

## SƏKKİZİNCİ SİNİF ÜÇÜN ELMİ ƏDƏBİYYATA DAXİL EDİLMİŞ KİMYƏVİ ANLAYIŞLARIN TƏSNİFATI

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### Xülasə

Bu tədqiqat işinin məqsədi İordaniya məktəblərində ilk dəfə 2016/2017-ci tədris ilinin əvvəlindən başlayaraq tədris olunan səkkizinci sinif üçün elmi dərsliyə daxil edilmiş kimyəvi anlayışları təsnif etmək və onların təhlilini verməkdir. Kimyəvi anlayışları təsnifləşdirmək və təhlil etmək üçün tədqiqat aləti işlənib hazırlanmışdır. Tədqiqatın sonunda (28) konsepsiya hazırlanmışdır və müvafiq olaraq təhlil alətinin etibarlılığı və sabitliyi yoxlanılmışdır. Təsnifatın və təhlilin nəticələri anlayışların (28) və təkrarlanmaların sayını (153) göstərmişdir. Təsnifləndirmə göstərmişdir ki, ilkin və sadə anlayışlar daha tez-tez təkrarlanır və ən yüksək paya malikdir, törəmə anlayışlar isə çox az təkrarlanır və ən aşağı paya malik hesab olunur. Bu anlayışların struktur imkanlarına gəldikdə, kimyavi anlayışların sayı 28 ilə məhdudlaşmışdır və ümid edilir ki, 115 konstruktiv anlayış yaranacaqdır. Tədqiqat işində səkkizinci sinif üçün fizika və biologiya elmi üzrə dərsliklərdə də anlayışların fərqli tip və kateqoriyalara bölünməklə təhlil edilməsi tövsiyə edilir.

**Açar sözlər:** təsnifat, kimyəvi anlayışlar, səkkizinci sinif, elmi kitab, analitik tədqiqat.

## CLASSIFICATION OF CHEMISTRY CONCEPTS INCLUDED IN THE SCIENCE BOOK FOR THE EIGHTH GRADE

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### Abstract

This study aimed to classify the concepts of chemistry and their analysis included in the science book for the eighth grade, which was taught in Jordanian schools for the first time since the beginning of the academic year 2016/2017. The study tool was developed to classify and analyze chemical concepts. The final form of the study was (28) concepts, and the validity

and stability of the analysis tool were verified. The results of the classification and analysis showed (28) concepts, and the number of recurrences (153). The classification showed that the primary and simple concepts are the most frequent and the highest proportion, and derivative concepts are considered the least frequent and the lowest proportion, With regard to the structural vision of these concepts, 28 structural activities has been limited to chemistry and it is hoped that 115 constructional concepts will be generated. The study recommended the need to analyze the concepts, physics and biology in the science book for the eighth grade in order to classify them into their different types and categories.

**Keywords:** Classification, Chemistry concepts, Eighth grade, Science book, Analytical Study.

## КЛАССИФИКАЦИЯ ХИМИЧЕСКИХ ПОНЯТИЙ, ВКЛЮЧЕННЫХ В НАУЧНУЮ ЛИТЕРАТУРУ ДЛЯ ВОСЬМОГО КЛАССА

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### Резюме

Целью данного исследования является классификация и анализ химических понятий, включенных в учебник по естественным наукам для восьмиклассников, преподаваемых в иорданских школах впервые с начала 2016/2017 учебного года. Был разработан инструмент исследования для классификации и анализа химических концепций. В конце исследования была разработана концепция (28), и соответствующим образом проверены надежность и стабильность инструмента анализа. Результаты классификации и анализа показывают количество понятий (28) и повторений (153). Классификация показала, что примитивные и простые понятия встречаются чаще и имеют наибольшую долю, тогда как считается, что производные имеют очень низкие повторения и самые низкие доли. Что касается структурных возможностей этих концепций, 28 структурных видов деятельности ограничены химией, и есть надежда, что будет создано 115 конструктивных концепций. В результате исследования рекомендуется провести анализ понятий в разных типах и категориях и для учебников по физике и биологии для восьмого класса.

