

Federal Democratic Republic of Ethiopia
Ministry of Education

Chemistry Syllabus, Grades 11 and 12

2009

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Introduction

According to the educational and training policy of Ethiopia, the second cycle of the secondary education and training will enable students to choose subjects or areas of training which will prepare them adequately for higher education and for the world of work.

On this basis this revised chemistry syllabus is prepared in such away that it can address those areas of study that chemistry students could attend at higher education. Students of chemistry are expected to join chemistry, physics, biology, medicine, pharmacy, earth science, engineering, agriculture and the likes. It is believed that there are grains of contents that lay ground for the above mentioned fields of studies.

The revision of the curriculum was based on the new curriculum framework of Ethiopian schools and assessments made in selected schools of the country.

Generally the process of the revision involved incorporating the comments given by the students and the teachers during the assessment, meeting the requirements of the framework and keeping international standards.

The major points that were considered in the revision were:

- Making the content overload appropriate to the period allotment;
- Making content difficulties appropriate to the grade level;
- Emphasise active learning approaches;
- Reducing unnecessary repetitions;
- Restructuring the curriculum to competency based;
- Strengthening the bridging role of the level to higher education;
- Integrating some technological, agricultural and health concepts.

To achieve the above mentioned purposes, some restructuring works have been done all through grades 7- 12. Consequently, both grades 11 and 12 are made to have 6 units each.

This reduction of the contents is believed to facilitate active learning process.

To mention few typical examples that has been made on this revision:

- In both grades 11 and 12 enough practical activities are included to implement active learning approaches,
- In grade 11, the title “phase equilibrium” is introduced in unit 5(Chemical and Phase Equilibrium) to deepen students’ knowledge on the properties of the three states of matter and their phase changes,

- To solve the problems of content overload, the past very broad and wide four units of grade 12, s-block metals, p- block metals, p-block non-metals and d-block metals are distributed and integrated to different grade levels and reduced here to one unit under the title “The Elements in Nature and Industry”. This unit treats only the occurrence and abundance of elements, recycling of carbon, nitrogen and phosphorus in nature, and production of some metals such us sodium, calcium, tin, lead, zinc and chromium, and metalloid, which is silicon , and compounds of some non-metals such us nitric acid, sulphuric acid and Diammonium Phosphate(DAP).

The format of the syllabus is different from the traditionally used one. There are only three columns of competency, content and suggested activities respectively in the syllabus below which comes the assessment row.

In the assessment the minimum learning competencies for students working at the minimum requirement level are listed to evaluate their performances. It also suggests assistance to be made for students working below and above the required levels.

Assessment is done through continuous process; however, specific assessment techniques are selected in order to collect information about how well students are achieving the competencies. The assessment techniques used at any particular time depends on what facility with the knowledge, skill, or process the teacher wants the student to demonstrate. The appropriateness of the techniques therefore results on the content, the instructional strategies used, the level of development of the students and what is to be assessed. The environment and culture of the students must also be considered.

In the assessment, the statement “**minimum requirement level**” should not mislead and should be understood as the “**standard level**”. Students working at the standard level are expected to achieve the competencies set for the grade level successfully.

Various assessment techniques are listed below. The techniques listed are meant to serve only fore reference, since the teacher exercises professional judgement in determining which technique suit the particular purpose of assessment.

Chemistry Syllabus: Grade 11 and 12

Correlating Instruction, Evaluation, and Science Goals

Instructional Strategies	Some Important Active Learning Methods for Science	Some Corresponding Assessment Techniques
Direct	<ul style="list-style-type: none"> • Demonstrations 	<ul style="list-style-type: none"> • Group/Individual (Peer/Self): Performance Assessments • Short-Answer Quizzes & Tests
Indirect	<ul style="list-style-type: none"> • Concept Mapping/Formation/ Attainment • Inquiry • Problem Solving 	<ul style="list-style-type: none"> • Individual/Group: Presentations • Oral Assessments • Performance Assessments • Written Assignments
Experiential	<ul style="list-style-type: none"> • Conducting Experiments • Field Observations & Trips • Model Building • Simulations 	<ul style="list-style-type: none"> • Group/Individual: Performance Assessments; • Written Assignments; • Peer/Self: Oral Assessments • Technical Skills
Independent Study	<ul style="list-style-type: none"> • Reports • Homework • Research Projects 	<ul style="list-style-type: none"> • Performance Assessments • Portfolios • Presentations • Quizzes • Written Assignments
Interactive	<ul style="list-style-type: none"> • Brainstorming • Co-operative Learning Groups • Discussion • Laboratory Groups 	<ul style="list-style-type: none"> • Group/Peer: Oral Assessments • Written Assignments

