

國立屏東教育大學 100 學年度學士班轉學考試

普通化學 試題

(化學生物系)

*注意事項：

- (1) 本試題共 4 頁，答案請「橫式」書寫，並依規定上下翻頁，否則不予計分。
(2) 不必抄題，但請依序將題號標出，並寫在答案紙上。

選擇題 (每題 4 分，共 100 分)

1. Which of the following square planar complex ions can have cis-trans isomers?
(A) $[\text{Pt}(\text{NH}_3)_4]^{2+}$ (B) $[\text{Ni}(\text{NH}_3)_4]^{2+}$ (C) $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ (D) $[\text{Pt}(\text{NH}_3)\text{Cl}_3]^-$
(E) $[\text{Ni}(\text{NH}_3)_3\text{Cl}]^+$
2. The measured voltage of the cell
 $\text{Pt(s)} \mid \text{H}_2(1.0 \text{ atm}) \mid \text{H}^+(\text{aq}) \parallel \text{Ag}^+(1.0 \text{ M}) \mid \text{Ag(s)}$
is 1.02 V at 25°C. Given E°_{cell} is 0.80 V, calculate the pH of the solution.
(A) 1.86 (B) 1.69 (C) 3.72 (D) 3.89 (E) 7.43
3. Vaporization is a process for which:
(A) ΔG is negative when vaporization occurs in an open container.
(B) ΔH° and ΔS° are negative.
(C) ΔH° is positive and ΔS° is negative.
(D) ΔG° is negative at low temperature, but positive at high temperature.
(E) ΔH° is negative, and ΔS° is positive.
4. The half-reaction occurring at the cathode during electrolysis of aqueous copper iodide solution is:
(A) $\text{I}_2 + 2\text{e}^- \rightarrow 2\text{I}^-$
(B) $\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$
(C) $\text{Cu}^{2+} + 2\text{e}^- \rightarrow \text{Cu}$
(D) $2\text{I}^- \rightarrow \text{I}_2 + 2\text{e}^-$
(E) $2\text{e}^- + 2\text{H}_2\text{O} \rightarrow \text{H}_2 + 2\text{OH}^-$

5. How many coulombs of charge are required to cause reduction of 0.20 mol of Cr^{3+} to Cr?
(A) 0.60 C (B) 3.0 C (C) 2.9×10^4 C (D) 5.8×10^4 C (E) 9.65×10^4 C
6. The molar solubility of MgCO_3 is 1.8×10^{-4} mol/L. What is K_{sp} for this compound?
(A) 1.8×10^{-4} (B) 3.6×10^{-4} (C) 1.3×10^{-7} (D) 3.2×10^{-8} (E) 2.8×10^{-14}
7. Calculate the H^+ ion concentration in 8.8×10^{-4} M $\text{Ca}(\text{OH})_2$.
(A) 8.8×10^{-4} M (B) 1.8×10^{-3} M (C) 2.2×10^{-11} M
(D) 1.1×10^{-11} M (E) 5.7×10^{-12} M
8. Arrange the acids HOCl , HClO_3 , and HClO_2 in order of increasing acid strength.
(A) $\text{HOCl} < \text{HClO}_3 < \text{HClO}_2$
(B) $\text{HOCl} < \text{HClO}_2 < \text{HClO}_3$
(C) $\text{HClO}_2 < \text{HOCl} < \text{HClO}_3$
(D) $\text{HClO}_3 < \text{HOCl} < \text{HClO}_2$
(E) $\text{HClO}_3 < \text{HClO}_2 < \text{HOCl}$
9. Which of the following is a basic anhydride?
(A) NO_2 (B) H_2O (C) K_2O (D) NaCl (E) SO_2
10. Which of the following will act as a Lewis acid?
(A) NH_3 (B) NH_4^+ (C) H_2O (D) BF_3 (E) F^-
11. In which one of the following substances will the individual molecules experience both London forces and dipole-dipole forces?
(A) HCl (B) BCl_3 (C) Br_2 (D) H_2 (E) CO_2
12. Which one of the following hydrocarbons does not have structural isomers?
(A) C_7H_{16} (B) C_6H_{14} (C) C_5H_{10} (D) C_4H_8 (E) C_3H_8
13. According to the VSEPR theory, the geometry of the SO_3 molecule is:
(A) pyramidal (B) tetrahedral (C) trigonal planar
(D) distorted tetrahedron (E) square planar

