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Implementation of The Merdeka Curriculum in The High School Chemistry Learning Process: Analysis of Variations in Hydrocarbon Material

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Abstract: *This study aims to analyze the characteristics of hydrocarbon chemicals in the Merdeka curriculum and curriculum 13, as well as explore variations of hydrocarbon materials taught by teachers in various schools under the Merdeka Curriculum. The type of research used is descriptive qualitative through survey methods. Respondents in this study involved 24 chemistry teachers who worked in DKI Jakarta and Yogyakarta. The selection of respondents was random. The results of this study show that there are differences in the characteristics of hydrocarbon materials taught in the 2013 curriculum and the Merdeka curriculum. In the Merdeka curriculum, most chemistry teachers still do not differ much from each other even though they have been given freedom in teaching, with only slight variations in the selection of the material. Teachers consider materials in hydrocarbon topics very important and must be taught thoroughly because they will be useful in learning the next topic. In making decisions to teach hydrocarbon material, teachers should increase their understanding of learning objectives, student heterogeneity, limited reference sources, school facilities, and students' initial knowledge.*

Keywords: *Chemistry Learning; Hydrocarbon; Material Variation; Merdeka Curriculum*

INTRODUCTION

One of the important components of an educational institution is the curriculum. The curriculum is used as a guideline for teachers in achieving educational goals, so it can be said that the curriculum plays an important role in the world of education (Lena et al., 2023; Santika et al., 2022; Yuliyanti et al., 2022). Indonesia has experienced several changes in the curriculum implemented in schools such as the KBK Curriculum, KTSP Curriculum, 2013 Curriculum, and most recently the Merdeka Curriculum (Setiawati, 2022). When the independent curriculum was implemented, the education system in Indonesia experienced significant changes compared to before (Sadieda et al., 2022). In

the previous education system, there were strict curriculum provisions and national standards that all schools had to follow. However, in the implementation of the Merdeka Curriculum, teachers are given more freedom to design teaching and teaching material sets according to the needs of students and the local context of their respective schools (Angga et al., 2022; Pratycia et al., 2023; Purnomo et al., 2023). Therefore, teachers find it helpful in terms of their work which becomes relatively easier. This is in line with the results of Prihatini and Sugiarti's research (2022), namely the Merdeka Curriculum is much easier to implement if teachers have sufficient understanding and practice. The purpose of introducing the Merdeka learning curriculum program is in the context of restoring education during the Covid-19 pandemic and to improve the quality of education so that students can face real future challenges (Sari et al., 2023; Wardani et al., 2023). Freedom to learn means learning freely and freely thinking carried out by teachers and students so that a free and pleasant spirit is awakened in exploring the knowledge, attitudes, and skills they have (Daga, 2021).

In the Merdeka curriculum, subject matter is given to students with full freedom. Teachers are free to convey where to start until they can randomize the material depending on what must be mastered by students first (Angga et al., 2022). One of the subjects that is notoriously complex and important in secondary school learning is chemistry (Suparwati, 2022). Chemistry is the science that studies the properties of matter and the changes that occur in it. In chemistry, there is one fundamental topic, namely hydrocarbons. In high school, hydrocarbon material is usually taught at the 10th-grade level. Hydrocarbons are chemical compounds consisting of the elements carbon (C) and hydrogen (H). This material became the basis for the understanding of the concept of organic chemistry. A strong understanding of hydrocarbon materials is essential in gaining a broader understanding of chemistry, such as *thermochemistry*, *stoichiometry, colligative properties of solutions, alkane derivatives, Halo-alkane, Reactions of Carbon Compounds, Benzene, Polymer, Carbohydrate*, *Protein*, and *Lipids* (Wiqoyati, 2013). Naqsyahbandi et al. (2022) His research stated that understanding basic material needs to be taught completely because the material is needed to learn the next material. Suppose hydrocarbon material is not understood and taught comprehensively. In that case, it is feared that students will not be able to learn and understand chemical materials that will be taught at the next level. Therefore, hydrocarbon material must be taught as a whole by the teacher in class.

