

NATIONAL FORENSIC SCIENCE LABORATORY
Khumaltar, Lalitpur

Syllabus of Chem-group
Sixth Level

Subject: General Chemistry (1st paper)

Part I: GENERAL CHEMISTRY

50%

Physical Chemistry

General Concept of ionic equilibrium: pH, buffer solution, buffer capacity and buffer range, pH change in acid base titration, theory of acid base indicator, hydrolysis of salt. Debye Huckel limiting law, activity and activity coefficient, ionic strength.

Inorganic Chemistry

General concept of metals and non-metals, Noble gas compounds, non-aqueous solvents, protic and non-protic solvents, ¹⁴C dating and radio-chemical analysis.

Organic Chemistry

Study and application of oxidation and reduction reaction, halogenations, acetylation and alkylation. Basic concept of photo-chemical energy.

Bio-Chemistry and Applied-Chemistry

General idea of natural products and drug analysis: isolation, purification and identification of natural molecules (alkaloids, terpinoids and flavonoids) and drugs (sedatives and antibiotics). General concept of pesticide and pesticide residue analysis in water, soil and food stuffs.

Part II: LABORATORY METHODS

50%

Chromatographic Techniques

Basic principles and application of chromatography (TLC, HPTLC, GC and HPLC).

Spectrophotometry techniques

General Principles and applications of Spectrophotometry techniques (UV, IR, NMR) and Atomic Absorption Spectroscopy.

Titrimetric analysis

Fundamental of acid-base, oxidation-reduction, non-aqueous, complexometric and potentiometric titration.

Statistical methods

General concept of statistical methods in chemical analysis: Accuracy, precision, minimization of error, significant figures, mean and standard deviation, reliability of results.

Bio-chemical Hazards Management

Basic concept of bio-chemical hazards (nature and precaution).

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Subject: Forensic (2nd paper)

Part I: GENERAL

20%

Definition of forensic science, Physical evidence. Locard's principle. Individuality principle. Interpretation of laboratory result and report writing. Expert witness (including cross examination). Nepalese History of Forensic Science. Present status of Forensic Science in Nepal. General concept of criminal justice system of Nepal. Nepalese acts related to physical evidence and its examination.

Part II: FORENSIC CHEMISTRY

40%

Forensic Chemistry

Basic concept of Forensic Chemistry and its significance.

Analysis of beverages

Alcoholic and nonalcoholic, country made liquor and illicit liquor.

Examination of petroleum products

Distillation and fractionation, various fractions and their commercial uses.

Explosives

Classification, composition and characteristics of explosives and detection of explosive residue in forensic samples.

Soil Analysis

Forensic examination of soil (colour test, density gradient and chemical analysis).

Part III: TOXICOLOGY

40%

Drugs of Abuse

Introduction, classification and its importance of examination in forensic.

Forensic Pharmacology

General concept of mechanism and action of drugs, their safety, uses, mode of administration, adverse drug reaction and drug interaction.

Forensic Toxicology

General concept of forensic toxicology. Collection and preservation of toxicological exhibits in fatal and survival cases.

Poisons

Classification of poisons, types of poisoning, signs and symptoms of poisoning, mode of action and its effect on vital functions.

Extraction techniques

Isolation and clean-up procedures of poisons/drugs using solvent extraction technique from biological samples (viscera, body fluids).

Identification techniques

Presumptive tests of drugs of abuse. Identification of insecticide and drugs of abuse using chromatographic techniques (TLC & GC). Identification of rodenticide from biological samples. Identification of volatile poisons (Alcohols, solvents etc) from biological fluids (blood and urine). Identification of carbon monoxide in blood.

Model Question (Objective)

Dichlorvos is an insecticide of the type :

- a) organochlorine b) organophosphorous c) carbamate d) pyrethroids

Model Question (subjective)

How do you identify the rodenticide poison from the viscera ?