**Ключевые слова:** классификация, химические понятия, восьмой класс, научная книга, аналитические исследования.

The structural theory is considered one of the theories that has helped to develop science as an ideal teaching method in the field of science in particular. It provides the learner with the ability to learn his own knowledge through a series of practices and

repetition in the theoretical and practical aspects of education. The learner constructs a clear vision of what he is doing, using the proper strategy to learn under the guidance of the teacher, so that he will obtain new experiences through his previous experiences. He reconstructs his cognitive knowledge of the concepts of chemistry himself and reaches the meanings through his learning, and shows by allowing the learner to build his knowledge actively and effectively and not by indoctrination. Teacher, uses high mental skills to help him increase his experience in the formation of concepts and learning skills. (Askar & Alqentar (2005), Kryman (2008)), the knowledge of chemistry in a functional way, so that the study of science becomes a means to understand the environment in a functional manner in line with the spirit of the times, and with the latest findings of science according to the growth of the learner at all stages (Atallah, Michelle (2010)).

The learning of scientific concepts is one of the most important outputs of science through which scientific knowledge is organized in a meaningful way. This has increased the interest of educators in scientific and chemical concepts. The acquisition of chemical concepts is one of the general objectives to be achieved in teaching science and chemistry in Jordan, ( Ministry of Education in Jordan (2010)). Scientific concepts play a prominent role in learning and teaching science; they facilitate the student's understanding of science clearly, as clarity of concepts and terminology is necessary for understanding and acquisition, and for achieving the scientific understanding and communication (Peter, 2014, Abo Athrah, 2012, Zaytoun, 2007, Khatiba, 2005). Moreover, the scientific concepts are the cornerstone of scientific knowledge, as it is in the second tier in the pyramid of scientific knowledge. (Al Soub, tareq 2014) noted that the importance of scientific concepts is that they absorb the new facts without disrupting the knowledge organization of the learner, and is an effective and easy way to connect different sciences together and thus achieve the concept of the integration of knowledge, in addition to it helps the learner to keep up with the growth in knowledge. It facilitates the process of selecting the content of the school curriculum, and helps both the teacher and the learner to understand the nature of science in terms of the material and method, reduce the scientific concepts of the need to re-learning as a result of forgetfulness, and facilitates the transfer of the impact of learning to new situations, and reduce the need for re-learning when faced with anything new in the course of learning.

Scientific concepts are characterized by a set of characteristics from other concepts because of their symbols, models and scientific knowledge, as it was stated by: (Joel, Michael, 2006) (Karlos, Alias, 2000) & (Aysh Zaytoun, 2004).

- 1- Recognition: The concept is to classify objects or situations according to common elements and is distinguished according to those elements, so that the concept is more likely to summarize human knowledge and experience, within the common characteristics of the elements of the concept.
- 2- Symbolism: A quality or a group of abstract qualities used to symbolize the concept. The concept is more abstract than reality, and has distinct dimensions. It may be called a sensory concept, and can be directly referred to by the senses, or an

abstract concept whose dimensions simply refer to facts that can't be reached by the senses such as the concept of atom.

- 3- Relative stability: Most of the concepts of relative stability are characterized by the formation of a set of relationships and interpretations between many of these concepts, which are acceptable to the students themselves, they are rooted in their cognitive structure, and to change them it requires a change in their perceptions about these concepts and the associated relationships and interpretations.
- 4- Cumulative: The concepts in the composition depends on the previous experiences of students through the educational process, which can represent variables in the formation of concepts, in addition to that there are emotional aspects and cognitive aspects associated with the formation of concepts and the perceptions they have.
- 5- Learnable: The concepts can be learned and can be developed by the learner, especially if their learning is related to the use of the senses, so that they can learn and acquire them correctly.
- 6- Generalization: The concept does not apply to one thing or attitude as in the case of scientific fact, but applies to a set of things and attitudes and thus more comprehensive than the truth.

Scientific concepts, including chemical concepts, are characterized as a variety of classifications. They are categorized on the basis of a number of fundamentals, as stated by (Azza Khalil Abdel Fattah, 2009), (Amal Bakri, Afaf Al-Kiswani, 2005):

a - In terms of levels:

- Preliminary concepts: are fundamental concepts that are not derived from other concepts, such as (electron).
- Derivative concepts: concepts derived from other concepts, Such as atomic number.

b- In terms of the way these concepts are understood:

