

***Passport to Science Exploration: Chemistry Concepts in Action* Major Topics**

The following is a list of the major topics covered in the *Passport to Science Exploration: Chemistry Concepts in Action*. These topics are meant to help students navigate CEF's study materials and should not be considered comprehensive. *You Be The Chemist* Challenge® questions are largely derived from information contained in the study materials, but are not limited solely to this information. Topics are arranged in the order that they appear in the study materials.

Section I: Laboratory Separations

- Distillation
- Centrifugation
- Decantation
- Crystallization
- Absorption and adsorption
- Solvent extraction
- Chromatography

Section II: Laboratory Analysis

- Qualitative analysis
- Quantitative analysis
- Flame tests
- Spectroscopy
- Titration
- Gravimetric analysis

Section III: Chemical Quantities

- Relative atomic mass
- Moles and Avogadro's number
- Solutes and solvents
- Percent composition by mass
- Molarity
- Saturation and supersaturation
- Polar and nonpolar solvents
- Freezing point depression
- Boiling point elevation
- Osmotic pressure

Section IV: Organic Chemistry

- Naming hydrocarbons
- Alkanes, alkenes, alkynes, and cycloalkanes
- Skeletal structures
- Identifying and naming functional groups
- Halocarbons, alcohols, ethers, aldehydes, ketones, carboxylic acids, esters, amines, and amides
- Fossil fuels
- Fractional distillation
- Proteins and amino acids
- Carbohydrates
- Lipids
- Nucleic acids
- Vitamins

Section V: Applications of Chemistry in Everyday Life

- Fermentation
- Sugars
- Pepper
- Garlic
- Caffeine
- Chocolate
- Gasoline
- Diesel
- Antifreeze
- Battery acid

Section VI: Industrial Applications of Chemistry

- Alloys
- Types of polymers
- Synthesizing polymers
- Plastics
- Biopolymers
- Rubber
- Pharmaceuticals

Section VI: Energy

- Mechanical and thermal energy
- Law of conservation of energy
- Conduction, convection, and radiation
- Units of energy
- Specific heat
- Electromagnetic waves
- Gamma rays, X-rays, UV radiation, visible light, IR radiation, microwaves, and radio waves
- Electrochemical cells