows that the thermochemical material in the textbook is not in accordance with the demands of the curriculum (Irawati, 2015).

The concept of curriculum develops with the development of educational theory and practice (Winarni, 2010). The curriculum serves as a guide for carrying out educational activities in schools for related parties, either directly or indirectly, principals, curriculum representatives, teachers, supervisors, parents, the community and the students themselves (Bet Shelvia, et al. 2020). The K13 curriculum is developed on the theory of "standards-based education", and the theory of competency-based curriculum. Competency-based learning is an educational approach that focuses on demonstrating the desired learning outcomes as the center of the learning process (Yeni Nuraeni, et al. 2020). The implementation of the 2013 curriculum was not only rejected by several teachers in Indonesia but also by students. There are many students who disagree about the implementation of the curriculum. Some of them said that in the

curriculum, the material was more difficult to understand than the previous curriculum (Kurniawan, 2015).

Why should we study chemistry? Students trust each other that the study of biology is more relevant to their daily lives than the study of chemistry or physics. In fact, chemistry provides a more practical explanation of the science and technology that surrounds us than biology (G. Kenneth, 2000). What do you think of when the word "chemistry" is mentioned? To many, chemistry projects the image of a mad scientist wearing a white lab coat mixing a concoction that froths, spits up, and smells. What is Chemistry? Chemistry is a branch of science that deals with the composition and structure of matter and the changes that matter undergoes (Pratiwi, 2015). Chemistry, like all branches of science, is a method that tries to simplify and organize. Each object we might consider is a separate piece of matter, and matter can be classified in a variety of ways (Myers, 2003). Recent studies in education to focus on learning problems.

Based on the regulations of the Ministry of Education and Culture of 2007, the textbook is a teaching material that has been regulated by the government and has met the criteria for use in learning activities. The list of criteria for textbooks that will be used adjusts the regulation of the Minister of Education and Culture of the Republic of Indonesia Number 1 of 2015. However, the regulation does not stipulate which textbooks are suitable for use in national learning activities according to K13. Learning to learn concepts is not only caused by the learning process, however, it can also be influenced by learning resources such as the textbooks used (Sheppard, 2006). The solution implemented to reduce the difficulty in chemistry concepts is to reanalyze the teaching materials given in the chemistry textbook. So the thing to do is to analyze this Textbook in a way that is the Concept Analysis of the textbook which is adapted to the KD in the K13 Syllabus (Siti, et al. 2020).

Misconceptions in students are very important among researchers, especially in the field of education, because misconceptions can affect how students learn new things, play an important role in subsequent learning and become an obstacle in obtaining correct knowledge (Siti, et al. 2020). Due to the difficulty of students who cannot solve complex problems in chemistry, there are misconceptions in students. Misconceptions, if left unchecked, will hinder the potential possessed by students in progressing in further learning. Identifying the occurrence of misconceptions in students is one of the first steps to determine students' understanding of concepts in the learning process (Dahar, 1989 & Nakhleh, 1992).

The concept of the role of chemistry in life is one of the materials in the odd semester class X high school curriculum. The 2007 Minister of National Education Regulation stipulates that textbooks that have been determined by the government and have met the requirements for use in the teaching and learning process and that these books must comply with the K13 curriculum. In these regulations, there are no types of chemistry textbooks that are suitable for use by teachers and students. Therefore, students have difficulty in learning and experience misconceptions in learning. One way to reduce the occurrence of misconceptions is to analyze the teaching materials that have been presented in the book, one of which is the Chemistry book. The thing that is

reviewed is whether the material is presented in good sentences and can be well received or not accepted by students (Siti, 2020).

The textbook analyzed was the Chemistry Book of SMA K13 by Sri Rahayu Ningsih and Michael Purba. Based on the background that has been stated above, the formulation of the problem for this research is how is the suitability of the concept of the role of chemistry in everyday life in the teaching materials of chemistry for SMA/MA class X to the 2013 curriculum? And what reviews will lead to misconceptions contained in the Chemistry Book for SMA/MA Class X K13 on the concept of the role of chemistry in everyday life?

## ▪ METHODS

The method used in this research is descriptive qualitative research method. The description carried out is the result of an analysis of the concept label of the suitability of teaching materials, and reviews that will lead to misconceptions in Chemistry teaching materials on the concept of the role of chemistry in daily life in the chemistry book of SMA/MA Class X against the K13 curriculum. Data collection time is September 2021. The instrument used to obtain data is a Concept Analysis Table that is adapted to the KD in the K13 curriculum syllabus and identification of potential Conceptual Errors in the concept of the role of chemistry in everyday life in the K13 High School Book. The data analysis technique used is by observing the textbooks that will be used in K13. There are two books that will be analyzed in this study, namely the Chemistry Book of K13 SMA by Sri Rahayu Ningsih and Michael Purba.

