



Academic Year : 2012 – 2013

Syllabus : General Chemistry / Department of Production and Metals

Prerequisite	None
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Course Instructor: Dr. Mohammed T. I. Ibrahim

Building & Office No.	Dept. of Chem. Eng. 423
Tele-Fax	-----
E – mail	mtiea66@gmail.com

Theoretical Lectures :

Section	Days	Time	Room No.
01	Sunday	12:30 – 14:30	8

Laboratory :

Section	Days	Time	Room No.
01	Monday	8:30 – 10:30	Chemistry Lab
02	Monday	10:30 – 12:30	Chemistry Lab

Office Hours:	Sun.	Mon.	Tues	Wed	Thu
Time	11:30 – 12:30	11:30 – 12:30	11:30 – 12:30	11:30 – 12:30	-----
Room No.	423	423	423	423	-----

And by appointment

Course Objectives :

To teach freshman students registered in the department of production and minerals the basic ideas and principles of general chemistry. The course also involves practical / laboratory experiments in the relevant subjects of analytical and organic Chemistry.

A- Course Description / Theoretical :

- 1- Fundamental concepts of chemistry including nomenclatures
- 2- Atomic structure
- 3- Atomic theory, molecules, molecular structure
- 4- Intermolecular forces
- 5- Chemical bonding
- 6- Chemical reactions, reactions and stoichiometry
- 7- Chemical kinetics
- 8- Periodic table and periodic trends
- 9- States of matter
- 10- Properties of gases, liquids, solutions and solids
- 11- Solution chemistry, properties, molarity, normality
- 12- Acid / base and ionic equilibria
- 13- Thermodynamics, energy
- 14- Nuclear chemistry
- 15- Analytical methods of analysis, qualitative
- 16- Analytical methods of analysis, quantitative
- 17- Volumetric analysis, gravimetric analysis
- 18- Instrumental methods of analysis
- 19- Introduction to organic chemistry
- 20- Structure and bonding of organic compounds including isomers
- 21- Reactions and properties of aliphatic and aromatic hydrocarbons, and organic compounds containing common functional groups
- 22- Introduction to mineral chemistry
- 23- Other topics of relevance :
 - a- Packing of atoms
 - b- Radius ratios and atomic coordination
 - c- Derivation of chemical formulae from chemical analysis
 - d- Atomic bonds and their relationship to mineral composition and structure
 - e- Unary and binary phase diagram
 - f- Systematic discussion of crystal chemistry and occurrence of main mineral groups

Subject matter :

Recommended Books	
Textbook	Steven S. Zumdahl and Susan A. Zumdahl. "Chemistry". 8 th Edition, BROOKS/COLE, CENGAGE Learning, 2010. ISBN : 978-0-495-82992-8.
Reference Books	(1) "Chemistry: Matter and its changes", James E. Brady and Fred Senesem, 5 th Ed., John Wiley & Sons Ltd., 2009. (2) "Chemistry, Principles and Reactions". W. Masterton, C. Hurley, 3 rd Ed. Saunders College Publishing 1997. (3) "Chemistry". R. Chang 8 th Edition, McGraw-Hill Higher Education, 2005. (4) "Chemistry, Principles and Reactions". W. Masterton, C. Hurley, 3 rd Ed. Saunders College Publishing 1997.
Supplementary Material	Power Point Presentations

B- Course Description / Laboratory experiments

First session : Introduction / safety and hygiene during chemistry lab works

Analytical Chemistry

- 1- Preparation of standard solution
- 2- Hydrochloric acid standardization and the determination of unknown sodium hydroxide molarity by volumetric titration
- 3- Quantitative analysis for a mixture of sodium carbonate and sodium hydroxide
- 4- The acidity of vinegar
- 5- Back titration
- 6- Redox reactions
- 7- Quantitative determination of ammonia concentration in ammonium salts
- 8- Quantitative determination of chloride ion concentration by Mohr method
- 9- Paper chromatography
- 10- Purification of table salt
- 11- Determining the presence of various cations

Organic Chemistry

- 1- Determination of melting point
- 2- Determination of boiling point
- 3- Preparation of aspirin
- 4- Production of an ester
- 5- Simple distillation
- 6- Determination of the presence of functional groups
- 7- Saponification
- 8- Organic dyes
- 9- Preparation of acetic acid
- 10- Preparation of ethyl acetate
- 11- Determination of the presence of certain elements in organic compounds

Subject matter :

A laboratory experiment manual is available to be supplied to course registered students

Course Evaluation:

	Date	%
Mid Term Exam	/ 01 / 2012	30 %
Course Work	Quiz 1	10 %
	Quiz 2	10 %
Final Exam	/ 06 / 2013	50 %
Total		100%

Projected Course Weekly Outline

W	Date	Theoretical Topics	Laboratory Experiments
1	18/11/12	Fundamental concepts of chemistry including nomenclatures	First session : Introduction / safety and hygiene during chemistry lab works
2	25/11/12	Atomic Structure	Ppn of std. Soln.
3	02/12/12	Atomic theory, molecules, molecular structure	Hydrochloric acid standardization and the determination of unknown sodium hydroxide
4	09/12/12	Intermolecular forces	Quantitative analysis for a mixture of sodium carbonate and sodium hydroxide
5	16/12/12	Chemical bonding	The acidity of vinegar
6	23/12/12	Chemical reactions and stoichiometry	Back titration
7	30/12/12	Chemical kinetics	Redox reactions
8	06/01/13	Periodic table and general trends	Quantitative determination of ammonia concentration in ammonium salts
9	13/01/13	Exams mid	Academic year 12/13
10	20/01/13	Continue	Exams
11	27/01/13	Continue	Exams
12	03/02/13	Spring	Break
13	10/02/13	Spring	Break

12	03/02/13		<i>Spring</i>	<i>Break</i>
13	10/02/13		<i>Spring</i>	<i>Break</i>
17	17/02/13	States of matter		Quantitative determination of chloride ion concentration by Mohr method
18	24/02/13	Quantitative determination of chloride ion concentration by Mohr method		Paper chromatography
19	03/03/13	Solution chemistry, properties, molarity, normality		Purification of table salt
20	10/03/13	Acids – Bases and ionic equilibria		Determining the presence of various cations
21	17/03/13	Thermodynamics, energy		Determination of melting point
22	24/03/13	Nuclear energy		Determination of boiling point
23	31/03/13	Analytical methods of analysis, qualitative		Preparation of Aspirin
24	07/04/13	Analytical methods of analysis, quantitative		Production of ester
25	14/04/13	Volumetric analysis, gravimetric analysis		Simple distillation
26	21/04/13	Instrumental methods of analysis		Determination of the presence of functional groups
27	28/04/13	Introduction to organic chemistry		saponification
28	05/05/13	Structure and bonding of organic compounds including isomers		Organic dyes
29	12/05/13	Reactions and properties of aliphatic and aromatic hydrocarbons and organic compounds		Preparation of acetic acid
30	19/05/13	Introduction to mineral chemistry		Preparation of ethyl acetate
31	26/05/13	Other topics of relevance : packing of atoms; radius ratios and atomic coordination; derivation of chemical formulae from chemical analysis; atomic bonds and their relationship to mineral composition and structure; unary and binary phase diagram; systematic discussion of crystal chemistry and occurrence of mineral groups		Determination of the presence of certain elements in organic compounds
32	02/06/13		<i>Continue</i>	<i>Continue</i>
33	09/06/13		Final	Exams