



UNIVERSITY OF NORTH BENGAL

B.Sc. Honours Part-II Examination, 2021

CHEMISTRY

PAPER-IV

INORGANIC CHEMISTRY

Full Marks: 60

ASSIGNMENT

*The figures in the margin indicate full marks.  
All symbols are of usual significance.*

Answer any *four* questions from the following

15×4=60

1. Explain why: 2½ × 6 = 15
- (a) Interhalogens are more reactive than their component halogens.
- (b) (CH<sub>3</sub>)<sub>3</sub>N and (H<sub>3</sub>Si)<sub>3</sub>N react with HCl in different ways.
- (c) The primary fission fragments undergo a series of β-decays.
- (d) Bond dissociation energy of F<sub>2</sub> is abnormally low.
- (e) Among the alkali metals, Li<sup>+</sup> is most extensively hydrated.
- (f) Perchloric acid has the formula HClO<sub>4</sub> whereas periodic acid has the formula H<sub>5</sub>IO<sub>6</sub>.
2. (a) Briefly discuss the characteristics of nuclear forces. 3
- (b) What are meant by mass defect and nuclear binding energy? Mention the important features of the nuclear binding energy curve. 2+3
- (c) Predict the disintegration of <sup>14</sup>C and <sup>13</sup>N. 2
- (d) What is enriched uranium? Why is enrichment necessary? 1½ + 1½
- (e) The half life period of <sup>60</sup>Co is 5.3 years. Find the activity of a millicurie of the sample after six months. 2
3. (a) Discuss the liquid drop model of nuclear structure. Show how this model explains the mechanism of nuclear fission reaction. 2+2
- (b) What are secular and transient equilibrium? 2+2
- (c) Discuss the method used in the separation of H<sub>2</sub>O and D<sub>2</sub>O. 3
- (d) What is multiplication factor? 2
- (e) Average life of a radioelement is a characteristic property of the element. — Explain. 2
4. (a) Give a comparative account of N, P, As, Sb and Bi with regard to: 2+3
- (i) Electronic configuration and
- (ii) Hydrides

- (b) Amongst the inert gas elements, xenon has the maximum ability to form compounds. — Explain. 3
- (c) Why do halogens exhibit characteristic colours? 3
- (d) Compare the acidic properties of gaseous  $\text{H}_2\text{S}$ ,  $\text{H}_2\text{Se}$  and  $\text{H}_2\text{Te}$ .  $2\frac{1}{2}$
- (e) Alkali metals are used in photoelectric cells. — Explain.  $1\frac{1}{2}$
5. (a) Discuss the geometrics of  $\text{XeF}_2$  and  $\text{XeOF}_4$  with the help of VSEPR theory. 3
- (b) Hard acids prefer hard bases and soft acids prefer soft bases. Illustrate giving examples. 3
- (c) Comment on basic property of iodine. 3
- (d)  $\text{LiF}$  is much less soluble than  $\text{LiCl}$  but  $\text{AgF}$  is much more soluble than  $\text{AgCl}$  — Comment. 3
- (e)  $\text{NO}_2$  dimerizes but  $\text{ClO}_2$  does not. — Explain. 3
6. (a) Give a comparative account of the oxyacids of the halogens. 3
- (b) Borazine is not a perfect analogue of benzene. 3
- (c) Xenon forms fluorides only with even number of fluorine atoms whereas iodine forms fluorides only with odd number of fluorine atoms. — Explain. 3
- (d) Briefly discuss the softness of alkali metals. 3
- (e) Solution of alkali metals in liquid ammonia is blue coloured and reducing in nature. — Explain. 3
7. (a) Compare Zn, Cd and Hg with respect to complex formation. 4
- (b)  $\text{SF}_6$  is unreactive towards  $\text{H}_2\text{O}$  but  $\text{TeF}_6$  is reactive. — Explain. 3
- (c) What are pseudohalogens? Give examples. 2
- (d) Why does fluorine show highest coordination number among the halogens? 2
- (e) What are phosphonitrilic halides? How can they be prepared? 1+3
8. Write short notes on the following (any *five*):  $3 \times 5 = 15$
- (a) Silicones
- (b) Radiocarbon dating
- (c) Lewis concepts of acids and bases
- (d) Abnormal valence states of Group IB elements
- (e) Peroxy acids of sulphur
- (f) Energy source of the sun.

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