## ▪ RESEARCH RESULTS AND DISCUSSION

This study describes the data results and discussions regarding the suitability of the concept of the role of chemistry in everyday life in the Chemistry Textbook of Class X High School against the Chemistry Syllabus of the K13 Curriculum. The following is a comparative analysis of concept labels in Book A and Book B which can be seen in Tables 1 as follows:

**Table 1.** Label the concept of the role of chemistry in everyday life

No	Concept Label	Book A	Pages	Book B	Pages
1	The Nature of Chemistry	√	3	√	6
2	Characteristics of Chemistry	√	3	-	-
3	Chemistry Scope	√	4	√	6
4	The Role of Chemistry in Life	√	6	√	9
5	The Role of Chemistry in Physics and Biology	√	7	√	12

No	Concept Label	Book A	Pages	Book B	Pages
6	The Role of Chemistry in the Health Sector	√	7	√	12
7	The Role of Chemistry in Geology	√	7	√	12
8	The Role of Chemistry in Agriculture	√	8	√	14
9	The Role of Chemistry in the Field of Law	√	8	√	13
10	The Role of Chemistry in the Economy	√	8	√	13
11	The Role of Chemistry in Solving Local and Global Problems	√	8	-	-
12	Development of Chemistry	-	-	√	15
13	Scientific Method	√	10	√	15
14	Introduction to Chemistry Laboratory	-	-	√	17
15	Laboratory Rules	√	18	√	19
16	Work Safety and Security	√	16	√	19
17	Hazardous Waste Handling	-	-	√	21
18	Material	-	-	√	22
19	Material Change	-	-	√	25
20	Mixed Separation	-	-	√	25

The discussion of the concept of the K13 Curriculum Chemistry Syllabus in book A and book B can be seen in table 2 as follows:

**Table 2.** Suitability of Concept Labels for Books A and B to the K13 Curriculum Misconceptions of Book A

Basic Competency Code	Main Material Code	Concept Label	In accordance with the Syllabus			
			Basic Competence (KD)		Subject Matter	
			Book A	Book B	Book A	Book B
3.1 Explain the scientific method, the nature of chemistry, safety in the laboratory, and the role of chemistry in everyday life 4.1 Presenting the design and experimental results	a. The essence of chemistry b. The role of chemistry in everyday life c. Scientific method d. Chemical safety and security in the laboratory	The Nature of Chemistry	3.1	3.1	A	A
		Characteristics of Chemistry	3.1	-	A	-
		Chemistry Scope	3.1	3.1	A	A
		The Role of Chemistry in Life	3.1	3.1	B	B
		The Role of Chemistry in Physics and Biology	3.1	3.1	B	B
		The Role of Chemistry in the Health Sector	3.1	3.1	B	B
		The Role of Chemistry in Geology	3.1	3.1	B	B
		The Role of Chemistry in Agriculture	3.1	3.1	B	B
		The Role of Chemistry in the Field of Law	3.1	3.1	B	B
		The Role of Chemistry in the Economy	3.1	3.1	B	B
		The Role of Chemistry in Solving Local and Global Problems	3.1	-	B	-
		Development of Chemistry	-	3.1	-	C
		Scientific Method	3.1	3.1	C	C
		Introduction to Chemistry Laboratory	-	3.1	-	D
		Laboratory Rules	3.1	3.1	D	D
		Work Safety and Security	3.1	3.1	D	D
		Hazardous Waste	-	3.1	-	D

Handling				
Material	-	3.1	-	A
Material Change	-	3.1	-	A
Mixed Separation	-	3.1	-	A

The review that has the potential for conceptual errors, namely in Figure 1 in book A (Label Concept of the Nature of Chemistry) shows the chemical formula of alcohol is  $C_2H_5OH$ , this is true, but it could be a student's perception that alcohol is the only chemical formula, whereas there are many types of alcohol, the chemical formula  $C_2H_5OH$  is ethanol, to avoid this, it is better to just write that ethanol is an example of alcohol can be seen in Figure 1 as follows:

jenis unsur, yaitu hidrogen dan oksigen, dengan rumus kimia  $H_2O$ , sedangkan alkohol merupakan senyawa yang tersusun dari tiga jenis unsur, yaitu karbon, hidrogen, dan oksigen, dengan rumus kimia  $C_2H_5OH$ . Rumus kimia menyatakan susunan atau hakikat zat.

**Figure 1.** Reviews of potential misconceptions

## ▪ CONCLUSION

Based on the results and discussion, it can be concluded that the overall concept labels contained in the two books are 20 concept labels, the concept labels in book A and in book B which correspond to the K13 syllabus are 14 and 18, respectively. There are 12 books equal between book A and book B. This makes book B written by the ancient Michel said to be more detailed and specific than book A by Sri Rahayu Ningsih. Reviews that have the potential to cause conceptual errors in book A are discussed on the label of the concept of the Nature of Chemistry. While in book B, no errors were found that would lead to misconceptions. This also affects the misconceptions contained in book A which are more likely to occur than with book B and can also affect students who will cause misconceptions if the teaching materials used are incomplete in explaining the concepts even though the teacher can explain in detail. As for the suggestion of this research so that teachers are more selective in choosing teaching materials that will be used in the learning process and for further researchers to carry out further research on other concepts.

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