To reinforce utilization of the syllabus other curriculum materials are also prepared to accompany it. These materials are: flowchart, minimum learning competency, student textbook, teacher's guide, practical activities manual, and students' workbook.

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The syllabus for Grades 11 and 12 were revised by six consultants, teachers and curriculum experts.

**Allotment of Periods for Units and Sub-units of Chemistry
Grades 11 and 12**

Grade	Unit	Sub-unit	Number of Periods	
			Sub-unit	Total
11	Unit 1: Fundamental Concepts in Chemistry	1.1 The scope of chemistry	2	15
		1.2 Measurements and units in chemistry	8	
		1.3 Chemistry as experimental science	5	
	Unit 2: Atomic Structure and Periodic Table	2.1 Historical development of the atomic nature of substances	1	28
		2.2 Dalton's atomic theory and the modern atomic theory	2	
2.3 Early experiments to characteristics the atom		3		
2.4 Make up of the nucleus		2		
2.5 Electromagnetic radiation (EMR) and atomic spectra		9		
2.6 The quantum mechanical model of the atom		5		
2.7 Electronic configurations and orbital diagrams		2		
2.8 Electronic configurations and the periodic table of the elements		4		
Unit 3: Chemical Bonding and Structure	3.1 Introduction	1	32	
	3.2 Ionic bonding	5		
	3.3 Covalent bonding	15		
	3.4 Metallic bonding	2		
	3.5 Chemical bonding	8		
	3.6 Types of crystal	1		
Unit 4: Chemical Kinetics	4.1 Rate of reaction	5	19	
	4.2 Theories of reaction rates	4		
	4.3 Rate equation or rate	7		
	4.4 Reaction mechanism	3		
Unit 5: Chemical Equilibrium and Phase Equilibrium	5.1 Chemical equilibrium	14	18	
	5.2 Phase equilibrium	4		

Chemistry Syllabus: Grade 11 and 12

Grade	Unit	Sub-unit	Number of Periods	
			Sub-unit	Total
	Unit 6: Carboxylic acids, Esters, Fats and Oils	6.1 Carboxylic acids 6.2 Esters 6.3 Fats and oils	8 6 6	20
12	Unit 1: Solutions	1.1 Homogenous and heterogeneous mixtures 1.2 Types of solutions 1.3 The solution process 1.4 Solubility as an equilibrium process 1.5 Ways of expressing concentrations of solutions 1.6 Preparation of solutions 1.7 Solution stoichiometry 1.8 Describing reactions in solution 1.9 Colligative properties of solutions	1 2 5 4 7 2 3 1 5	30
	Unit 2: Acid-base Equilibrium	2.1 Acid base concepts 2.2 Ionic equilibria of weak acids and bases 2.3 Common ion effect and buffer solutions 2.4 Hydrolysis of salts 2.5 Acid base indicators	5 9 4 2 6	26
	Unit 3: Introduction to Chemical Thermodynamics	3.1 Common thermodynamic terms 3.2 First law of thermodynamics and some thermodynamic quantities 3.3 Thermo chemistry 3.4 Entropy and second law of thermodynamics	2 3 4 3	12
	Unit 4: Electro Chemistry	4.1 Reduction- oxidation reacting 4.2 Electrolysis of aqueous solutions 4.3 Quantitative aspects of electrolysis 4.4 Industrial application of electrolysis 4.5 Voltaic cells	5 6 3 2 5	21
	Unit 5: Some Elements in Nature and Industry	5.1 Some elements in nature 5.2 Some elements in industry	5 12	17
	Unit 6: Polymers	6.1 Polymerization 6.2 Synthetic polymers 6.3 Natural polymers	2 5 7	14