國立嘉義大學九十六學年度

轉學生招生考試試題

科目：普通化學

Single choice questions (單一選擇題，每題 2 分，共 100 分)

1. A solid has a mass of 20 grams and occupied a volume of 5.0 mL. What is its density in grams/mL?
   A) 4.0 B) 0.25 C) 100 D) 2.5
2. The number of protons for $^{80}_{35}X$ is:
   A) 35 B)36 C) 45 D) 80
3. The number of electrons for $^{80}_{35}X$ is:
   A) 34 B) 35 C) 45 D) 80
4. The number of neutrons for $^{80}_{35}X$ is:
   A) 35 B) 45 C) 46 D) 80
5. Which **one** of the following name-formula pairs is correct?
   A) phosphoric acid, H_3PO_3 B) sulfate ion, SO_3^{2-}
   C) carbonate ion, CO_3^{-} D) nitrate ion, NO_3^{-}
6. For each of the following names, identify the **one** element that forms a stable diatomic molecule:
   A) sulfur B) lithium C) boron D) nitrogen
7. Calculate the gram formula weight of $CaCO_3$ in g/mol.
   A) 50 B) 100 C) 200 D)150
8. Calculate the percent potassium in $KClO_3$.
   A) 31.9 % B) 35.5 % C) 48.0 % D)58%
9. Calculate the empirical formula of a compound containing 85.63 % C and 14.37 % H.
   A) CH_3 B) CH_2 C) CH D) C_2H
10. In the production of hydrogen
    $CaH_2 + 2\ H_2O$ ------> $Ca(OH)_2 + 2\ H_2$
    how many grams of H_2 can be produced from 50.0 g CaH_2?
    A) 12.3 g B) 4.78 g C) 2.39 g D)2.60g
11. Which of these ions is isoelectronic with neon?
    A) N^{3-} B) F^{+} C) C^{4+} D) Ar
12. Which general electron configuration is responsible for the family properties of noble gases?
    A) ns^2 B) ns^2np^4 C) ns^2np^5 D) ns^2np^6
13. What is the ground state electronic configuration of nitrogen?
    A) $2s^22p^5$ B) $1s^22s^22p^63s^2$ C) $1s^21p^22s^22p^1$ D) $1s^22s^22p^3$
14. A negatively charged ion is called:
    A) a cation B) an anion C) a negatron D) a valence ion
15. Which bond is completely nonpolar?
    A) F-F B) H-F C) C-N D) H-O
16. What is the electron pair geometry surrounding the oxygen atom in water?
    A) Tetrahedral B) Linear C) Trigonal planar D) Square planar
17. What is the electron pair geometry surrounding the boron atom in BF_3?
    A) Trigonal planar B) Angular(bent) C) Octahedral D) Tetrahedral
18. What is the electron pair geometry surrounding the sulfur atom in SF_6?
    A) Tetrahedral B) Angular(bent) C) Octahedral D) Trigonal planar
19. Which **one** of the following molecules is polar?
    A) CO_2 B) BF_3 C) C_2H_6 D) NF_3
20. In a class demonstration, Mg was burned in air. Complete the following equation:
    $Mg + O_2$ -------> MgO
    What is the sum of the coefficients?
    A) 3 or less B) 4 C) 5 D) 6
21. Balance the following equation:
    HOCl -------> $Cl_2O + H_2O$
    What is the sum of the coefficients?
    A) 3 or less B) 4 C) 5 D) 6
22. What is the coefficient for O_2 when the equation $C_2H_6 + O_2$ ----> $CO_2 + H_2O$ is properly balanced?
    A) 7 B) 6 C) 5 D) 4
23. Balance the following equation:
    $Ba(OH)_2 + H_2SO_4$ -------> $BaSO_4 + H_2O$
    What is the sum of the coefficients?
    A) 4 B) 5 C) 6 D) 7
24. 80.0 grams of potassium sulfate are dissolved in 320 grams of water. Find the percentage concentration.
    A) 15.0% B) 20.0% C) 25.0% D) 30.0%
25. If 45.5 g of $BaCl_2$ are dissolved in water to produce 2.74L of solution, what is the molarity of the solution?
    A) 0.219 B) 0.599 C) 0.263 D) 0.0797
26. Dilute laboratory bench reagents are generally 6.0 M. What volume of dilute HCl must be used to prepare 500 mL of 0.25 M HCl?
    A) 8.3 mL B) 21 mL C) 12 mL D) 50 mL

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27. Nitric acid is commercially available at a concentration of 15.9 M. What volume of this solution must be diluted to a final volume of 1.00 L to prepare a 4.00 M solution?
A) 400 mL B) 39.8 mL C) 25. 2 mL D) 252 mL

