

Advanced Chemistry Concepts

Chemistry · Answer Key · 8 Questions

1. What is the term for the energy required to remove one mole of electrons from one mole of gaseous atoms in their ground state?

- A) Electron affinity
- B) Ionization energy**
- C) Electronegativity
- D) Bond enthalpy

2. Which of the following statements accurately describes the concept of entropy in thermodynamics?

- A) Entropy is a measure of the energy absorbed during a chemical reaction.
- B) Entropy is the minimum amount of energy required to start a chemical reaction.
- C) Entropy is a measure of the randomness or disorder of a system.**
- D) Entropy is the net change in enthalpy of a reversible process.

3. In the Arrhenius equation, $k = Ae^{(-E_a/RT)}$, what does the 'A' term represent?

- A) The activation energy
- B) The gas constant
- C) The pre-exponential factor (frequency factor)**
- D) The reaction rate constant

4. What is the primary reason why diamond is harder than graphite?

- A) Diamond has a higher melting point.
- B) Diamond has a tetrahedral sp^3 hybridized carbon structure, forming a rigid 3D network, while graphite has planar sp^2 hybridized layers held by weaker Van der Waals forces.**
- C) Diamond contains more carbon atoms per unit volume.
- D) Diamond is an ionic compound, while graphite is covalent.

5. The equilibrium constant (K_c) for the reaction $2A(g) + B(g) \rightleftharpoons 2C(g)$ is 0.5 at a certain temperature. If the initial concentrations are $[A] = 2.0 \text{ M}$, $[B] = 1.0 \text{ M}$, and $[C] = 0 \text{ M}$, what is the concentration of C at equilibrium?

- A) 0.22 M**
- B) 0.33 M
- C) 0.45 M
- D) 0.50 M

6. Which of the following techniques is used to separate and identify components of a mixture based on their different boiling points?

- A) Chromatography
- B) Spectroscopy
- C) Distillation**
- D) Filtration

7. What is the quantum mechanical description of an electron's location within an atom called?

- A) A shell
- B) A subshell
- C) An orbital**
- D) A valence electron

8. In a voltaic cell, what is the purpose of the salt bridge?

- A) To increase the voltage of the cell.
- B) To provide a path for electron flow between the two half-cells.
- C) To complete the electrical circuit by allowing ion migration between the half-cells, maintaining electrical neutrality.**
- D) To act as an electrode where oxidation occurs.