

Chem V01A

1. Balance Chemical equations and solve general Chemistry problems by applying the scientific method including developing hypotheses, hypotheses testing and evaluation.
2. Calculate quantities involving Chemical equations including using Chemical symbols, IUPAC nomenclature, balancing reactions and stoichiometry.
3. Use Chemical concepts such as enthalpy, VSEPR theory, changes of state, and colligative properties to determine the physical properties of substances.

Chem V01AL

1. Understand laboratory procedures, safety, scientific method and lab notebook recording.
2. Understand the concepts of random error, systematic error, precision and accuracy, and their relationship to significant figures.
3. Master Chemical laboratory techniques such as measurement, determination of density, pipetting, titration, and spectroscopy.

Chem V01B

1. Use kinetic data to formulate chemical mechanisms and analyze the results using thermodynamic arguments.
2. Determine relative properties of elements using periodic trends and apply that knowledge to chemical systems.
3. Use chemical concepts such as enthalpy, VSEPR theory, changes of state, and colligative properties.

Chem V01BL

1. Evaluate a chemical reaction system to determine how chemical equilibria will be altered by changes in temperature, concentration, or pressure by applying LeChatelier's principle.
2. Experiment with rate dependence on temperature and calculate activation energy from experimental data analysis.
3. Test common hydrocarbons and organic compounds to identify what functional groups are present.

Chem V12A

1. Categorize, arrange and assemble structures of alkanes, alkenes, alkynes alkyl halides, alicyclics, alcohols, ethers and aromatics using IUPAC, derived and common systems of nomenclature.
2. Examine, evaluate and formulate mechanisms for the reactions of alkanes, alkenes, alkynes, alkyl halides, alcohols and aromatics given reactant and target compounds. They will also be required to propose alternate steps in reaction mechanisms for common reactions.
3. Examine, evaluate and formulate appropriate multi-step synthetic pathways leading to target compounds involving alkanes, alkenes, alkynes, alkyl halides, alcohols and aromatics.
4. Evaluate spectra (infrared, mass, HNMR, CNMR, UV) to formulate structures for organic compounds involving alkanes, alkenes, alkynes, alkyl halides, alcohols and aromatics.

Chem V12AL

1. Synthesize simple organic molecules using modern reaction techniques and analyze the success of each synthesis on the basis of gravimetric, spectroscopic, and chromatographic evidence and physical properties.
2. Analyze unknown substances using qualitative Chemical tests and to confirm the analysis using the interpretation of infrared, nuclear magnetic resonance, and gas chromatography-mass spectroscopy.

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Chem V20

1. Solve quantitative Chemistry problems using various mathematical procedures including dimensional analysis and algebraic equations, and demonstrate clear reasoning in their work.
2. Explain the basic structure of atoms and molecules and describe how atoms combine to form compounds.
3. Describe how the structure of atoms and molecules leads to the macroscopic properties of a material such as reactivity, boiling point, melting point, and polarity.
4. Analyze, predict, and represent Chemical changes using knowledge of Chemical formulas, solubility rules, periodic trends, stoichiometry, and Chemical equations

Chem V20L

1. Perform laboratory techniques correctly following written protocols and using appropriate safety procedures.
2. Evaluate sources of error, and their effect on experiment results
3. Perform careful and accurate laboratory measurements and correlate these measurements with scientific laws, and the properties of substances.

CHEM V21

1. Solve organic and bioChemistry problems by applying the scientific method including developing hypotheses, hypotheses testing and evaluation.
2. Know the IUPAC names and the structures of alkanes, alkenes, alkynes, alcohols, ethers, thiols, benzene and aromatic compounds, amines, aldehydes, ketones, carboxylic acids, esters, amides, acid anhydrides and polyfunctional molecules.
3. Understand the process of DNA replication, transcription, translation, mutation and polymerase chain reaction; as well as the processes of catabolism and anabolism.

CHEMV21L

1. Understand laboratory procedures, safety, scientific method and lab notebook recording.
2. Master techniques for organic Chemistry reactions, synthesis, chromatography and quantitative analysis.
3. Master bioChemical laboratory procedures for isolating and identifying DNA.

Chem V30

1. Describe the structure and composition of matter, and use knowledge of the particulate structure of matter in order to predict and explain macroscopic properties.
2. Solve quantitative Chemistry problems using dimensional analysis and algebraic equations involving the mole, pH, unit conversions, and other concepts.
3. Classify organic molecules, predict their properties based on their formula and structure, and represent their characteristic reactions.

Chem V30L

1. Perform laboratory techniques correctly following written protocols and using appropriate safety procedures.
2. Analyze the results of laboratory experiments quantitatively.
3. Perform experiments with organic compounds and use the results of these experiments to classify, and predict the behavior of organic compounds.