國立嘉義大學九十二學年度轉學生招生考試試題

科目：普通化學 （請將答案寫在答案卷上）

單選題：(每題四分，答錯倒扣一分)

1. A piece of indium with a mass of 16.6 g is submerged in 46.3 cm^3 of water in a graduated cylinder. The water level increases to 48.6 cm^3. The correct value for the density of indium from these data is:

   A) 7.4 g/cm^3 B) 7.2 g/cm^3 C) 0.14 g/cm^3 D) 0.138 g/cm^3

2. The scientist who discovered the law of conservation of mass and is also called the father of modern chemistry is

   A) Proust B) Boyle C) Priestly D) Lavoisier.

3. $^{79}_{35}Br^-$ contains

   A)35 protons, 44 neutrons, 36 electrons. B)35 protons, 44 neutrons, 34 electrons.

   C)44 protons, 35 neutrons, 45 electrons. D)44 protons, 79 electrons, and 35 neutrons.

4. A sample of ammonia has a mass of 56.6 g. How many molecules are in this sample?

   A) 3.32 B) 3.32×10^{23} C) 6.63×10^{24} D) 2.00×10^{24} molecules

5. Vitamin C contains the elements C, H, and O. It is known to contain 40.9% C and 4.58% H by mass. The molar mass of vitamin C has been found to be about 176. The molecular formula for vitamin C is:

   A) $C_3H_5O_3$ B) $C_7H_{12}O_5$ C) $C_6H_8O_6$ D) $C_5H_4O_7$

6. How many grams of NaCl (Fw=58.44) are contained in 350. mL of a 0.250 M solution of sodium chloride?

   A) 41.7 g B) 5.11 g C) 14.6 g D) 87.5 g

7. You mix 260. mL of 1.20 M lead(II) nitrate with 300. mL of 1.90 M potassium iodide. The lead(II) iodide is insoluble. (Pb: 207.2)

   A)The final concentration of Pb^{2+} ions is 0.0482 M. B)The final concentration of K^+ is 1.11 M.

   C)The final concentration of NO_3^- is 1.02 M. D)You form 79 g of lead(II) iodide

8. The following reactions:

   $Pb^{2+} + 2I^- \rightarrow PbI_2$

   $2Ce^{4+} + 2I^- \rightarrow I_2 + 2Ce^{3+}$

   $HOAc + NH_3 \rightarrow NH_4^+ + OAc^-$ are examples of

   A)precipitation, redox, and acid-base reactions, respectively. B)precipitation, precipitation and acid-base reactions.

   C)precipitation, acid-base, and redox reactions, respectively. D)redox, redox, and acid-base reactions, respectively.

9. If all of the chloride in a 5.000-g sample of an unknown metal chloride is precipitated as AgCl with 70.90 mL of 0.2010 M AgNO3, what is the percentage of chloride in the sample?

   A)50.55% B) 20.22% C) 10.10% D) 1.425%

10. A student weighs out 0.568 g of KHP (molar mass = 204 g/mol) and titrates to the equivalence point with 36.78 mL of a stock NaOH solution. What is the concentration of the stock NaOH solution? KHP is an acid with one acidic proton.

    A)0.102 M B) 0.315 M C) 0.943 M D) 0.0757 M

11. A sample of helium gas occupies 12.4 L at 23℃ and 0.956 atm. What volume will it occupy at 40℃ and 1.20 atm?

    A)0.488 L B) 6.28 L C) 10.4 L D) 12.4 L

12. Consider the following numbered processes:

    I. $A \rightarrow 2B, \Delta H_1$ II. $B \rightarrow C + D, \Delta H_2$ III. $E \rightarrow 2D, \Delta H_3$

    ΔH for the process $A \rightarrow 2C + E$ is

    A) $\Delta H_1+\Delta H_2+\Delta H_3$ B) $\Delta H_1+\Delta H_2$ C) $\Delta H_1+\Delta H_2-\Delta H_3$ D) $\Delta H_1+ 2\Delta H_2-\Delta H_3$

13. For an element, which of the following transitions does the light emitted have the longest wavelength?

    A) n = 4 to n = 3 B) n = 4 to n = 2 C) n = 4 to n = 1 D) n = 3 to n = 2

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14. List the following atoms in order of increasing ionization energy: Li, Na, C, O, F.

A) Li < Na < C < O < F B) Na < Li < C < O < F C) F < O < C < Li < Na D) Na < Li < F < O < C

15. The hybridization of the central atom in SeF4 is:

A) sp B) sp^2 C) sp^3 D) dsp^3

16. Which of the following has the shortest bond length?

A) O_2^+ B) O_2 C) O_2^- D) O_2^{2-}

17. Which of the following has the highest melting temperature?

A) H_2O B) Na C) MgF_2 D) S_8

18. In which of the following does nitrogen have an oxidation state of +4?

A) NO_2 B) N_2O C) NH_4Cl D) HNO_3

19. When a 20.0-g sample of an unknown compound is dissolved in 500. g of benzene, the freezing point of the resulting solution of 3.77℃.The freezing point of pure benzene is 5.48℃ and K_f for benzene is 5.12℃/m. Calculate the molar mass of the unknown compound.

A) 140. g/mol B) 120. g/mol C) 100. g/mol D) 80.0 g/mol

20. For a reaction in which A and B react to form C, the following initial rate data were obtained:

[A] (mol/L)	[B] (mol/L)	Initial Rate of Formation of C (mol/L ?s)
0.2	0.2	0.50
0.4	0.2	2.00
0.2	0.4	1.00

What is the rate law for the reaction?

A) Rate = k[A][B] B) Rate = $k[A]^2[B]$

C) Rate = $k[A][B]^2$ D) Rate = $k[A]^2[B]^2$

21. $2HF(g) \rightarrow H_2(g) + F_2(g)$, K=0.0100

Given 1.00 mole of HF(g), 0.500 mole of $H_2(g)$, and 0.750 mole of $F_2(g)$ are mixed in a 5.00-L flask, determine the reaction quotient, Q, and the net direction to achieve equilibrium.

A) Q = 0.375; the equilibrium shifts to the left.

B) Q = 0.375; the equilibrium shifts to the right.

C) Q = 0.150; the equilibrium shifts to the left.

D) Q = 0.150; the equilibrium shifts to the right.

22. Solubility Products (Ksp)

$BaSO_4$	1.5×10^{-10}
$Zn(OH)_2$	3.0×10^{-16}
CaF_2	3.9×10^{-11}
AgBr	5.0×10^{-13}

Which of the following compounds is the most soluble (in moles/liter)?

A) $BaSO_4$ B) CaF_2 (C) $Zn(OH)_2$ D) AgBr

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

A) ΔH is positive, ΔS is positive. B) ΔH = 0, ΔS is negative.

C) ΔS = 0, ΔH is positive. D) ΔH is negative, ΔS is positive.

24. If a constant current of 5.0 amperes is passed through a cell containing Cr^{3+} for 1.0 hour, how many grams of Cr will plate out onto the cathode? (The atomic mass of Cr is 51.996.)

A)0.054 g B) 9.7 g C) 3.2 g D) 1.5 g

25. The half-life of ^{90}Sr is 28 years. How long will it take for a given sample of ^{90}Sr to be 90.% decomposed?

A) 9 half-lives B) 4.3 years C) 93 years D) 5.7×10^3 years