- Sensible or observational concepts: concepts that can be perceived by observation using the senses or aids to the senses, for example: (the concept: the temperature, meaning: feeling cold or hot).
- Abstract or non-observational concepts: concepts that cannot be perceived by observation and senses but require cognition of specific mental processes and perceptions. For example, corn is the smallest unit of the element that can be found alone, or linked to another, and bears the characteristics of that element.

c- In terms of the degree of learning:

- Easy to learn concepts: are the concepts that use in its definition words that are familiar to learners, or are the concepts that the learner has already studied the requirements of its learning, such as (the concept of chemical interaction).
- Difficult concepts of learning: are the concepts that use in its definition words that are unfamiliar to learners, or concepts that the learner has never studied the requirements of its learning, such as (structural formula).

d- In terms of its complexity:

- Simple concepts: include a few words. It is based on a few dimensions and relationships, for example (ion: atom or charged atomic group).

- Complex concepts: include more than words, and based on dimensions, and many tangled relationships. For example: (Atom) is an integrated system of particles carrying negative charges orbiting at energy levels around the nucleus where the atom is located. There are two types of particles, one with a positive charge and the other uncharged, and the number of positive charges is equal to the number Negative charges).

There are conditions for learning the chemical concepts must be available so It is clear: that does not present the new concept in the implicit form, but in a clear and acceptable one: The concept is scientifically valid and does not contradict with any other scientific concept that students have already learned, so that he can believe in it and that it would be fruitful: that is, the multiplicity of benefits in arriving at interpretations of certain scientific phenomena, in finding solutions to problems related to the phenomenon that he interprets, and leading students to a new vision (Gustone, R et al., 2002). Structural theory is clearly shown in the science book for the eighth grade, which was taught in 2016/2017, which in turn reflects on a constructive vision in learning scientific concepts. It is hoped that this theory leads to the problem of study, which its content will be the analysis of classification of the concepts of chemistry.

### **The problem of the study and its questions**

The problem of the study is the continuous development of science, which needs to develop and improve the curricula of science, including the curricula of chemistry. Therefore, the chemical concepts must be categorized to suit this update in order to accommodate the changes in the concept of science and its effects on all aspects (Atallah, 2010, p 14.). The reform movements of education turned towards constructive learning and education and began to take their place in the educational learning process in their curricula and teaching. (Zaytoun, 2007).

After studying the previous science book for the eighth grade, which was taught since the academic year 2005/2006 until the end of the academic year 2015/2016 and compared with the new science book for the eighth grade, which was taught for the first time in the academic year 2016/2017, there is a clear shift to focus on the constructive theory, based on survey, concept maps and collaborative learning, and solving problem of issues. In previous studies, the concepts of chemistry were analyzed (Alimat, 2006). However, this study, and after transferring to constructive in the new book, aimed at analyzing the classification of the concepts of chemistry with a structural vision in the ancient book.

To achieve this goal, this study attempted to answer the following questions.

- 1 - What are the concepts of chemistry included in the book of science for the eighth grade basic parts I and II?
- 2 - What are the chemical concepts classifications included in the science book for the eighth grade in its first and second parts?
- 3 - What is the constructive vision of the concepts of chemistry included in the book of science for the eighth grade basic parts I and II?

## Definitions

- 1- The Scientific Concept: Abu Jalal defines the scientific concept as the abstraction of the common elements among several things and giving this abstraction a name, symbol or number that bears an indication of its characteristics and characteristics. (Abu Jalal, 2007: 105);
2. The concepts of chemistry: what develop in the individual of meaning and understanding related to chemical terminology? In this study, the concepts of chemistry were analyzed and categorized to be included in the scientific classifications as presented in the instrument of the study;
- 3 - The book of science for the eighth grade: It is a book for students of the eighth grade, and consists of two parts, and approved by the Ministry of Education and Jordan since the academic year 2016/2019;
- 4- Constructive and structural vision: "Constructive is one of the theories of learning and education, which rely on the activation of prior knowledge to build on them to reach a new knowledge, as the new learning depends and has a direct relationship to what the learner know. (Zaytoun, 2007, p. 24). In this study, the constructive vision is the chemical concepts reached by students during the analysis of the scientific activities related to the survey and interpretation, and the development of knowledge on the concepts of chemistry and its classifications.