Furthermore, questions arise regarding the extent to which the Merdeka Curriculum is understood and implemented uniformly in various schools in Indonesia, even though the Merdeka Curriculum provides more freedom to teachers in designing learning and teaching in the classroom. The variation of material taught between teachers in one school and teachers in other schools cannot be avoided if it follows the new paradigm in this Merdeka curriculum (Nurcahyono & Putra, 2022). The variety of material taught by teachers has important implications for the understanding of their learners. When some schools teach hydrocarbon material to a greater depth than others, this can result in gaps in learners' understanding. Some learners may have a deeper understanding of hydrocarbons, while others may understand only basic concepts. Based on the explanation that has been described, this study will analyze the characteristics of chemical materials on the topic of hydrocarbons in the Merdeka curriculum and curriculum 13. After that, variations of hydrocarbon material taught by teachers in various schools under the Merdeka Curriculum in Indonesia will be explored to see the influence of freedom given to teachers in designing lessons.

METHODS

This study uses a type of descriptive qualitative research that collects data through survey methods. The survey method is used to

examine the variety of chemical materials that teachers teach on the topic of Hydrocarbons in class as an effort to implement a Merdeka curriculum. The survey in this study used data collection techniques in the form of questionnaires sent through the Google Form application. In the questionnaire, there are questions about chemical indicators that teachers should teach on the topic of hydrocarbons in implementing a Merdeka curriculum. Then there is a reason column to find out more clearly why the teacher teaches these materials. The respondents in this study were 24 chemistry teachers who had implemented a Merdeka curriculum in the working areas of DKI Jakarta and Yogyakarta Provinces and the selection of respondents was carried out randomly online with a deadline of September 29 – October 5, 2023.

RESULT AND DISCUSSION

The purpose of this study is to provide an overview of the variations in hydrocarbon material taught by teachers when implementing the independent curriculum. The data in this study was collected using a questionnaire instrument disseminated through online media Google Forms. The questionnaire on the variety of material used consists of questions related to the material that the teacher teaches in class accompanied by reasons why choosing and teaching the material. The distribution questionnaires were given to 24 high school chemistry teachers who were in the working areas of DKI Jakarta and Yogyakarta Provinces and had implemented a Merdeka curriculum. The majority of teacher respondents who filled out the questionnaire had more than 5 years of teaching experience, namely 20 people (83.3%). The last education respondents were mostly S1 graduates totaling 14 people (58.3%). They came from the Department of Chemistry Education which amounted to 15 people (62.5%) and the majority of female teachers totaled 20 people (83.3%), while male teachers were only 4 people. The status of teachers who filled out the questionnaire was dominated by civil servant teachers totaling 15 people (62.5%). The characteristics of respondents in this study can be seen in full in Table 1.

Table 1. Respondent characteristics

No	Information	N	Percentage
1	Year of Teaching		
	> 5 Years	20	83.3 %
	3 - 5 Years	0	0 %
	1 - 3 Years	3	12.5 %
	< 1 Year	1	4.2 %
2	Educational Background		
	Bachelor	14	58.3 %
	Master	10	41.7 %
	Doctoral	0	0 %
3	Academic Majors		
	Chemistry Education	15	62.5 %
	Science Education	5	20.8 %
	Chemistry	4	16.7 %
4	Teachers' Position		
	Civil Servant	15	62.5 %
	Private School	6	25.0 %
	Honorary	3	12.5 %
5	Gender		
	Man	4	16.7 %
	Woman	20	83.3 %

Based on the results of the analysis that has been done, there are variations in chemical materials on the topic of hydrocarbons taught by teachers in high school classes in the implementation of the Merdeka Curriculum. As an idea, the hydrocarbon material indicator used in this study is a derivative of KI 3.1 Class 11 on K13 (Permendikbud RI, 2016). Teachers choose what material they teach in class and add other material to other items if they are not listed in the questionnaire options. The results of the questionnaire related to variations in hydrocarbon material can be seen in full in Figure 1.

