※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. How many atoms of carbon are in 24 grams of carbon? (5%)
2. What is the weight of the air in the atmosphere over an area of one square meter? (5%)
3. Explain why a mixture of ammonium chloride and ammonia in solution has a buffering action. (5%)
4. If 25 mL of a 0.50 M NaCl solution is diluted to 125 mL, what is the molarity of the resulting solution? (5%)
5. Give the definitions of pH and pKa. What are the differences between these two terms? (10%)
6. How does a catalyst change the rate of a reaction?　Does it change the rate of the reverse reaction?　How does a catalyst affect the equilibrium? (10%)
7. What is the first law of thermodynamics? What is the second law of thermodynamics? (10%)
8. What is alpha radiation?　Beta radiation?　Gamma radiation?　Which type is electromagnetic in nature?　Which types have particles with mass?　Which types have particles with significant mass?　Which types have charged particles? (10%)
9. Explain the following terms: (40%)
   (a) Covalent, ionic, and hydrogen bonds
   (b) Solubility product constant
   (c) Isomer, isotope, and polymer
   (d) Diels-Alder reaction