

AG- 301

Chemistry I

Credit Hours 2+1

Prerequisite: F.Sc or Equivalent

LEARNING OUTCOMES:

Students will acquire knowledge about

- law of mass action and its application in Geology.
- Phase rule and various systems.
- classical techniques of analytical chemistry a
- fundamental concepts of advanced instrumental analysis.

CONTENTS

MASS SPECTROMETRY

Principle, instrumentation and applications of Mass Spectrometry

CHROMATOGRAPHIC METHODS

Basic principle, instrumentation and applications of gas liquid and gas solid chromatography.

LAW OF MASS ACTIONS

Law of mass action and its application to solubility of calcite, amorphous silica, evaporation to sea water, formation to Gypsum anhydrite, transformation to Feldspar to kyanite

PHASE RULE

Basic concept of phase rule and concepts of following system: kyanite-andualite-sillimanite and Leucite silica

THERMODYNAMICS

Various forms of 1st Law of Thermodynamics, specific heat at constant temperature and pressure

2nd law of thermodynamics, adiabatic changes, reversible and irreversible process.

Thermodynamics and formation of Galena, Wallastonite and Malachite

SPECTROSCOPIC TECHNIQUES

General theory of spectroscopy, Basic principles and instrumentation of Atomic Absorption spectroscopy, Atomic emission spectroscopy particularly flame photometry, Atomic Florescence Spectroscopy, UV Visible Spectrophotometry

Lab.

Chemical analysis of Limestone, Gypsum, Iron ore, Chromite or determination of Calcium content by EDTA titration and Carbonate by acid base titration.

Determination of water hardness.

Determination of metals (Na, K) in rock / soil samples

Determination of Metals (Na, K) in different water samples of geological areas.

Determination of Fe ion by complexing with potassium thiocyanate

Determination of Fe ion by complexing with 1, 10-phenantroline.

TEACHING – LEARNING STRATEGIES

- Lecture based examination
- Presentation/seminars
- Class discussion
- Quizzes

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED BOOKS

- A book of Analytical chemistry by G.D. Christian 2014
- A text book of Inorganic and Applied chemistry for B.Sc Students by Haq Nawaz Bhatti, Carvan Book House Lahore 2017.
- Principles of Analytical Chemistry for B.Sc Students by Haq Nawaz Bhatti and RabiaRehman, Carvan Book House Lahore 2017.
- A text book of Inorganic chemistry for B.Sc Students by Zafar Iqbal.2002
- Principle of Physical Chemistry by Haq Nawaz Bhatti and Kazim Hussain,Carvan Book House Lahore.2000.
- Experimental Inorganic Chemistry by Haq Nawaz Bhatti and Kazim Hussain ,Carvan Book House Lahore.
- Advanced Experimental Inorganic Chemistry by Haq Nawaz Bhatti and Kazim Hussain,Carvan Book House Lahore. 2017
- Organic spectroscopy for B.Sc students by M.younas 1998
- Introduction to Instrumental Analyses Robert D. Brown Mcgraw Hill intl 1987