28. What is the normality of a 4.0 M solution of sulfuric acid (H_2SO_4)?
A) 2.0 N B) 3.0 N C) 6.0 N D) 8.0 N

29. What is the normality of a 4.0 M solution of potassium hydroxide(KOH)?
A) 2.0 N B) 4.0 N C) 6.0 N D) 12.0 N

30. Na_2SO_4 is a strong electrolyte.
A) True B) False

31. Water or water solutions in which $[H^+] = [OH^-] = 10^{-7}$ M are neutral soutions, neither acidic nor basic.
A) True B) False

32. $Kw = [H^+][OH^-] = 1.0 \times 10^{-14}$ at $25^\circ C$.
A) True B) False

33. A water solution is considered acidic when what is true?
A) $[H^+] = [OH^-]$ B) $[OH^-] > [H^+]$ C) $[H^+] > [OH^-]$

34. Which of the following solutions is most acidic?
A) $[H^+] = 10^{-4}$ B) pH = 10 C) $[OH^-] = 10^{-3}$ D) pOH = 12

35. What is the hydroxide ion concentration in a solution with pH = 3?
A) 10^{-3} M B) 11 M C) 10^{-11} M D) 3 M

36. What is the oxidation number of chlorine in Cl_2?
A) +2 B) +4 C) +1 D) zero

37. An oxidation-reduction reaction that we discussed in class is:
A) $H^+ + OH^- \text{-----> } H_2O$
B) $H_2CO_3 \text{-----> } H_2O + CO_2$
C) $Zn\ (s) + Cu^{2+}\ (aq) \text{----> } Zn^{2+}\ (aq) + Cu\ (s)$
D) The conversion of a base into its conjugate acid.

38. 27.7 L of a gas is cooled at constant pressure from $87^\circ C$ to $24^\circ C$. What will the volume be at the lower temperature?
A) 7.64 L B) 22.9 L C) 33.6 L D) 12.4 L

39. The volume of a gas is 200 mL at 800 torr pressure. Calculate the volume of the same gas at 765 torr.
A) 109 mL B) 209 mL C) 300 mL D) 800 mL

40. What would be the volume at STP of 3.62 liters of N_2 gas, measured at 649 torr and $16^\circ C$.
A) 0 L B) 7.35 L C) 3.54 L D) 2.92 L

41. The vapor pressure of pure water at $100^\circ C$ is
A)100 torr B) 250 torr C)500 torr D) 760 torr

42. The equilibrium constant for the reaction $HA \rightleftharpoons H^+ + A^-$ is called:
A) K_a B)K_b C) K_w D) K_p

43. Which of the following is a conjugate acid/base pair?
A) HCl/OCl^- B) H_2SO_4/SO_4^{2-} C) NH_4^+ / NH_3 D) H_3O^+ / OH^-

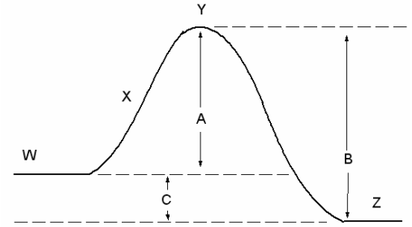
44. The frequency of an electromagnetic wave is 6×10^{14} Hertz (s^{-1}). What is its wavelength in meters?
A) 1.8×10^{-7} m B) 2×10^{6} m C) 5×10^{2} m D) 5×10^{-7} m

45. Which form of electromagnetic radiation has the longest wavelengths?
A) gamma rays B) microwaves C) x-rays D) infrared radiation

46. In the hydrogen atom spectrum, for which of the following transitions does the light emitted have the shortest wavelength?
A) $n = 6$ to $n = 5$ B) $n = 3$ to $n = 2$ C) $n = 5$ to $n = 3$ D) $n = 6$ to $n = 3$

47. Which of the following statements is typically true for a catalyst?
A) The concentration of the catalyst will go down as a reaction proceeds.
B) The catalyst provides a new pathway in the reaction mechanism.
C) The catalyst speeds up the reaction.
D) Two of these.

Use the following to answer question 48-50:
The questions below refer to the following diagram.



48. Why is this reaction considered to be exothermic?
A) Because energy difference B is greater than energy difference C
B) Because energy difference B is greater than energy difference A
C) Because energy difference A is greater than energy difference C
D) Because energy difference B is greater than energy difference C plus energy difference A

49. At what point on the graph is the activated complex present?
A) point W B) point Y C)point Z D)none of these

50. If the reaction were reversible, would the forward or the reverse reaction have a higher activation energy?
A) The diagram shows no indication of any activation energy.
B) The forward and reverse activation energies are equal.
C) The forward activation energy
D) The reverse activation energy