## Significance of the study

The importance of this research is expressed in the knowledge of the chemical concepts in the science book of the eighth grade in Jordan, its classification and its suitability and activation to improve and develop the process of teaching and learning. The importance of this study stems from the use of structural theory in teaching science which became widely used and clearly evident in the new edition of the science book for the eighth grade and contains many basic scientific concepts, including chemical, and know the percentages among them in the classification. This study is the first of its kind - according to the researcher's knowledge - which is based on the analysis of scientific concepts and classification in the science book for the eighth grade, which was taught for the first time in the beginning of the academic year 2016/2017 and is still taught.

## Theoretical studies

Through the researcher's knowledge of previous local, Arab and the world studies and researches, also visited the university libraries to find out what's new in the subject of research.

The study of Shuaile (2016) aimed to analyze the content of science books from the 5<sup>th</sup> grades till the 10<sup>th</sup> in light of the content standards for scientific education (NSES) by imposing knowledge of the extent to which they contain those standards.

Al-Jafrah (2015) analyzed the concepts of biology and the concepts of the environment included in the science book for the eighth grade and the degree of student acquisition of these concepts in the Karak area in Jordan.

The study of Abdulkarim (2014) aimed to identify the concepts of physics included in the science book for the 8<sup>th</sup> grade in Jordan and the degree of acquisition of the 8th grade students of these concepts. He analyzed the concepts of physics. The concepts of physics were classified into seven categories. The study found that the total number of the concepts of physics included in the book was (114) concepts. The study recommended the need to review the concepts of physics and their presentation in the content.

A study conducted by Shukri (2011) aimed at analyzing the content of science books for the 8<sup>th</sup>, 9<sup>th</sup> and 10<sup>th</sup> grades in light of the scientific culture components and to know the balance between these components.

Morrow, 1994; Haury, 2000; Eichinger and Roth, 1992; and Anderson, 1992) analyzed several science books in the primary and secondary stages where the analysis was based on sequence and the sequence of content in these books but did not address the scientific concepts contained in them. Johanston (2000) study in the United States of America aimed at restricting the most difficult chemical concepts from the point of view of teachers. This was the first step towards referring to the classification of chemistry concepts in schools to easy and difficult chemical concepts. The study also included the concepts of chemistry, physics and biology combined by (Finely, Shewart & Yaroch, 1982). The study aimed to identify the most difficult and important concepts in these materials, but from the point of view of teachers and not by analyzing the content of scientific books. Alalimat (2006) aimed at defining basic and difficult chemistry concepts in the science curriculum of the primary stage in Jordan. The researcher used a basic chemistry test of (40) concept to identify difficult chemical concepts that were built on the basis of the analysis of the content of the science curriculum for the primary stage, where the coefficient of agreement among analysts was calculated to identify basic chemical concepts. As a result of the analysis of the content, the results showed that 40 basic chemical concepts were taught in the science curriculum of the primary stage. In addition, the results indicated that (11) basic chemical concepts are difficult.

The study of Al Qar'an (2005) aimed at analyzing the chemical concepts included in the science books of the basic intermediate stage in Jordan, in addition to evaluating the units of study from the point of view of the science teachers in Karak governorate in Jordan. The results of the study showed that the number of concepts of chemistry included in these books were (99) concepts, of which (16) concepts were repeated, where the number of concepts was (10, 17, 34, 37) in the books of the 5<sup>th</sup>, 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> grades respectively.

### **Empirical studies**

It was found that some of these studies were close to the subject of this study, where the scientific concepts were determined in order to conduct tests to determine the extent to which students absorbed them. When the science books were analyzed in some of these studies, the analysis was done either to investigate the content of these books to the universal standards of scientific education, or to define concepts of chemistry, physics or biology. Within the limits of the researcher's knowledge, there is

not a single study focused on the classification of the chemical concepts contained in the eighth grade science books in Jordan.

This study differs from the previous studies on the subject - within the limits of the researcher's knowledge - in two respects: First, this study focuses on the classification of the concepts of chemistry in terms of the classification methods and their frequencies in the science book for the 8<sup>th</sup> grade in Jordan, on the other hand, in this study, the constructivist vision included in these concepts which have been classified. Moreover, this study is conducted on the 8<sup>th</sup> grade science book which was first applied in the academic year 2016/2016 in the Jordanian schools.