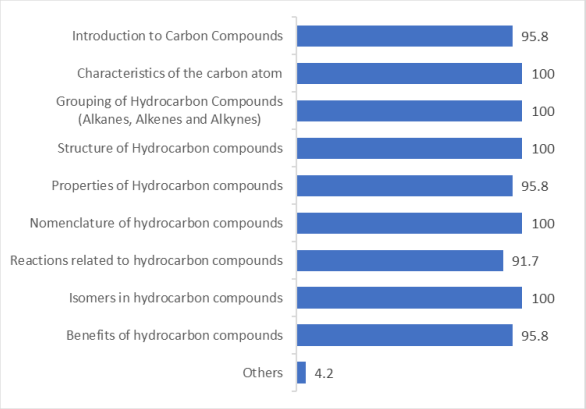

Figure 1. The results of the questionnaire analysis of hydrocarbon material variation in percent (%)

The results of the analysis of variations in hydrocarbon material taught by teachers in the Merdeka Curriculum show that most teachers have taught all hydrocarbon chemistry (100%) in their classes in the Merdeka curriculum. There are only a few teachers who have not taught the material introduction, properties, reactions, and benefits of carbon compounds in class which is shown not 100% full in Figure 1.

Then the teacher gives reasons related to the selection of hydrocarbon material they teach in class. The results of the data obtained are then reduced to the data so that it can be grouped and easier to understand. The results of data reduction for the reasons teachers teach and choose materials on the topic of hydrocarbon can be seen in Table 2.

Table 2. Results of data reduction of respondents' reasons

No	Reduction Results	Number of Respondents	Percentage
1.	As the curriculum demands	10	41.67 %
2.	It is important to understand the next material	5	20.83 %
3.	To understand hydrocarbon material completely	5	20.83 %
4.	Tracking and interrelated material	3	12.50 %
5.	Materials close to everyday life	1	4.17 %

Based on the results of data reduction, it can be seen that most teachers, namely 41.67%, choose and teach materials on the topic of hydrocarbons because they still follow the demands of the curriculum. The teacher also believes that hydrocarbon material is important for the next material and to understand hydrocarbon material completely, each of which was answered by 20.83% of respondents. Another reason is that the material is coherent and interrelated, which was answered by 12.5% of respondents and few teachers who taught hydrocarbon material because it is close to everyday life, which is as much as 4.17%.

Curriculum Merdeka is a learning system that includes a diversity of materials that provide opportunities for all students to strengthen their competencies by maximizing learning time. In this curriculum, teachers have the flexibility to choose a variety of learning tools that suit the needs and interests of learners. This is what distinguishes the Merdeka curriculum from the previous curriculum, namely the 2013 curriculum. The Merdeka curriculum is a curriculum that prioritizes character education and independent learning. At the same time, the 2013 curriculum focuses on three competencies of learners, namely affective competence, cognitive competence, and psychomotor competence (Hutabarat et al., 2023).

In the 2013 curriculum, the graduation criteria for students to proceed to the next level are assessed based on the results of national examinations, which cannot fully reflect the unique potential, skills, and knowledge possessed by each student in various fields (Lubis & Lubis, 2019; Pangabean et al., 2021). In addition, developing lesson plans that are too complicated and time-consuming often hinder the effective learning process. This monotonous curriculum does not always encourage the independence of students and teachers. Therefore, the concept of curriculum development in Indonesia has evolved in response to different needs. The main purpose of developing the Merdeka Curriculum is to face educational challenges in the era of the Industrial Revolution 4.0. These goals include the development of learners' critical thinking, problem-solving skills, creativity, communication, and collaboration. This is in line with the results of Santika's research (2022) that the concept of curriculum is dynamic and always changes with the times, the interests and needs of students, and the demands of society, science, and technology.

