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DCCH401

Reg. No.

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IV Semester B.Sc. Degree Examination, July/August - 2024

CHEMISTRY

Inorganic And Physical Chemistry - II
(NEP CBCS Scheme 2021-22 Onwards)

Paper : IV



Time : 2½ Hours

Maximum Marks : 60

Instructions to Candidates:

1. The question paper has Three parts. Answer all parts.
2. Draw diagrams and write chemical equations wherever necessary.

PART - A

Answer any Five of the following. Each question carries 2 marks. (5×2=10)

1. What is the limiting radius ratio of ionic crystal with co-ordination number 4 and 6.
2. State Fajan's rule.
3. Define bond order.
4. What is homogeneous catalysis? Give one example.
5. Write any one statement of II law of thermodynamics.
6. What are intensive and extensive property?
7. Write DHO equation, Explain the term involved in it.

PART - B

Answer any Four of the following questions. Each question carries 5 marks.

(4×5=20)

8. a) Based on VSEPR theory explain the formation of NH₃ molecule.
b) Write any two rules of LCAO. (3+2)
9. a) Explain the formation of SiCl₄ molecule using the concept of hybridisation.
b) What is meant by resonance energy. (3+2)

[P.T.O.]



10. a) Write molecular orbital diagram of H_2^+ ion and calculate bond order.
b) What is Bent's rule. (3+2)
11. a) Explain Freundlich's adsorption isotherm.
b) What is meant by catalytic promoter? Give one example. (3+2)
12. a) What is free electron theory of metallic bonding.
b) Write BET equation and explain the term involved in it. (3+2)
13. a) Mention the limitations of Arrhenius theory of electrolytic dissociation.
b) Define molar conductance. Write its SI unit. (3+2)

PART - C

Answer any Three of the following questions. Each question carries 10 marks.

(3×10=30)

14. a) Set up Born - Haber cycle for the formation NaCl crystal. Compute the calculation of lattice energy using this cycle.
b) Explain dsp^2 hybridisation with a suitable example.
c) How bond strength is related to bond order? (4+4+2)
15. a) Draw molecular orbital diagram for N_2 molecule. Write the electronic configuration, calculate bond order and predict magnetic property.
b) What are intrinsic and extrinsic semiconductors. Explain with suitable examples. (6+4)
16. a) Derive relationship between C_p and C_v for an ideal gas.
b) The standard enthalpy change and standard entropy change for a reaction are 178 kJ/mol and 0.16 kJ/mol respectively. Calculate standard free energy change. Is the reaction spontaneous or not? Give reason.
c) Explain Joule - Thomson's coefficient. (4+4+2)
17. a) Explain the determination of transport number of an ion by moving boundary method.
b) Explain conductometric titration of strong acid and strong base.
c) State Kohlrausch's law of independent migration of ions. (4+4+2)
18. a) Derive an expression for the velocity constant of a second order reaction where $a=b$.
b) Write postulates of Arrhenius theory of electrolytic dissociation.
c) For a reaction, the values of rate constants at 298 K and 328 K are $1.2 \times 10^{-3} S^{-1}$ and $5 \times 10^{-2} S^{-1}$ respectively calculate energy of activation [$R = 8.314 J/mol/K$]. (4+4+2)
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