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Total Pages-12

[Time : 3 Hours]

[Total Marks : 100]

Please check whether you have got the right question paper.

- N.B. : 1. All Questions are compulsory.  
 2. Figures to the right indicate full marks.  
 3. Use of log-table/nonprogrammable calculator is allowed.

4. Answers for the same question as far as possible should be written together.

1.	(A)	Select the correct option and complete the following sentences. (any twelve)	12
	(i) Ans	(a) Parallel	
	(ii) Ans	(b) $-E_a/2.303R$	
	(iii) Ans	(a) $k = A e^{-E_a/RT}$	
	(iv) Ans	(a) $C_6H_6$ and $C_6H_5CH_3$	
	(v) Ans	(a) homogeneous.	
	(vi) Ans	(a) Steam distillation	
	(vii)	$B_2H_6$	
	(viii)	$BBr_3 > BCl_3 > BF_3$	
	(ix)	All B-H bonds in diborane are similar	
	(x)	$NH_3$	
	(xi)	$NF_3$	
	(xii)	$BiH_3$	
	(xiii)	(c)	
	(xiv)	(c)	
	(xv)	(b)	
	(xvi)	(a)	
	(xvii)	(a)	
	(xviii)	(c)	
	(B)	State whether the following statements are true or false. (any three)	3
	(i)	True	
	(ii)	True	
	(iii)	True	
	(iv)	True	
	(v)	True	

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	(vi)	True		
(C)	Match the column. (any five)			5
	(i)	$A \rightarrow B \rightarrow C$	(f)	Consecutive reaction
	(ii)	Water + Nicotine	(d)	Partially miscible with upper & lower CST
	(iii)	B	(a)	Group 13
	(iv)	As	(c)	Group 15
	(v)		(e)	
	(vi)		(i)	
2.	Attempt any four of the following.			20
(A)	Explain with suitable examples, what is meant by reversible reactions and parallel reactions.			
Ans	i) Explanation of Reversible reaction-02 mark ii) Example of Reversible reaction-01 mark iii) Explanation of parallel reaction-01 mark iv) Example of parallel reaction-01 mark			
(B)	What are the drawbacks of the collision theory of reaction rates.			
Ans	i) Collision theory -01 mark ii) Four drawbacks of collision theory-04 mark			
(C)				
Ans	i) Given terms and correct conversion-01 mark ii) Correct formula and value substitution-01 mark iii) Two step calculation-02 mark iv) Correct answer and unit-01 mark			
(D)	What is steam distillation? Describe it with a neat labelled diagram.			
Ans	i) Statement-01 mark ii) Neat labelled diagram-01 mark iii) Explanation with example-03 mark			
(E)	Draw vapour pressure – composition diagram. Explain positive and negative deviation from Raoult's law.			
Ans	i) vapour pressure – composition diagram -01 mark ii) Explanation of Raoult's law-01 mark			

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		iii) Explanation of positive deviation from Raoult's law-1.5 mark iv) Explanation of negative deviation from Raoult's law-1.5 mark	
(F) Ans		i) Equation: $W_A/W_B = (P^0A/P^0B) \times (M_A/M_B)$ -01 mark ii) Calculation of $P^0A$ and $P^0B$ -02mark iii) Calculation of $W_A/W_B$ -01 mark iv) Calculation of molecular weight -01mark	
3.	Attempt any four of the following.		20
(A)	Draw structure of $BF_3$ ? why does it called Lewis acid? Write its any three applications. <b>Ans.:-</b> • Structure – 2M • It is Lewis acid there are 6e's in the valence shell of boron atom in boron trifluoride, therefore it has a great tendency to accept two more e's to complete octate. Hence it is Lewis acid. – 2M • Applications- 1M		5
(B)	What is borax? Explain any two methods used for its synthesis. <b>Ans.:-</b> • Borax is $Na_2B_4O_7 \cdot 10H_2O$ . It is sodium salt of tetraboric acid $H_2B_4O_7$ – 1M • Each method with reaction - 2M		5
(C)	Write a note on purification of germanium by any one method. <b>Ans:-</b> Diagram - 2½M Description - 2½M		
(D)	What is atomic number of silicon? What is its electronic configuration? What is its position in the periodic table? Name any two compounds of silicon? <b>Ans:-</b> • Atomic no. of Si- 14 – 1M • E.C. - $1S^22S^22P^63S^23P^2$ – 1M • Position in periodic table – it is group 14 element and it is a P block element. – 1M • Compound of Silicon – $SiO_2$ and silicones (organo silicon polymer) – 2M		5
(E)	Name and formulate any 5 oxides of nitrogen. Write O.S. of Nitrogen in each of them. <b>Ans.:-</b>		5



