

※ 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. The vapor pressure of pure water is 24 torr at room temperature. According to Raoult's law, when 1 mole of sugar is dissolved in 4 moles of water. What is the vapor pressure of the water in the sugar-water mixture? (10%)
2. Please describe and explain (a) Arrhenius equation, (b) Pauli exclusion principle, (c) Ideal solution, (d) Second law of thermodynamics, (e) Ideal gas law. (20%)
3. A 7.6 g sample of the compound CS_2 is decomposed into its elements, the amount of carbon is 1.206 g and the amount of sulfur is 6.394g. If the mass of a single carbon atom is 12 amu then what is the average atomic mass of sulfur? (10%)
4. A 9.6 A current is passed for 1000 seconds through a solution containing Ag^+ ions. How many moles of silver would plate out during this time based on $\text{Ag}^+ + \text{e}^- \rightarrow \text{Ag}$? (10%)
5. Describe in detail steps how to prepare 500 mL of 1 M H_2SO_4 from concentrated sulfuric acid (95% w/w, specific gravity 1.83). (10%)
6. A 100 mL sample of 0.1M silver nitrate is added to 100 mL of 0.2 M calcium chloride. A white precipitate forms. Calculate the concentration of Cl^- ions remaining in solution. (10%)
7. What is the percent by weight composition of carbon in aspirin ($\text{C}_9\text{H}_8\text{O}_4$)? In other words of the total weight of aspirin what percent is due to carbon? [H=1, C=12, O=16] (10%)
8. One mole of an ideal gas is expanded from a volume of 1 L to a volume of 10 L against a constant of external pressure of 1.5 atm. How much work is performed on the surroundings at 25°C ? (10%)
9. A compound decomposed by a first-order reaction. The concentration of compound decreases from 0.118 M to 0.095 M in 2.6 min. What fraction of the compound remains after 3.55 min? (10%)