### Methodology and procedures

The researcher analyzed the book of the 8<sup>th</sup> grade to learn the chemical concepts included in the units of study. The researcher has found that the book of science in its two parts contains seven units of study divided as shown in the following table:

Table 1. The units included in the science book for the eighth grade in Jordan with the number of pages per article

part	Unit	Subject	Number of pages
The first	First	Organisms and Environment (Biology)	40
	Second	Movement (Physics)	40
	Third	Substance/ Matter (Chemistry)	48
	Fourth	Vibrations and Waves (physics)	27
	Fifth	Genetics (Biology)	23
The second	Sixth	mobile electricity (physics)	23
	Seventh	Earth and Space Science (Geology)	33

The table shows that the less material for the number of pages in question is geology (33) pages, and the most materials in the number of pages were physics (90) pages, while the chemical subject of the search the number of pages was (40) pages, so there is a difference in the number of pages for each material which may affect the number of concepts included in each one of them.

### Population and sample of the study

The population of the study is the concepts of chemistry included in the eighth grade science book which was approved by the Ministry of Education in Jordan since the academic year 2016/2017, which is being taught is to date in all Jordanian schools. The study sample it is also the same as the population of the study.

### Instrument of the study

The researcher used the analytical descriptive method where the units of the concepts of chemistry were analyzed in the science book for the eighth grade In order to detect these concepts and classify them to levels.



### Instrument validity

In order to verify the validity of the instrument, it was presented to a group of arbitrators of specialization in its preliminary form. It contained 28 concepts in chemistry. The arbitrators were asked to express their opinion regarding the belonging of concepts to the classification levels, the inclusion of the categories of analysis for all concepts, later on Concepts are omitted or added. The observations of the arbitrators were followed and the observations of the arbitrators were adopted. In its final form, the instrument consists of (28) concepts in chemistry.

### Instrument reliability

To ensure the reliability of the analysis instrument, a science teacher teaching science for the eighth grade re-analyzed the sample itself after being trained to classify the concepts.

The Cooper equation (Madi and Othman, 1999) was used to calculate the proportion of the agreement as follows:

Percentage of agreement = number of times of agreement divided by ((number of times of agreement + number of times difference) X 100% and the rate of agreement was 86.8% and this value is acceptable for the purposes of this study.

### Results of the study

To answer the first question, which states: What are the concepts of chemistry included in the science book for the eighth grade in the first and second parts? The concepts of chemistry contained in the two chapter unit of Matter in the science book were analyzed as: The first chapter is the composition of matter and included 13 concepts whose total recurrence was (99) one. The second chapter is the chemical bond and the chemical equations. It included 15 concepts whose total recurrence was (153) one. Tables 2 and 3 show the results of this analysis.

Table 2. Concepts of chemistry contained in Module third / Chapter one: The composition of the material included in the science book for the eighth grade in Jordan is ascending and percentage

No	Type of chemistry concept	Frequency	Percentage
1	Matter	1	1,01
2	Element	2	2,02
3	Cycle	3	3,03
4	The group	3	3,03
5	Periodic Table	5	5,05
6	Metals	7	7,07
7	Electronic distribution	8	8,08
8	Atomic number	10	10,10
9	Mass number	10	10,10
10	Electrons	12	12,12
11	Neutrons	12	12,12
12	Protons	12	12,12
13	atom	14	14,14
	Total	99	100%

Table (2) shows the chemical concepts in chapter one of the eighth grade chemistry book in Jordan, It was found that the least repetitive of these concepts in this chapter are the matter and the element and the most frequent chemical concepts are the concepts of atoms, protons, neutrons and electrons, while the other concepts ranged from (3-10).

Table 3. Concepts of chemistry contained in Unit three / Chapter two: chemical bonds and chemical equations included in the science book for the eighth grade in Jordan in ascending order and the percentage

№	Type of chemistry concept	Frequency	Percentage
1	charge (positive and negative)	5	3,268
2	Ionic compound	5	3,268
3	compound	6	3,92
4	Element	7	4,58
5	Resultant substances	8	5,23
6	Reactant	8	5,23
7	Ionic Collection	9	5,88
8	Partial compound	9	5,88
9	Chemical formula	9	5,88
10	Negative ion	10	6,54
11	chemical reaction	11	7,19
12	Positive ion	12	7,84
13	Chemical bond	14	9,15
14	Covalent bond	15	9,80
15	Ionic bond	15	9,80
Total		153	100%

Table (3) shows that the less frequent chemical concepts are the concepts of charge (positive and negative). The most frequent chemical concepts are the concepts of ionic bonding, covalent bonding and the concept of chemical bonding, while the other concepts ranged from (6-14).

