

科目 普通化學 類組別 A-1、A-5、B-5、B-6 共 4 頁第 2 頁 *請在試卷答案卷(卡)內作答

16. Which of the following aqueous solutions will have the highest boiling point?
(A) 0.040 *m* glycerin (B) 0.030 *m* phenol (C) 0.025 *m* KBr (D) 0.020 *m* BF₄NH₃ (E) 0.015 *m* PbSO₄
17. Which of the following will shift the equilibrium to the left?

$$3\text{Fe}(s) + 4\text{H}_2\text{O}(g) \rightleftharpoons \text{Fe}_3\text{O}_4(s) + 4\text{H}_2(g), \Delta H^\circ = -150 \text{ kJ}$$
 (A) Fe₃O₄(*s*) is added to the system.
 (B) A catalyst is added to the mixture.
 (C) The volume of the reaction vessel is doubled.
 (D) Raise the temperature of the mixture.
 (E) Introduce more H₂O(*g*).
18. Which of the following aqueous solutions (with the same molarity) will show the strongest basicity?
(A) NH₄NO₃ (B) NH₄Cl (C) KBr (D) KCl (E) KF
19. Which of the following is the weakest acid?
(A) CH₂ClCOOH (B) CCl₃COOH
(C) CH₃CH₂COOH (D) CH₂ClCH₂COOH (E) CCl₃CH₂COOH
20. If a buffer solution is prepared by carbonic acid (H₂CO₃) and its sodium salts. Which pH range shown in the following will have the strong buffer capacity?
(The pK_{a1}, pK_{a2}, and pK_{a3} of carbonic acid are 6.352, and 10.329, respectively.)
(A) 3.0 ~ 4.0 (B) 4.5 ~ 5.5 (C) 6.0 ~ 7.0 (D) 7.5 ~ 8.5 (E) 9.0 ~ 10.0
21. What compound in the following is a major greenhouse gases?
(A) CO (B) CO₂ (C) O₃ (D) SO₃ (E) Chlorofluorocarbons (CFCs)
22. Which of the following reactions is positive in the entropy change?
(A) C₆H₁₂O₆(*s*) + 6O₂(*g*) → 6CO₂(*g*) + 6H₂O(*l*)
(B) N₂(*g*) + O₂(*g*) → 2NO(*g*)
(C) Cooling of nitrogen gas from 20 °C to -50 °C.
(D) Ag(*s*) + Cl⁻(*aq*) → AgCl(*s*)
(E) 3Fe(*s*) + 4H₂O(*g*) $\rightleftharpoons$ Fe₃O₄(*s*) + 4H₂(*g*), ΔH° = -150 kJ
23. Which of the following conditions will fit the results of ΔS > 0 and ΔH < 0?
(A) The temperature of a solid is lowered by 25 °C.
(B) A diatomic molecule dissociates into atoms.
(C) A piece of charcoal is combusted to form CO₂(*g*) and H₂O(*g*).
(D) A solid sublimates.
(E) Polymerization of ethylene to polyethylene.
24. Given the following reduction potentials for a typical NiCd voltaic cell, find the standard emf of the cell.

$$\text{Cd}(\text{OH})_2(s) + 2e^- \rightarrow \text{Cd}(s) + 2\text{OH}^-(aq) \quad E_{\text{red}}^\circ = -0.76 \text{ V}$$

$$\text{NiO}(\text{OH})(s) + \text{H}_2\text{O}(l) + e^- \rightarrow \text{Ni}(\text{OH})_2(s) + \text{OH}^-(aq) \quad E_{\text{red}}^\circ = +0.49 \text{ V}$$
 (A) 1.50 V (B) -1.50 V (C) 1.25 V (D) -1.25 V (E) -0.27 V
25. The following is a list of common particles in radioactive decay and nuclear transformations. Which is an electromagnetic radiation?
(A) α particle (B) β particle (C) γ particle (D) Positron (E) Proton
26. From the VSEPR model, the best one to describe the molecular geometries of BrF₃ is
(A) linear (B) a bent T (C) trigonal planar (D) trigonal bipyramidal (E) octahedral.
27. How many unpaired electrons does the tetrahedral [CoCl₄²⁻] ion have?
(A) 3 (B) 4 (C) 5 (D) 6 (E) 7