

## ASSIGNMENT ON GROUP 15 ELEMENTS

- Q.1. Why does the metallic character of the elements of group 15 increase down the group?
- Q.2. Why are the IE of the atoms of group 15 elements much higher?
- Q.3. Explain why nitrogen cannot expand its covalency but can exhibit an oxidation state of +5.
- Q.4. Give reasons for the following for the hydrides of group 15 elements:
- Thermal stability decreases down the group
  - Reducing character increases down the group
  - Basic character decreases down the group
  - Boiling point of ammonia is greater than that of phosphine.
- Q.5. Why does nitrogen not form any pentahalide?
- Q.6. Explain why  $\text{NF}_3$  is an exothermic compound but  $\text{NCl}_3$  is not.
- Q.7. Out of red phosphorus and white phosphorus which is more reactive and why?
- Q.8. Explain each one of the following:
- Nitrogen is much less reactive than phosphorus.
  - Tendency to form pentahalides decreases down the group in group 15 of the periodic table.
  - Solid  $\text{PCl}_5$  is ionic in nature.
  - $\text{H}_3\text{PO}_3$  is a dibasic acid.
  - +3 oxidation state becomes more and more stable from As to Bi in the group 15.
  - Dinitrogen is a gas but phosphorus is a solid.
  - $\text{R}_3\text{P}=\text{O}$  exists but  $\text{R}_3\text{N}=\text{O}$  does not, where R is an alkyl group.
  - Bond angle in the ammonium ion is greater than that in ammonia molecule.
  - Bi(V) is a stronger oxidising agent than Sb(V).
  - Catenation property of nitrogen is less than that of phosphorus.
  - $\text{H}_3\text{PO}_2$  and  $\text{H}_3\text{PO}_3$  act as good reducing agents while  $\text{H}_3\text{PO}_4$  does not.
  - $\text{PCl}_5$  is more covalent than  $\text{PCl}_3$ .
- Q.9. Mention the conditions to maximise the yield of ammonia by Haber's process.
- Q.10. A translucent white waxy solid(A) on heating in an inert atmosphere is converted to its allotropic form (B). Allotrope A on reaction with very dilute solution of aqueous KOH liberates a highly poisonous gas (C) having rotten fish smell. With excess of chlorine it forms (D) which hydrolyses to compound (E). Identify the compounds (A) to (E).