NKT/KS/17/5132

Bachelor of Science (B.Sc.) Semester—III (C.B.S.) Examination

INDUSTRIAL CHEMISTRY (ICH—301)

Paper—I

Time : Three Hours] [Maximum Marks : 50

N.B. :— (1) All the **FIVE** question are compulsory and carry equal marks.

(2) Draw diagrams and give equations wherever necessary.

1. (A) A gas mixture contains 0.274 K mol of HCl, 0.337 K mol N_2 and 0.089 K mol of O_2. Calculate :

(i) Average molecular weight of gas, and

(ii) Volume occupied by this mixture at 405.3 kPa and 303 K. 5

(B) Define : Molarity, Molality and mole fraction. Show that the sum of mole fractions of two components present in system is equal to unity. 5

OR

(C) Define weight percent and density of gas mixture. 2½

(D) A sample of $Na_2CO_3.H_2O$ weighing 0.62 gm is added to 100 ml of 0.1 N H_2SO_4 solution. Will the resulting solution be acidic, basic or neutral (use numerical method) ? 2½

(E) Write a note on humidity. 2½

(F) Explain the following terms :

(i) Dew point, and

(ii) Percentage relative humidity. 2½

2. (A) Explain briefly, the guidelines for solving problems relating to systems without chemical reactions. 5

(B) Draw flow diagrams for material balance without recycle for following operations :

(i) Distillation operation for a binary mixture, and

(ii) Recrystallization.

Write an overall material balance equation mixture. 5

OR

(C) Explain the terms :

(i) Recycle and

(ii) Bypass with the help of flow diagrams.

Give any two reasons for carrying out these operations. 2½

(D) Draw block diagram of extraction operation without chemical reaction. 2½

(E) Explain the material balance in crystallization process with neat flow sheet diagram. 2½

(F) What is meant by recycle ratio, feed ratio and purge ratio ? 2½

3. (A) What are alloys ? How does alloying improve the metallic properties ? 5

(B) What are the chemical factors affecting the adhesive action ? Explain the bonding processes in adhesives. 5

OR

(C) What are the different alloys of :

(i) Nickel, and

(ii) Copper ? 2½

(D) What is the effect of temperature on the mechanical properties of material ? 2½

(E) Discuss the various alloys of aluminium with respect to their composition. 2½

(F) How will you manufacture hide glue ? Give its uses. 2½

4. (A) Explain how you will determine dissolved oxygen experimentally. 5

(B) Explain in detail manufacturing process of pulp. 5

OR

(C) Explain the following terms :

(i) Beating, and

(ii) Refining in paper industry. 2½

(D) Write a note on soda pulp. 2½

(E) How will you determine total hardness, temporary hardness and permanent hardness experimentally ? 2½

(F) What do you mean by alkalinity ? What is the significance of alkalinity ? 2½

5. Attempt any **ten** of the following :

(i) Define saturation.

(ii) Define molecular weight and equivalent weight.

(iii) State ideal gas law.

(iv) Draw flow diagram for material balance in liquid-liquid extraction.

(v) Explain the term by-pass.

(vi) Convert 1 ppm NO_2 into $\mu g/m^3$.

(vii) Name any two advantages of alloy.

(viii) What do you understand by adhesive strength ?

(ix) Classify adhesives.

(x) Define acidity.

(xi) Give the chemical composition of kraft pulp.

(xii) What is pulp ? 1×10=10