To answer the second question that state which chemical classifications are included in the science book for the eighth grade in the first and second parts? The chemistry unit was analyzed in the first and second parts of the book, where the unit was in the first part of the book. The chemical concepts were classified and the percentages were identified. Tables (4, 5, 6) show the results of this analysis and classification.

Table 4. Classification of chemistry concepts contained in unit three / Chapter one, percentage from where

Classification	Frequency	Percentage
1. Levels		
Preliminary concepts:	10	19,23
Derivative concepts	13	5,77
2 - the way to perceive these concepts		
Concrete or observational concepts	9	17,31
Abstract or non-observational concepts	4	7,69
3 - degree of learning		

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Easy to learn concepts	10	19,23
Difficult concepts of learning	3	5,77
4. Their complexity		
Simple concepts	5	9,62
Complex concepts	8	15,38
Total	52	100%

Table (4) shows that the chemical concepts in Module three/ Chapter one and their classification were the least frequent classifications were (3) derivative Concepts and the most frequent chemical concepts in terms of classifications were elementary concepts and easy to learn concepts for each of them (10) concepts.

Table 5. Classification of chemistry concepts included in unit three / Chapter two, and percentage:

	Duplicates	Percentage
1. Levels		
Preliminary concepts:	11	18,33
Derivative concepts	4	6,67
2 - the way to perceive these concepts		
Concrete or observational concepts	5	8,33
Abstract or non-observational concepts	10	16,67
3 - degree of learning		
Easy to learn concepts	8	13,33
Difficult concepts of learning	7	11,67
4. Their complexity		
Simple concepts	10	16,67
Complex concepts	5	8,33
Total	60	100%

Table (5) shows that the chemical concepts included in Unit three / Chapter two and by their classification the least frequent classifications were (4) derivative Concepts and the most frequent chemical concepts in terms of classifications were the primary concepts (11) concepts.

Table 6.To classify the chemical concepts contained in the science book in its two parts, and to know the percentage of each category and compare it with other classes

Category	Duplicates	Percentage
Preliminary concepts:	21	18,75
Derivative concepts	7	6,25
Concrete or observational concepts	14	12,50
Abstract or non-observational concepts	14	12,50
Easy to learn concepts	18	16,7
Difficult concepts of learning	10	8,93
Simple concepts	15	13,39
Complex concepts	13	11,61
Total	112	100%

Table (6) shows that the chemical concepts in the book of science in its two parts, and the percentage of each category and compare it with the other classes, where the percentage of derivative concepts (6.25) which is the lowest percentage, while the percentage of preliminary concepts (18.75) which is the highest percentage.

And to answer the third question, which states: What is the constructive vision of the concepts of chemistry included in the book of science for the eighth grade in the first parts of the first and second? The chemistry book was analyzed, found to contain activities based on exploration and interpretation, and solving the scientific problem which is based on the direct and effective involvement of the students in them. This activity is one of the pillars of learning and constructive education, which has been focused on by the authors of the science book. These activities show that it helps students acquire new experience based on their previous experiences and revitalizing them. These activities which are directed constructively help the students to reach new scientific concepts in chemistry which will enrich their concepts knowledge that will help them classify and apply them in fields of life. The following table shows the number of exploration and exploration activities, the development of knowledge with a structural vision in chemistry, and the number of concepts of chemistry that is expected to be achieved in the field of chemistry, generated from these construction activities.

Table 7. The number of exploration and exploration activities and knowledge development activities with a constructive vision in the field of chemistry, and the number of concepts of chemistry expected to be generated from these construction activities

№	Type of chemical activities with structural vision	Number of chemistry activities	Percentage	Number of concepts of chemistry to be hoped for
1	Exploration and interpretation activities	19	67.86	69
2	Knowledge development activities	9	32,14	46
Total		28	100%	115

Table (7) shows that there are (19) activities in the category of exploration and interpretation with a constructional vision that are expected to generate (69) chemical concepts if implemented by students. This table also shows that (9) activities in the knowledge development category with a construction vision are expected to generate (46) chemical concepts in case of implementation.

