

科目：普通化學

適用：應化系

編號：376

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

本 試 題

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第 1 頁

選擇題 20 題,每題 5 分

1. An element's most stable ion forms an ionic compound with chlorine having the formula XCl_2 . If the ion has 36 electrons, what is the element from which the ion comes?
 - a. Kr
 - b. Se
 - c. Sr
 - d. None of the above
2. Which of the following is *not* the correct chemical formula for the compound named?
 - a. Li_2O , lithium oxide
 - b. FePO_4 , iron(III) phosphate
 - c. HF , hydrogen fluoride
 - d. BaCl_2 , barium dichloride
3. Which of the following 100.0-g samples contains the greatest number of atoms?
 - a. Magnesium
 - b. Zinc
 - c. Silver
 - d. All samples contains the same number of atoms.
4. Lead(II) nitrate reacts with sodium chloride in aqueous solution to form a precipitate. What is the net ionic equation for this reaction?
 - a) $\text{Pb}^{2+}(\text{aq}) + 2\text{NO}_3^{-}(\text{aq}) \rightarrow \text{Pb}(\text{NO}_3)_2(\text{s})$
 - b) $\text{Na}^{2+}(\text{aq}) + \text{Cl}^{-}(\text{aq}) \rightarrow \text{NaCl}(\text{s})$
 - c) $\text{Pb}^{2+}(\text{aq}) + 2\text{Cl}^{-}(\text{aq}) \rightarrow \text{PbCl}_2(\text{s})$
 - d) $\text{Na}^{+}(\text{aq}) + \text{NO}_3^{-}(\text{aq}) \rightarrow \text{NaNO}_3(\text{s})$
5. The equilibrium constant for $\text{A} + 2\text{B} \rightleftharpoons 3\text{C}$ is 2.1×10^{-6} . Determine the equilibrium constant for $2\text{A} + 4\text{B} \rightleftharpoons 6\text{C}$.
 - a) 4.2×10^{-6}
 - b) 4.4×10^{-12}
 - c) 2.3×10^{11}
 - d) 1.8×10^{-11}

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6. You have 100.0 mL of a solution of hydrochloric acid that has a pH of 3.00. You add 100.0 mL of water to this solution. What is the resulting pH of the solution?

- a) pH = 5.00 (the average of 3.00 and 7.00).
- b) pH = 10.00 ($3.00 + 7.00 = 10.00$).
- c) pH = 3.00 (water is neutral and does not affect the pH).
- d) None of the above is correct, but the pH must be greater than 3.00.

7. A 50.0-g sample of water at 80°C is added to a 50.0-g sample of water at 20°C. The final temperature of the water should be

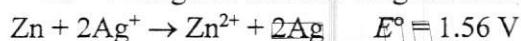
- a) between 20°C and 50°C.
- b) 50°C.
- c) between 50°C and 80°C
- d) None of the above.

8. In which case must a reaction be spontaneous at all temperatures?

- a) ΔH is positive, and ΔS is positive.
- b) ΔH is negative, and ΔS is negative.
- c) ΔH is positive, and ΔS is negative.
- d) ΔH is negative, and ΔS is positive.
- e) $\Delta H = 0$, and $\Delta S = 0$.

9. Determine the standard reduction potential for

$\text{Zn}^{2+} + 2\text{e}^- \rightarrow \text{Zn}$ given the following standard potentials:



- a) -0.76 V
- b) 0.04 V
- c) 0.76 V
- d) -0.38 V

10. Which of the following statements is false?

- a) The energy of electromagnetic radiation increases as its frequency increases.
- b) An excited atom can return to its ground state by absorbing electromagnetic radiation.
- c) An electron in the $n = 4$ state in the hydrogen atom can go to the $n = 2$ state by emitting electromagnetic radiation at the appropriate

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frequency.

- d) The frequency and the wavelength of electromagnetic radiation are inversely proportional to each other.

11. Sodium losing an electron is an _____ process and fluorine losing an electron is an _____ process.

- a) endothermic; exothermic
- b) exothermic; endothermic
- c) endothermic; endothermic
- d) exothermic; exothermic

12. Which of the following has two π bonds?

- a) C_2H_6
- b) C_2H_4
- c) C_2H_2
- d) C_3H_8
- e) CH_4

13. Which of the following is diamagnetic?

- a) N_2^-
- b) N_2^+
- c) O_2
- d) N_2

14. The rate constant k is dependent on

- a) the concentration of the reactant.
- b) the concentration of the product.
- c) the temperature.
- d) the order of the reaction.

15. Which intermolecular force is the strongest?

- a) Dipole-dipole forces
- b) London dispersion forces
- c) Hydrogen bonding
- d) Ion-ion interactions

16. Which ions are very important for the proper functioning of biologic systems, such as nerves and muscles?

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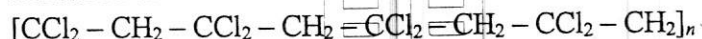
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- a) Alkaline earth metal ions
- b) Alkali metal ions
- c) Oxygen ions
- d) Sulfur ions
- e) Nitrogen ions

17. What is the correct molecular structure for $\text{PCl}_5(g)$?

- a) Trigonal bipyramidal
- b) Trigonal planar
- c) Tetrahedral
- d) Octahedral
- e) None of these

18. The structure of the polymer used in a freezer wrap can mainly be described as follows:



What is the structure of chief monomer of this wrap?

- a) $\text{CCl}_2 = \text{CH}_2$
- b) $\text{Cl}_2\text{C} - \text{CH}_2$
- c) $\text{Cl}_2\text{C} = \text{CH}_2 = \text{CCl}_2$
- d) CCl_2

19. Which of the following steps will increase the rigidity of a polymer?

- a) Use shorter polymer chains
- b) Make chains more branched
- c) Decrease cross-linking
- d) Introduce the possibility of hydrogen bonding between chains

20. You are holding two balloons, each of which is filled with the same mass of gas. One balloon contains hydrogen gas (H_2); the other balloon contains helium gas (He). Which of the following statements is correct?

- a) The balloon filled with hydrogen is twice as large as the balloon filled with helium.
- b) The balloon filled with helium is twice as large as the balloon filled with hydrogen.
- c) The balloons have equal volumes
- d) None of the above.