

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. (20%) Write a structural formula for each of the following compounds.
(1) Glycerol, (2) 3,3-Diethyl-1-octyne, (3) Ethylene glycol, (4) Silver nitrate, (5) Dimethyl ether, (6) 2-Iodopentane, (7) Ammonium sulfate, (8) Manganese trioxide, (9) Magnesium metal, (10) *meta*-Aminobenzoic acid.
2. (10%) Name the following compounds with **English** and **Chinese**.
(1) Fe_2O_3 , (2) TiO_2 , (3) $\text{K}_3[\text{Fe}(\text{CN})_6]$, (4) $\text{K}_2\text{Cr}_2\text{O}_7$, (5) O_3
3. (10%) What current is needed to deposit 0.500 g of chromium from a solution containing Cr^{3+} over a one hour period (MW for Cr=52)?
(Farady's Law : Q (charge) = nF)
Here, n = number of moles of electrons, F = constant of 96500 Coulomb/mole)
4. (10%) How would Arrhenius define a weak base? And why is it proper to call ammonia a weak base?
5. (15%) Please give an example to describe what is
(1) disaccharide, (2) double helix, (3) polypeptide, respectively.
6. (5%) A particular linear hydrocarbon molecule has 6 carbons and 10 hydrogens.
Is it unsaturated or saturated? Please draw their possible line drawings.
7. (10%)
 - (1) Show how a general carboxylic acid ($\text{R}-\text{COOH}$) will react with a tertiary amine (NR_3).
 - (2) Write an equilibrium to show how a primary amine (H_2NR) makes water basic. To which side does the equilibrium lie? What does this imply?
8. (10%) Do not use a calculator for this problem. How many milliliters of a 1.500 M solution of NaCl do you need to obtain 100.0 g of NaCl? (Note: one mole of NaCl = 58.443 g)
9. (10%) Consider the reaction: $\text{CH}_4(\text{g}) + 2 \text{H}_2\text{S}(\text{g}) \rightleftharpoons \text{CS}_2(\text{g}) + 4 \text{H}_2(\text{g})$
For this reaction at 900°C , The equilibrium concentrations (K_{eq}) is 3.59. The concentrations of the gases in the vessel at 900°C are; $\text{CS}_2 = 1.51 \text{ M}$; $\text{H}_2 = 1.08 \text{ M}$; $\text{CH}_4 = 1.15 \text{ M}$; $\text{H}_2\text{S} = 1.20 \text{ M}$. Please calculate it and show that this reaction is at equilibrium or not.