



**Chose one of the following:**

- (1) Properties of gases, characteristics of gas, gas pressure, and gas laws (Boyle's law - Charles's law).
- (2) Gas laws (Boyle's law, Charles's law, and Avogadro's law) and deriving the ideal gas equation from the empirical gas laws.
- (3) Dalton's law of partial pressure of gas mixtures, Graham's law for diffusion, and application of the ideal gas equation.
- (4) Deviation from ideal behavior, the van der Waals equation, and compressibility factor  $Z$ .
- (5) Phase changes, types of phase changes, chemical changes, and physical changes.
- (6) Acid and bases.
- (7) Solutions, physical properties of solutions, concentration of solution, and factors that affect on solubility.