In the context of chemistry learning, there are differences in the characteristics of chemical materials, especially the topic of hydrocarbons delivered in the 2013 curriculum and the Merdeka curriculum. Hydrocarbon material is conveyed in the 2013 curriculum, precisely in KI 3.1 grade 11, namely analyzing the structure and properties of hydrocarbon compounds based on the peculiarities of carbon atoms and their compound groups (Permendikbud RI, 2016). Meanwhile, in the Merdeka curriculum, hydrocarbon material is delivered implicitly in the learning outcomes of chemical materials in Phase F High School, namely understanding organic chemistry including its application in everyday life (Kemdikbudristek RI, 2022). In addition, the 2013 curriculum emphasizes more on using a scientific approach, while the Merdeka curriculum which is oriented towards student competence uses differentiated learning. Therefore, of course, the output produced from these two curricula will be different.

In terms of material variation, the results of this study show that there is not much material diversity that chemistry teachers teach in class when implementing the Merdeka curriculum so far. Of the 9 indicators presented in the questionnaire, 5 of all teachers teach in class (100%) and 4 other indicators, only 1-2 teachers did not choose these indicators. The most unselected indicator of hydrocarbon matter is the reaction material related to hydrocarbon compounds, which only 91.7% of teachers choose. This is because the teacher reasoned that the material would be taught in the next topic, namely alkane-derived compounds (Purba & Fitri, 2021). Teachers have the responsibility to design learning with relevant strategies to help students develop their abilities. Teachers must be able to fulfill roles following curriculum requirements, namely as teachers, mentors, and educators. As teachers, teachers need to be able to implement education and create engaging and efficient learning experiences (Sutiani et al., 2022). Learners need to understand the previous material conceptually before moving on to the next topic (Anggraini et al., 2022). Some hydrocarbon materials are not taught in class, because there are obstacles in lesson planning. Based on the results of Nurcahyono and Putra's research (2022) there are 5 obstacles to lesson planning, which include (1) lack of understanding of how to derive/translate CP into learning objectives; (2) heterogeneity of students in the classroom; (3) lack of references to differentiated learning models; (4) limited facilities and infrastructure in schools; (5) limitations of initial knowledge and subject matter.

Based on the results of research, most chemistry teachers who choose hydrocarbon chemistry topics and teach them in class reason that they still follow the demands of the curriculum, which is 41.67%. This is certainly not in line with the paradigm of a Merdeka curriculum that provides freedom for teachers to determine the material they will teach in class by first looking at the abilities and competencies possessed by students. The Merdeka curriculum is a curriculum that has only been introduced in Indonesia starting in early 2022 and the Merdeka curriculum does not explicitly explain the material taught as in the 2013 curriculum, so there are still many teachers who take reference material to the Merdeka curriculum. All indicators presented on the questionnaire sheet according to some teachers, which amounted to 20.83%, were important material to be understood thoroughly and as many as 20.83% of teachers also stated that the material was important because the material would be useful for studying further chemistry topics. This is reinforced by the reason for a small number of teachers, namely 12.50%, stating that all chemical materials must be taught in order because they are interrelated with each other. A strong understanding of fundamental chemical materials is needed, especially hydrocarbon materials which are very important to gaining a broader understanding of chemistry (Wiqoyati, 2013).

CONCLUSION

The characteristics of hydrocarbon materials have differences when taught in the 2013 curriculum from those taught in the

Merdeka curriculum. In the 2013 curriculum, hydrocarbon material is explained explicitly while in the Merdeka curriculum, it is delivered implicitly. The hydrocarbon material taught by most chemistry teachers is still not much different from one another, with only slight variations in the selection of the material. Although the Merdeka curriculum gives freedom to teachers to determine the material to be taught based on the competence of students, most teachers still follow the previous curriculum and see all material as something important for a thorough understanding. A solid understanding of hydrocarbon materials is considered an important foundation for further chemical understanding. Barriers to lesson planning, such as understanding learning objectives, student heterogeneity, limited reference sources, school facilities, and students' initial knowledge, also affect teacher decision-making in teaching hydrocarbon materials.

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