Chemical Engg Deptt.

Sub 21103 (Chemical Process Calculation)

Full Marks 50. Time: 3 hours

For 2/ChE & 3/BT students Nov,12 End term

Instruction: Stepwise results must be shown. Answer all.
1st page of your answer script must be reserved to write only the results of solutions in ascending order of questions

Q1. A solution contains 62kg $CaCl_2$ per 100 kg water. Calculate the Wt of this soln required to dissolve 250 kg of $CaCl_2$,$6H_2O$ at 25°C (solubility 7.38 kg mole of $CaCl_2$ per 1000 kg of water (10)

Q2. Air (65°C,760mm Hq, DPt 4.5°C) enters a drying chamber and it leaves the chamber at 35°C,755mm Hq, with DPt 24°C.Calculate the volume in m^3/hr of the air required to remove 100 kg of water /hr.(VP of water 6.3mm Hq at 4.5°C & 22.4 mm Hq at 24°C). (10)

Q3. Calculate TFT of a gas (30% CO & 70% N2), when burnt with 200% excess air. Both gas & air enter at 25 °C.

Data : Ht of formations : CO2 = --94052 kcal/kg mole , CO= --26912 kcal/kgmole
C_p(avg)in kcal/kgmole °C: CO2: 12.1 , O2 : 7.9 , N2: 7.55 (10)

Q4. A gas mixture of N2-H2 (1:3) is fed to the converter converting 30 % to NH3, which is separated by a condenser. The unconverted gases are **recycled** to the reactor. The initial gas mixture contains 0.25 parts of argon to 100 parts of N2-H2 mixture. The tolerance limit of argon entering the reactor is 8 parts to 100 parts of N2-H2 mixture by volume. Find out the fraction of recycle to be purged.(Draw the flow sheet) (10)

Q5.A coal (87% C ,7% H_2 & rest inert) is burnt with 40% excess air .
Calculate a) kg of air used /kg of coal burnt b)Composition (by wt)of the flue gas for total combustion.. (5+5)