

# 大同大學 九十四 學年度 轉學考試 試題

考試科目：化學 系別：材料工程學系

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註：本次考試不可以參考自己的書籍及筆記； 不可以使用字典； 不可以使用計算器。

1. (10%)Vegetarians sometimes suffer from a lack of vitamin B<sub>12</sub>. Each molecule of vitamin B<sub>12</sub> contains a single atom of cobalt (atomic mass of cobalt: 58.9amu) and is 4.35% cobalt by mass. What is the molecular weight of vitamin B<sub>12</sub>?
2. (10%)What are the molarity and molality? Which will be influenced by temperature variation? And explain your choice briefly.
3. (10%)Please illustrate the trend of electronegativity among the main-group elements in the periodic table and explain them.
4. (10%)What is the polar bond? Please illustrate two macroscopic properties of materials that are mainly dependent on the polarity of bond.
5. (10%)What is the bond order? How does the bond order influence the bond stability, bond length and bond energy.
6. (10%)Please illustrate the Brønsted-Lowry theory and the Lewis theories for the definitions of acid and base. Please explain the two theories are consistent in some cases.
7. (10%)What are the assumptions of the kinetic-molecular theory?
8. (10%)What is the osmotic pressure? Please describe the requirements to create the osmotic pressure. In your daily life, please illustrate one example of osmosis application.
9. (10%)Please illustrate the factors that affect reaction rates. If the dependence of specific rate constant on the temperature obeys the Arrhenius equation, please write down a graphical method for determining activation energy.
10. (10%)Which are wrong statements for the direction of spontaneous reaction? Please explain the reasons why it/they is/are wrong.
  - (a) The entropy tends towards a maximum in the closed system.
  - (b) The Gibbs free energy tends toward a minimum at constant temperature and volume.
  - (c) The enthalpy change is exothermic.