

本試題是否可以使用計算機： 可使用， 不可使用（請命題老師勾選）

1. A sample of 100.g of acetic acid contains 39.9 g C, 6.7 g H, and 53.4 g O. The molecular weight of acetic acid was determined by experiment to be 60.0 amu. What is its molecular formula? (10%)
2. Magnesium (Mg) metal reacts with hydrobromic acid (HBr) to produce hydrogen gas and a solution of magnesium bromide. Write the molecular equation for this reaction. Then write the corresponding net ionic equation. (10%)
3. A sample of natural gas is 80 % methane, CH₄, and 20 % ethane, C₂H₆, by mass. What is the density of this mixture at 18 °C and 771 mmHg? (10%)
4. (10%) Hydrazine, N₂H₄, is a colorless liquid used as a rocket fuel. What is the enthalpy change for the process in which hydrazine is formed from its element?
$$\text{N}_2(\text{g}) + 2\text{H}_2(\text{g}) \rightarrow \text{N}_2\text{H}_4(\text{l})$$
Use the following reaction and enthalpy changes:
$$\text{N}_2\text{H}_4(\text{l}) + \text{O}_2(\text{g}) \rightarrow \text{N}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l}); \Delta\text{H} = -622.2 \text{ kJ}$$
$$2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l}); \Delta\text{H} = -571.6 \text{ kJ}$$
5. Please describe and explain (a) Boyle's Law, (b) Entropy, (c) Specific heat capacity, (d) First law of thermodynamics, (e) Pauli exclusion principle. (20%)
6. The solubility of carbon dioxide in water is 0.161 g CO₂ in 10 mL of water at 20°C and 1.0 atm. A soft drink is carbonated with carbon dioxide gas at 8.5 atm pressure. What is the solubility of carbon dioxide in water at this pressure? (10%)
7. How much heat must be added to 50.0 g of solid sodium, Na, at 25.0 °C to give the liquid at its melting point, 97.8°C? The heat capacity of solid sodium is 28.2 J/(K · mole), and its heat of fusion is 2.60 kJ/mol. (10%)
8. Describe and draw the Potential-energy curve for an exothermic reaction. (10%)
9. Explain the Acid Rain from the viewpoint of Chemistry. (10%)