

※ 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. Please describe and explain (a) Arrhenius equation, (b) Colloid (c) Haber process, (d) Second law of thermodynamics, (e) Ideal gas law. (20%)
2. Please explain the Brønsted-Lowry Concept of Acids and Bases, and give a suitable example as an illustration. (10%)
3. A sample of natural gas is 80% methane, CH_4 , and 20% ethane, C_2H_6 , by mass. What is the density of this mixture at 20°C and 750 mmHg? (15%)
4. Calculate the molar solubility of $\text{Fe}(\text{OH})_2$ (a) in pure water and (b) in a solution of $\text{pH}=12$? (The K_{sp} of $\text{Fe}(\text{OH})_2$ is 1.6×10^{-14}) (15%)
5. On the basis of molecular orbital theory, please describe the energy level diagram for the F_2 molecule. (Atomic Number: $\text{F} = 9$) (10%)
6. Explain the Acid Rain from the viewpoint of Chemistry. (10%)
7. Draw a potential-energy diagram for an uncatalyzed exothermic reaction. On the same diagram, indicate the change that results on the addition of a catalyst. Discuss the role of a catalyst in changing the rate of reaction. (10%)
8. Draw the pressure-temperature phase diagram for water. Draw a line with an arrow head to represent of heating water from 25°C to boiling under 1 atm. (10%)