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END SEMESTER REGULAR / RETEST EXAMINATION, JULY–2023

Branch : Chemical Engineering

Semester : 4th (New)

Subject Code : CH-401

APPLIED CHEMISTRY

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

(i) *All* questions of PART – A are compulsory.

(ii) Answer any *five* questions from PART – B.

PART – A

Marks – 25

1. Fill in the blanks : 1×5=5

   (a) The functional group present in acetone is _____.

   (b) Colloidal solutions are _____ system of dispersed phase and dispersion medium.

[Turn over

(c) Aromatic compounds produce _____ flame.

(d) Gibbs potential is used to predict the _____ of a chemical reaction.

(e) Hydrolysis of ester is a _____ order reaction.

2. Write True or False : 1×5=5

(a) On dilution, conductivity of a solution decreases.

(b) Rusting of iron has high reaction rate.

(c) Enthalpy is a state function.

(d) pH of acetic acid is always less than hydrochloric acid.

(e) Lyophobic sols are solvent-loving sols.

3. Choose the correct options : 1×5=5

(a) In an isothermal process

(i) Temperature remains constant

(ii) Volume remains constant

(iii) Heat remains constant

(iv) Pressure remains constant

(b) Benzyl alcohols are

(i) Derivatives of benzene

(ii) Aromatic alcohols

(iii) Aromatic carboxylic acid

(iv) Polyhydric alcohols

(c) Which of the following species show +I effect ?

(i) Alkyl group (ii) Nitro group

(iii) Carboxylic group (iv) None of these

(d) In Aerosol, the dispersed phase and dispersion medium are

(i) Liquid, solid (ii) Solid, liquid

(iii) Liquid, liquid (iv) Liquid, Gas

(e) The relation between Cp and Cv is :

(i) $Cp - Cv = R$ (ii) $Cp + Cv = R$

(iii) $Cp / Cv = R$ (iv) None of these

4. Answer the following questions in brief : $1 \times 5 = 5$

(a) What is the half-life of 1st order reaction ?

(b) Give one example of an intensive property.

(c) How many pi electrons are there in benzene ?

(d) Define conductivity.

(e) What is an open system ?

5. Match the following : 1×5=5

(a) Oxidising agent	(i) S^{-1}
(b) Conductance	(ii) Carboxylic acid
(c) Alcohol oxidation	(iii) Seperate emulsions
(d) First order reaction	(iv) Inverse of resistance
(e) Demulsifier	(v) O_3

PART – B

Marks – 45

5. (a) State the First law of thermodynamics. 2

(b) Explain the term entropy. How are entropy and spontaneity related ? 3+1=4

(c) Distinguish between state function and path function with examples. 3

6. (a) Explain the Arrhenius equation with the help of graphical representation. 4

(b) Distinguish between order and molecularity of a reaction. 2

(c) Derive the integrated rate law of Zeroth order reaction. 3

7. (a) Write any two applications of buffer solution. 2

(b) Find the pH of 0.001 M $Ca(OH)_2$. 3

(c) Write notes on : 2+2=4

(i) Common ion effect

(ii) Conductometric titration.

8. (a) Explain the hybridization and shape of carbon center in carbocation. 3

(b) What do you mean by emulsions ? Explain the two types of emulsions. 1+4=5

(c) Name one optical property of lyophobic sol. 1

9. (a) What happens when phenol reacts with (Give reactions) 5

(i) Zn dust at high temperature

(ii) CH_3I in presence of NaOH

(iii) Br_2 water

(iv) Dil. HNO_3

(v) Chloroform ($CHCl_3$) in presence of aq. NaOH.

(b) Define substitution reaction with an example. 2

(c) Write the structure of citric acid and tartaric acid. 2

10. (a) How is ethanol manufactured from starch ? 4

(b) Explain mesomeric effect with a suitable example. 3

(c) Write one method of preparation of ethanoic acid in laboratory. Give reactions. 2