[注意：本普通化學考題請以筆算，禁止使用計算機演算]

1. Write the formula for the following compounds.
(a) magnesium bicarbonate   (b) sodium carbonate   (c) calcium phosphate
(d) potassium nitride   (e) aluminum fluoride   **(10%)**

2. On this planet 98.89% of all the carbon is ^{12}C, 1.11% is ^{13}C and only a trace of the ^{14}C isotope exists in nature. Please sketch the numbers of proton, electron and neutron in those atoms, respectively.   **(10%)**

3. Bromine exists as only two isotopes in nature, $^{79}_{35}Br$ (atomic weight 78.918, % natural abundance = 50.69%), and $^{81}_{35}Br$ (atomic weight 80.916).   **(10%)**
   (a) What is the % natural abundance for $^{81}_{35}Br$?
   (b) Calculate the atomic weight of the naturally occurring mixture of isotopes.

4. A battery is constructed from iron (Fe) and silver (Ag) by dipping a strip of each metal into a solution of its ions (Fe^{3+} and Ag^+, respectively). As the battery operates, the Fe^{3+} concentration increases, while the Ag^+ concentration decreases.   **(10%)**
   (a) What is getting oxidized and the other is reduced?
   (b) Please draw a battery scheme and label which way the electrons flow.

5. Using the symbol R, write a general formula for a primary alcohol, a secondary alcohol, and a tertiary alcohol.   **(10%)**

6. Describe the alternative definitions of acids and bases on the basis of Arrhenius, Brönsted-Lowry and Lewis concepts, respectively.   **(10%)**

7. A solution is prepared by dissolving 0.250 moles of LiOH in enough water to get 4.00 L of solution. (a) What is the OH⁻ concentration, and (b) what is the H_3O^+ concentration?   **(10%)**

8. Suppose that 3.00 g of gaseous nitrogen (N_2) are placed into a 2.00 L container. The pressure is measur5ed to be 450.5 mm Hg. What is the temperature of the gas in ℃ ?
   (R = 0.0821 L · atm/K · mole) [Hint: Solve the ideal gas equation for T.]   **(15%)**

9. Consider the reaction: $CH_4 (g) + 2 H_2S (g) \rightleftharpoons CS_2 (g) + 4 H_2 (g)$

The equilibrium concentrations of the reactions and products are; $CS_2 = 6.10 \times 10^{-3}$ M; $H_2 = 1.17 \times 10^{-3}$; $CH_4 = 2.35 \times 10^{-3}$ M; $H_2S = 2.93 \times 10^{-3}$ M. Calculate the value of Keq for the reaction. **(15%)**