### Discussion and analysis

The results of this study showed and through the discussion of the first question, which relates to the classification of the concepts of chemistry in the book of science for the 8<sup>th</sup> grade in Jordan, and after reading the theoretical literature and previous studies, the concepts of chemistry contained in the book of science for the 8<sup>th</sup> grade were analyzed and classified as follows, In the third unit on two chapters, the number of chemical concepts therein (28) concepts were repeated (252) time, and there is a difference in the number of concepts of chemistry in the old edition of the book of science for the 8<sup>th</sup> grade and the modern edition where the number of concepts in the old edition were

more as mentioned in the Al-Aliamat study (2006), despite the diversity of chemical concepts contained in the new edition, the concepts included in the activities had a structural nature. These activities were of the type of exploration and interpretation, to develop knowledge that will generate many concepts if applied by students. The ancient edition of the eighth grade science book did not contain a constructive vision in the way the scientific concepts were clearly communicated.

The second question is to classify the chemical concepts contained in the new edition of the 8<sup>th</sup> grade science book in Jordan. The numbers of chemical concepts were (28) and have been classified as follows: in terms of their levels, the way these concepts are understood, their degree of learning and their complexity. The classifications showed that the number of repetition of derivative and difficult to learn concepts were (3) for each concept in the first chapter and by a percentage of (5.77%). The primary and easy to learn concepts within the classification were the most frequent (10) for each concept in the first chapter and by a percentage of (19.23%). The second chapter the derivative concepts in the less frequent category with (4) in the second semester and by a percentage of (6,67%), And the primary concepts within the most frequent classification were (11) in the second chapter, by a percentage of (18.33%).

The results of tables (4, 5, 6) showed that the focus was on the classification of concepts of simple and primary character. The percentage of the total classification of these concepts in the eighth grade book was (34.82%) of the total percentage of concepts whereas the derivative concepts got less than (6.25%) of the total percentage of concepts, while other types of concepts such as: concrete concepts or based on observation and abstract concepts or concepts that are not based on observation or complex and were of average frequency and good percentages ranging from (11.61 - 12.50). The eighth grade writers focused in the first and second parts on the primary and easy to learn concepts to help the student to understand the derivative and difficult to learn concepts, although the number of difficult and derivative concepts were very little for the level of students in the 8<sup>th</sup> grade, and contained concepts that need to be concrete, experiment, observation or complex concepts need to experiment more and practice by Students to reach the concepts.

The third question is about the structural vision of the concepts of chemistry contained in scientific activities of structural nature. The constructivist vision has focused on exploration, interpretation and knowledge development activities. It is well known that constructivist focuses on the activities of inquiry and inference, which is a condition for building the concept. The concept is constructed only on the basis of empirical conclusions deriving from previous knowledge, problem solving activities and activities that rely on thinking and collaborative learning, which helps to develop the spirit of cooperation and work as a team among the learners Where students benefit from reviewing their previous information to build new knowledge, as the new knowledge does not consist only if the reference to their previous knowledge and then build on them.

Table (7) shows the existence of (19) activities in chemistry in the exploration and exploration category that are expected to generate (69) concepts in chemistry if im-

plemented. And (9) activities in the knowledge development category of which 46 concepts are expected to be generated in chemistry, In order to clarify the meaning of the structural vision in the scientific concepts, there is an activity in the chemistry included in the science book for the eighth grade, as follows: Exploration and interpretation activity (atom) where the previous knowledge indicates that in the atom is equal to the number of protons and the number of electrons. Through the activity students will be looking to answer the question: What happens to the atom if you lose one of its electrons? The answer becomes a positive charge. And what does it charge when you earn an electron? The answer is negative. In this case, the student has acquired the concepts of chemistry such as loss of electrons, acquisition of electron, positive charge, negative charge, neutral atom and so on. In the application of one activity in the constructivist way the student acquires a set of concepts generated from this activity, thus, it has a repository of initial concepts on which new derivative concepts are based. The presentation of the content does not allow the teacher to use active learning strategies that seek to find the pros of the learner by knowing his learning abilities and what are the positive aspects, and did not provide the activities that develop manual skills through dealing with modern devices, tools and techniques While learning, and did not show the role of the classroom and local environment in providing better learning through the use of its resources.

### Recommendations

The study recommends that:

1. Analysis and classification of the concepts of physics or biology in the science book for the eighth grade.
2. Research the evaluation questions in the science book for the eighth grade, because these questions are of the type of evaluation and meditation.

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