CONSTRUCTED QUESTIONS (90pts)

1. (8pts) Calcium carbide, CaC2, is an important preliminary chemical for industries producing synthetic fabrics and plastics. CaC2 may be produced by heating calcium oxide with coke:

CaO + 3C CaC2 + CO

<- 0.85 -> 17/60 (mol

What is the amount of CaC2 which can be produced from the reaction of excess calcium oxide and 10.2 g of carbon? (Assume 100% efficiency of reaction for purposes of this problem.)

nC = m/M = 10.2/12 = 0.85 mol

n CaC2 = nC/3 = 17/60 mol

m CaC2 = n.M= 17/60 x 64 = 18.13 g

2. (25pts) Complete chemical reactions below, write net ionic equation (if possible) and figure out what types of those reaction.

a) CxHyOzNt +(x+y/4-z/2) O2 → xCO2 + y/2H2O + t/2N2 (ΔH<0)

Combustion Reaction

b) Cu + Cl2 → CuCl2: Redox reaction

c) 2H3PO4 + 3Ba(OH)2 → Ba3(PO4)2 + 6H2O: Neutralization reaction

Net ion equation:

6H+ + 2(PO4)3- + 3BA2+ + 6OH- -> 3Ba2+ + 2(PO4)3- + 6H2O

* 6H+ + 6OH- -> 6H20
* H+ + OH- -> H2O

d) 6FeCl2 + 3H2SO4 + 2HNO3 → Fe2(SO4)3 + 4FeCl3 + 2NO + 4H2O: Redox Reaction

e) SO3 + H2O → H2SO4 Combination Reaction

3) Order of increasing solubility in water:

C5H1202 > C5H12O > C5H11CL = C5H12

C5H12O2 is axit cacboxylic so it’s highly soluble in water, C5H12O is partially soluble because it contains -OH group and can form hydrogen bond with water but the C5H12 is nonpolar. And the rest C5H11Cl and C5H12 are insoluble due to their hydrocarbon part.