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	<p>2. Treatment of salt with suitable alkyl halide -1mk</p> <p>3. Treatment of alkyl derivative with conc. alkali and acidification -1mk</p> <p>ii.</p> <p>1. Treatment with sodium ethoxide -1/2mk</p> <p>2. Treatment of salt with suitable alkyl halide -1mk</p> <p>3. Treatment of alkyl derivative with conc. alkali -1mk</p>	
(F)	<p>i.</p> <p>1. Description of selective and controlled reduction of acid halide - 1 1/2 mk</p> <p>2. General reaction -1 1/2mk</p> <p>ii.</p> <p>1. Description -1mk</p> <p>2. Reaction -1mk</p>	<p>3</p> <p>2</p>
5. Attempt any four of the following.		
(A)	<p>Discuss the activated complex theory of reaction rate.</p> <p>i) Statement -01 mark</p>	5
Ans	ii) Reaction with explanation -04 mark.	
(B)	<p>State and explain Nemst distribution law. What are its important applications?</p> <p>i) Statement -01 mark</p>	5
Ans	<p>ii) Explanation -02 mark</p> <p>iii) Applications-02marks.</p>	
(C)	<p>Draw structure of tetraborane. Explain various bonds involved in the structure.</p> <p>Calculate the total no. of e's involved the bonding.</p> <p>Ans:-</p> <ul style="list-style-type: none"> <li>• structure of tetraborane - 2M</li> <li>• 6 terminal B-H bonds - 1M</li> <li>• 4 bridge B-H-B bonds - 1M</li> <li>• 6 terminal B-H bonds - <math>6 \times 2 = 12</math> e's</li> <li>1 B-B bond - <math>1 \times 2 = 2</math> e's</li> <li>4 bridge B-H-B bonds - <math>4 \times 2 = 8</math> e's</li> </ul> <p style="text-align: center;"><b>22 e's - 1M</b></p>	5
(D)	<p>What is silica? Explain its structure and bonding. Why is it inert?</p> <p>Ans:-</p> <ul style="list-style-type: none"> <li>• Silica is silicon dioxide - <math>\text{SiO}_2</math> -1M</li> <li>• Structure with hybridisation - 2 M</li> <li>• Description of structure -In <math>\text{SiO}_2</math> structure all bonds are <math>\sigma</math> covalent bonds. II</li> </ul>	5

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	<p>bonds are absent in the structure as 3p orbital of silicon atom and 2p orbital of oxygen atom have appreciable difference in their energy. – 1M</p> <ul style="list-style-type: none"><li>• The giant structure of SiO<sub>2</sub> is very stable and great amount of energy is required to break Si-O bonds hence it is inert. - 1M</li></ul>	
(E)	<p>1. What is Cannizarro's reaction? 1mk</p> <p>2. General reaction -1mk</p> <p>3. Formation of oxyanion -1mk</p> <p>4. The hydride shift -1mk</p> <p>5. Proton exchange -1mk</p>	5
(F)	<p>i.</p> <p>1. What is Friedel Craft's acylation -1mk</p> <p>2. Mechanism -2mk</p> <p>ii.</p> <p>1. Description -1mk</p> <p>2. Reaction -1mk</p>	3 2

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