

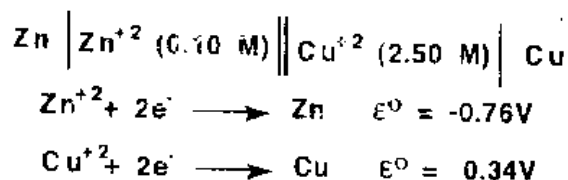
# 國立中央大學八十七學年度轉學生入學試題卷

化學系 二年級

科目：普通化學

共一頁 第一頁

- Answer the following questions (20% 4 points each).
  - What is reversible process? What is Hess law?
  - The structure and usage of PVC.
  - What is the steady-state approximation for determining the rate law?
  - Write down the major structure of DNA and protein.
  - What is the kinetic molecular theory of gases?
- How does hard water affect the cleaning efficiency of soap? Write a balanced equation to illustrate your answer. (10%)
- Give the structure of each following (10%, two points each)
  - p-di-tert-butylbenzene.
  - 1-phenyl-2-butene.
  - 2,4-heptadiene.
  - cumene
  - 4-methyl-1-pentyne.
- A chemist wishing to do an experiment requiring  $^{47}\text{Ca}^{+2}$  (half life = 4.5 days) needs 5  $\mu\text{g}$  of the unclide. What mass of  $^{47}\text{CaCO}_3$  must be ordered if it takes 48 hours for delivery from the supplier? Assume that the atomic mass of  $^{47}\text{Ca}$  is 47.0. (10%)
- What are the special properties of transition metal ions. (10%)
- A zinc-copper battery is constructed as follows at 25°C



- Calculated the cell potential when this battery is first connected.
  - Calculate the cell potential after 10.0 A of current has flowed for 10.0 hours. (Assume each half-cell contains 1.0 L of solution).
  - Calculate the mass of each electrode after 10.0 hours.
  - How long can this battery deliver a current of 10.0 A before it goes dead? (10%)
- A sample of a certain monoprotic weak acid was dissolved in water and titrated with 0.125 M NaOH, requiring 16.0 mL to reach the equivalence point. During the titration, the pH after adding 2.00 mL of NaOH was 6.912. Calculate  $K_a$  for the weak acid. (10%.)
  - Write Lewis structures and predict whether each of the following is polar or nonpolar. (10%)
    - COS
    - $\text{CF}_2\text{Cl}_2$
    - $\text{H}_2\text{NNH}_2$
    - $\text{H}_2\text{CO}$
  - What are the bonding modes used to describe the bonding in metals, ionic compounds and covalent compounds, (10%)

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