

Study Guide for Exam #5 (Ch. 12-14)

Chem20, Elementary Chemistry

MEMORIZE

- Intermolecular Forces: London (dispersion) forces, dipole-dipole interactions, hydrogen bonding
- $\text{mass percent} = \frac{\text{mass solute}}{\text{mass solution}} \times 100\%$
- $\text{molarity (M)} = \frac{\text{moles solute}}{\text{L solution}}$
- $M_1V_1 = M_2V_2$
- $\text{molality (m)} = \frac{\text{mols solute}}{\text{kg solvent}}$
- $\Delta T_f = m \times K_f$
- $\Delta T_b = m \times K_b$
- $K_w = [\text{H}_3\text{O}^+][\text{OH}^-]$
- $\text{pH} = -\log([\text{H}_3\text{O}^+]); [\text{H}_3\text{O}^+] = 10^{-\text{pH}}; \text{pOH} = -\log([\text{OH}^-]); [\text{OH}^-] = 10^{-\text{pOH}}$
- $14.00 = \text{pH} + \text{pOH}$

Chapter Twelve

I. Phase Changes (12.4-12.5): Know how to use the heat of fusion or heat of vaporization to calculate the energy needed to change phases of matter. Know how to sum the total heat required when changing the temperature of a sample over a wide range.

Ex., Ch. 12: 49-50, 53-54, 57-62, 91-92, 95-96.

II. Intermolecular Forces (12.6): Given the structure, know how to determine what intermolecular forces will be present in a molecule and how they will affect rate of vaporization and boiling point, or rate of melting and melting point.

Ex., Ch. 12: 64-66, 69, 97-98

Chapter Thirteen

I. Concentration (13.5-13.6, 13.8): Know how to calculate the concentration of any solution in units of mass percent or molarity. Or, given the concentration, be able to use it in stoichiometry problems.

Ex., Ch. 13: 41-44, 47-54, 60-68, 91-96, 115-116

II. Dilutions (13.7): Know how to calculate dilution values of concentration or volume using $M_1V_1 = M_2V_2$.

Ex., Ch. 13: 81-88, 109-112

III. Colligative Properties (13.9): Know how to use the freezing point depression and boiling point elevation equations in calculations.

Ex., Ch. 13: 99-100, 105-106, 121-122

Chapter Fourteen

I. Acids and Bases (14.5): Know how to use acid-base neutralization and solution data to calculate stoichiometry in reactions.

Ex., Ch. 14: 49-52, 91-92

II. Amphoteric Water (14.8): Know how to use the ion product constant expression for water to calculate $[\text{H}_3\text{O}^+]$ or $[\text{OH}^-]$. Know how to determine whether a solution is acidic or basic from either.

Ex., Ch. 14: 63-66

III. pH and pOH Scales (14.9): Know how to use pH, pOH, $[\text{H}_3\text{O}^+]$, and $[\text{OH}^-]$ to convert between any of the four.

Ex., Ch. 14: 67-84