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CHEMISTRY PAPER - I : CHE - 241
Physical Chemistry & Inorganic Chemistry - II
(24135)

P. Pages : 2

Time : Two Hours

Max. Marks : 40

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Student should note, no supplement will be provided.
4. All questions are compulsory.
5. Programmable calculators are not allowed.
6. Figure should be right indicate full marks.
7. Draw a neat diagram wherever necessary.

1. a) Attempt **any four** of following :

4

- i) The electrode at which reduction take place is act as.....
a) Positive electrode b) Negative electrode
c) Indicator electrode d) Redox electrode
- ii) The bond order of N_2 molecule is.....
a) 2 b) 3
c) 4 d) 1
- iii) Which of the following has lowest atomic number.
a) Yb b) Gd
c) Sm d) La
- iv) For spontaneous process, ΔG is.....
a) Positive b) Negative
c) Zero d) None of these
- v) Which is the most common oxidation state for lanthanides.
a) +2 b) +3
c) +5 d) +4

b) Attempt **any two** of following :

4

- i) Define fugacity and activity.
- ii) Define lanthanide contraction.

- iii) Define homonuclear and heteronuclear diatomic molecule with suitable example.
2. Attempt **any two** of following : 8
- Give the properties of Gibbs free energy change.
 - Describe Poggendorff compensation method for measuring the emf of cell.
 - Give the four assumption of molecular orbital theory.
3. a) Attempt **any one** of following : 4
- Discuss any one method for preparation of actinides.
 - Calculate the standard emf of cell
 $\text{Cd}/\text{Cd}^{2+}(1\text{M})//\text{Cu}^{2+}(1\text{M})/\text{Cu}$.
 Given - $E_{\text{ox}}^0(\text{Cd}/\text{Cd}^{++}) = 0.40\text{V}$
 $E_{\text{ox}}^0(\text{Cu}/\text{Cu}^{++}) = -0.34\text{V}$
- b) Attempt **any one** of following. 4
- Draw MO energy level diagram of N_2 (Nitrogen) molecule.
 - Four moles of an ideal gas at 300 K and 3.5 atm. Are compressed isothermally and reversibly to 15.8 atm Calculate the change in Gibbs free energy for the compression.
 $(R = 8.314 \text{ J deg}^{-1} \text{ mole}^{-1})$
4. Answer **any two** of following : 8
- Draw M.O. energy level diagram of O_2 molecule and calculate bond order and stabilisation energy.
 - Explain construction and working of standard hydrogen electrode.
 - Explain the extraction of lanthanides from monazite sand.
5. a) Answer **any one** of following : 6
- Explain with suitable examples, the metal - metal ion electrode & gas electrode with reference to formulation, electrode reaction & expression of electrode potential.
 - Derive Gibbs Helmholtz equation.
- b) Give any two uses of lanthanides. 2
