

國立中山大學 110 學年度 碩士暨碩士專班招生考試試題

科目名稱：普通化學【海資系碩士班選考】

— 作答注意事項 —

考試時間：100 分鐘

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科目名稱：普通化學【海資系碩士班選考】

題號：452001

※本科目依簡章規定「不可以」使用計算機(選擇題)

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單選題 (每題五分)

1. The gas-phase decomposition of N_2O is believed to occur in two steps:

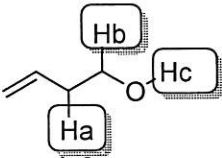
Step 1: $N_2O \rightarrow N_2 + O$

Step 2: $N_2O + O \rightarrow N_2 + O_2$

Experimentally the rate law is found to be $\text{rate} = k[N_2O]$.
The rate-determining step is?

A) Step 1 B) Step 2 C) Step 1 + Step 2 D) $2N_2O \rightarrow 2N_2 + O_2$
2. Please determine which protons is most acidic.

A) Ha B) Hb C) Hc D) all the same


3. The electron configuration of a carbon atom with a negative charge is?

A) $1s^2 2s^2 2p^2$ B) $1s^2 2s^2 2p^1$ C) $1s^2 2s^2 2p^3$ D) $1s^2 2s^2 2p^4$
4. The pressure of a sample of gas is measured at sea level is 254 mmHg. Thus, the pressure of the gas is?

A) 35107 Pa B) 1 atm C) 0.352 bar D) 254 torr
5. The molecular structure of BF_3 is?

A) bent line B) linear C) trigonal planar D) tetrahedral
6. Which of the following gases is expected to be most soluble in water?

A) CH_4 B) CCl_4 C) $CHCl_3$ D) CH_3CH_3
7. In Lewis structure of Cl-F, the formal charges of Cl and F are?

A) -1, +1 B) +1, -1 C) 0, 0 D) 0, -1
8. At the same temperature and pressure, the time required for a certain gas to diffuse is 4 times that of the same volume of hydrogen (H_2). Which of the following is the gas? (atomic mass: H = 1, N = 14, O = 16, S = 32)

A) O_2 B) CO_2 C) NH_3 D) SO_2
9. The Equilibrium constant is affected by the following factors.

A) catalyst B) concentration of reactants C) concentration of products D) reaction temperature
10. Which of the following is the main force between molecules CH_4 ?

A) ion-dipole attraction B) London-dispersion force C) dipole-dipole attraction D) ionic bonding
11. At room temperature, the $[H^+]$ of an alkaline solution = 2.0×10^{-9} M. After diluting 100 ml of this solution to 1 liter with water, how much M is $[H^+]$ in the solution?

A) 2.0×10^{-8} B) 2.0×10^{-10} C) 5.0×10^{-5} D) 5.0×10^{-4}
12. The copper oxide (CuO) and carbon powder are fully mixed and heated to produce red metal and gas. Which of the following statements is correct?

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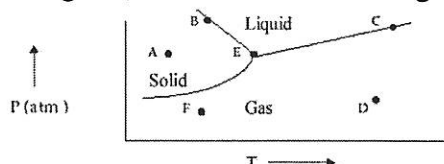
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共 2 頁第 2 頁

A) the gas is CO_2 B) the red metal is copper carbide C) this experiment shows that copper is more active than carbon D) pour the gas into the water, it can be detected by the pH test strips to be alkaline.

13. Based on this phase diagram, which of the following statements is wrong?



A) points C to E indicate gas and liquid equilibrium B) from point A to F, sublimation occurs C) the molecules are arranged closer at point F than at point A D) the average kinetic energy of the molecule is smaller at point F than at point D.

14. The rate law of a reaction $2\text{A}(\text{g}) + \text{B}(\text{g}) \rightarrow 2\text{C}(\text{g})$ is $R = k(\text{PA})^2 \cdot \text{PB}$. If A and B are stored in a container with a molar ratio of 3:1, Now change the volume of the container so that the total pressure is 8 times the original partial pressure of gas B. What is the reaction rate ratio between this new condition and the original condition?

A) 4:1 B) 8:1 C) 1:1 D) 16:1

15. In the coordination compound $\text{Cr}(\text{NH}_3)_4\text{Cl}_2$, what is the oxidation number of the central atom Cr?

A) +1 B) +2 C) -3 D) +3

16. At a constant temperature, if the volume of the gas in a container decreases,

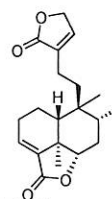
A) the pressure becomes smaller, the density becomes smaller B) the pressure becomes smaller, the density becomes larger C) the pressure increases, the density increases D) the pressure increases, the density decreases.

17. In the reaction $\text{NH}_3(\text{aq}) + \text{HCl}(\text{aq}) \rightleftharpoons \text{NH}_4^+(\text{aq}) + \text{Cl}^-(\text{aq})$ the conjugate acid of NH_3 is?

A) HN_4^+ B) Cl^- C) NH_2 D) HCl

18. How many chiral centers are there for the right compound?

A) 8 B) 7 C) 6 D) 5

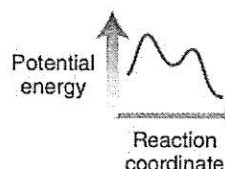


19. The radioactive nuclide of a certain element has undergone 87.5% decay during 360 years, which means that 12.5% of the original amount remains. How long is the half-life of this nuclide?

A) 180 B) 150 C) 120 D) 100

20. The energy diagram of reaction is:

A) a two-step exothermic B) a two-step endothermic
C) a one-step exothermic D) a one-step endothermic



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共 1 頁第 1 頁

1. 水 (H_2O) 是生命重要元素，請說明水對於細胞運作之角色 (20%)
2. 說明光合作用過程 (20%)
3. 請說明原核與真核細胞之染色體差異 (20%)
4. 請說明非專一性與專一性防禦機轉 (20%)
5. 請說明分類體系 (Taxonomy) 及演化 (20%)