



SF-6421

B. E. II (Sem. IV) (Chem. Engg.) Examination
May / June - 2011

Physical Chemistry : Paper - III

Time : Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दृष्टावेक निशानीवाणी विगतो उत्तरवडी पर अवश्य लपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="checkbox"/> B. E. II (Sem. IV) (Chem. Engg.)	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="checkbox"/> Physical Chemistry : Paper - III	<input type="text"/>
Subject Code No. : <input type="text"/> 6 <input type="text"/> 4 <input type="text"/> 2 <input type="text"/> 1	Section No. (1, 2,.....): <input type="text"/> NIL
Student's Signature	

- (2) Give reactions and diagrams wherever necessary.
(3) Figures to the right indicate full marks.
(4) Write clearly the questions and sub-question numbers answered.

1 (a) Fill in the blanks.

11

- (1) The phase rule is applicable to _____.
- (2) All nucleophiles are _____ and electrophiles are _____.
- (3) A catalyst is _____.
- (4) The movement of sol particle under an applied electric potential is called _____.
- (5) _____ occupy the same place in the periodic table.
- (6) The Ocatet rule is _____.
- (7) _____ stops as soon as the incident radiation is cut off.
- (8) Surface tension is _____.
- (9) Mixing of two gases is _____ process.
- (10) For isobaric process dP is _____.

(b) Match the following :

05

1	Milk	A	2
2	$2N_2O_5 \rightarrow 4NO_2 + O_2$, order of reaction is	B	Emulsion
3	Silica	C	1
4	Starch	D	Non-clastic gel
5	$2NO_2 \rightarrow 2NO + O_2$, order of reaction is	E	Elastic gel

(c) Write in brief :

16

- (1) Optical activity.
- (2) Refractive index.
- (3) Gels and Emulsion.
- (4) Catalytic Poisoning.
- (5) Lewis' concept of acid and base.
- (6) Phase and Component.
- (7) Coagulation.
- (8) Henry's law of distribution.

2 Attempt any three.

18

- (1) State first law of thermodynamics. Obtain the mathematical expression for this law. Establish the relationship between ΔH and ΔE .
- (2) Define isotops. Discuss the construction and working of Dempster's mass spectrograph to identify the isotop.
- (3) Discuss the Stark-Einstein law of photo chemical equivalence. Derive the expression to calculate the energy of 1 Einstein of light in K. Cal/mol.
- (4) Derive the Calusius-Calperyron equation and discuss its various applications.

3 Attempt any four.

16

- (1) Prove that multiple extraction with smaller volume extract more solute than the single extraction with larger volume.
- (2) What is the quantum yield ? What are the causes of high and low quantum yield ?

- (3) What is electrophoresis ? How does this phenomenon provide information about the sign of charge on particle.
- (4) The following data was obtained on the hydrolysis of methyl acetate 250⁰c. in 0.35N HCl.

<i>Time (sec.)</i>	0	4500	7140	∞
<i>Volume</i>	24.36	29.32	31.72	47.15

Show that it is a first order reaction.

- (5) Prove that time taken to change the concentration of a reactant to half of its initial value is independent of the initial concentration of the reactant.

4 Attempt any three. 18

- (1) Define rate of reaction. Derive the integrated rate equation for second order reaction.
- (2) Differentiate Lyophilic and Lyophobic sols. Discuss the ultra filtration method of purification of sol.
- (3) Discuss the buffer solution and type of buffer solution. Derive Handerson equation for calculation of pH of buffer solution.
- (4) A system is irradiated for 20 minutes and is found to absorb 4×10^{18} quantum per sec. If the amount decomposed in 3×10^{-3} mole and $N = 6.023 \times 10^{23}$. Calculate the quantum efficiency of the reaction.

5 Attempt any four. 16

- (1) Describe Partition Chromatography and write its applications.
- (2) Discuss the define Covalent bond. What are the conditions necessary for formation of Covalent bond ?
- (3) Discuss and define : a. Molar heat capacity at constant volume (C_v), b. Molar heat capacity at constant pressure (C_p) and prove that $C_p - C_v = R$.
- (4) State the explain phase rule. Discuss phase, component and degree of freedom in detail.
- (5) Discuss the Henry's law of distribution and derive its equation.