2007 KARNATAKA STATE NATIONAL INSTITUTE OF TECHNOLOGY

III SEM.B.TECH.-CHEMICAL ENGINEERING.

PROCESS CALCULATIONS

SEPTEMBER 2006 TIME : 1 HOUR

MARK : 30

NOTE :- Answer the following. Make appropriate assumptions wherever necessary and state them.

1] . A solution of sulfuric acid in water contains 22.25% H_2SO_4 (by weight) at 15.6°C. The specific gravity of solution is 1.16. Find the concentration of sulfuric acid in the solution in grams per liter. Also, compute the molarity, normality and molality of the solution.

2] An organic compound contains carbon, hydrogen and oxygen. A sample of the compound weighing 0.660 gm, upon complete combustion gives a0.968 gm of carbon dioxide and 0.792 gm of water. Calculate the mass percentage of oxygen in the compound.

3] A Stock solution contains 5000 ppm of phenol (C_6H_5OH) in water at 28°C. You are required to prepare 5 liters of phenolic water containing 50 ppm of phenol. What are the quantities of stock solution and distilled water you will take to prepare the required solution?

.4] A gas mixture containing 60% CO_2, 10% CO, 5%CH_4 and 25% $N_2$by volume at 250°C is flowing through a pipe line under a draft of 2 inches of water, at a flow rate of 1500 liters per minute. Compute the density and mass Dow rate of the mixture.

5] . A mixture of nitrogen gas and benzene vapor is available at 102.6 Kpa, 26°C, and 90 m^3/hr; its relative saturation is 35%. The mixture is isothermally compressed to a final total pressure of 966.3 Kpa. Calculate the rate of condensation of benzene. The vapor pressure of benzene at 26°C may be taken as 100 mm Hg.