14. The correct name for K_2S is _____.
- (A) potassium sulfate (B) potassium disulfide (C) potassium bisulfide
(D) potassium sulfide (E) dipotassium sulfate
15. Which one of the following is not true concerning automotive air bags?
- (A) They are inflated as a result of a decomposition reaction
(B) They are loaded with sodium azide initially
(C) The gas used for inflating them is oxygen
(D) The two products of the decomposition reaction are sodium and nitrogen
(E) A gas is produced when the air bag activates.
16. An aqueous ethanol solution (400 mL) was diluted to 4.00 L, giving a concentration of 0.0400 M. The concentration of the original solution was _____ M.
- (A) 0.400 (B) 0.200 (C) 2.00 (D) 1.60 (E) 4.00
17. A tin atom has 50 electrons. Electrons in the _____ subshell experience the lowest effective nuclear charge.
- (A) 1s (B) 3p (C) 3d (D) 5s (E) 5p
18. The electron configuration of the S^{2-} ion is _____.
- (A) $[Ar]3S^23p^6$ (B) $[Ar]3S^23p^2$ (C) $[Ne]3S^23p^2$ (D) $[Ne]3S^23p^6$
(E) $[Kr]3S^22p^{-6}$
19. The molecular geometry of the H_3O^+ ion is _____.
- (A) linear (B) tetrahedral (C) bent (D) trigonal pyramidal (E) octahedral
20. Which of the following has dispersion forces as its only intermolecular force?
- (A) CH_4 (B) HCl (C) $C_6H_{13}NH_2$ (D) $NaCl$ (E) CH_3Cl
21. The effect of a catalyst on an equilibrium is to _____.
- (A) increase the rate of the forward reaction only
(B) increase the equilibrium constant so that products are favored
(C) slow the reverse reaction only
(D) increase the rate at which equilibrium is achieved without changing the composition of the equilibrium mixture
(E) shift the equilibrium to the right

22. The reduction half reaction occurring in the standard hydrogen electrode is _____.

- (A) $\text{H}_2(\text{g}, 1 \text{ atm}) \rightarrow 2\text{H}^+(\text{aq}, 1\text{M}) + 2\text{e}^-$
- (B) $2\text{H}^+(\text{aq}) + 2\text{OH}^- \rightarrow \text{H}_2\text{O}(\text{l})$
- (C) $\text{O}_2(\text{g}) + 4\text{H}^+(\text{aq}) + 4\text{e}^- \rightarrow 2\text{H}_2\text{O}(\text{l})$
- (D) $2\text{H}^+(\text{aq}, 1\text{M}) + 2\text{e}^- \rightarrow \text{H}_2(\text{g}, 1 \text{ atm})$
- (E) $2\text{H}^+(\text{aq}, 1\text{M}) + \text{Cl}_2(\text{aq}) \rightarrow 2\text{HCl}(\text{aq})$

23. Hybridization of Xe in XeF_4 is _____ and in XeF_2 is _____.

- (A) $\text{sp}^3\text{d}^2, \text{sp}^3\text{d}^2$
- (B) $\text{sp}^3\text{d}, \text{sp}^3\text{d}^2$
- (C) $\text{sp}^3\text{d}^2, \text{sp}^3\text{d}$
- (D) $\text{sp}^3, \text{sp}^3\text{d}$
- (E) $\text{sp}^3, \text{sp}^3\text{d}^2$

24. The hydrometallurgical process used in refining gold ore entails converting metallic gold to a water-soluble complex. The formula of the complex is _____.

- (A) $\text{Au}(\text{NH}_3)_2^+$
- (B) $\text{Au}(\text{CN})_4^{3-}$
- (C) $\text{Au}(\text{CN})_2^-$
- (D) $\text{Au}(\text{CO})_4^{2-}$
- (E) $\text{Au}(\text{CO})_4^+$

25. The correct name for $[\text{Ni}(\text{NH}_3)_6](\text{NO}_3)_3$ is _____.

- (A) dinitrohexaamminenickel (II)
- (B) hexaamminenickel (III) trinitrate
- (C) dinitrohexaamminenickelate (III)
- (D) hexaamminenickel (II) nitrate
- (E) hexaamminenickel (III) nitrate