

Previous HSE Questions from the chapter “The P-block Elements”


- Suppose you are given a sample of NaCl salt. How will you prepare chlorine gas in laboratory using the above sample? (Write balanced chemical equations) (2)
- Briefly explain the manufacture of sulphuric acid by contact process. (3)
- Explain with the help of equations, preparation of Xenon fluorides. (3) [SAY 2018]
- Write the chemical equation of the following reactions:
 - Preparation of XeO_3 from XeF_6 . (1)
 - Mixing PtF_6 and Xe. (1)
- What is the formula of phosphine? (1)
 - How phosphine is prepared in laboratory? (2)
- Assign the possible reason for the following:
 - Stability of +5 oxidation state decreases and that of +3 oxidation state increases down to 15th group elements. (1)
 - H_2O is less acidic than H_2S . (1)
- (c) H_3PO_2 acts as a good reducing agent while H_3PO_4 does not. (1) [March 2018]
- Identify the most acidic compound from the following:
 - H_2O
 - H_2S
 - H_2Se
 - H_2Te(Score 1)
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| SO_2 | Step P | SO_3 | Step Q | H_2SO_4 |
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 - Explain step P and Q. (Score 2)
 - Give a reaction which indicates dehydration property of Conc. H_2SO_4 . (Score 1)
 - Write any two uses of sulphuric acid. (Score 1)
- Identify the least basic compound among the following:
 - NH_3
 - PH_3
 - AsH_3
 - SbH_3(Score 1)
 - Halogens have maximum negative electron gain enthalpy in the respective periods. Give reason. (Score 2)
 - Draw the structure of Perchloric acid (HClO_4) (Score 1)
 - Write the formula of any two interhalogen compounds. (Score 1) [SAY 2017]
- Nitrogen forms a number of oxides and oxoacids.
 - Which of the following is a neutral oxide of Nitrogen?
 - N_2O
 - N_2O_5
 - NO_2
 - N_2O_4(Score 1)
 - Prepare a short write-up on Nitric acid highlighting its laboratory preparation, chemical properties and uses. (Score 4)
- Phosphorous forms a number of compounds.
 - The gas liberated when calcium phosphide is treated with dil. HCl is:
 - Cl_2
 - H_2
 - PH_3
 - All of the above(Score 1)
 - Prepare a short write-up on PCl_3 and PCl_5 highlighting the preparation and chemical properties of PCl_3 and structure of PCl_5 . (Score 4) [March 2017]
- Nitrogen shows different oxidation states in different oxides.
 - In which of the following oxides, nitrogen is in +4 oxidation state?
 - NO
 - N_2O
 - N_2O_3
 - NO_2(1)
 - Prepare a short write up on Nitric acid highlighting its structure, manufacture and any two properties. (4) [SAY 2016]
- Phosphorous forms oxoacids.
 - In which of the following phosphorous is in +1 oxidation state?
 - H_3PO_2
 - H_3PO_3
 - $\text{H}_4\text{P}_2\text{O}_7$
 - H_3PO_4(1)



- b) Prepare a short write up on Ammonia highlighting its structure, manufacture and properties. (4)
[SAY 2016]
14. a) Account for the following :
 (i) NH_3 acts as a Lewis base.
 (ii) PCl_3 fumes in moist air.
 (iii) Fluorine shows only -1 oxidation state. (3)
 b) (i) Suggest any two fluorides of Xenon. (1)
 (ii) Write a method to prepare any one of the above mentioned Xenon fluorides. (1) [March 2016]
15. a) Account for the following :
 (i) H_2O is a liquid while H_2S is a gas.
 (ii) Noble gases have very low boiling points.
 (iii) NO_2 dimerises to N_2O_4 . (3)
 b) i) What are interhalogen compounds? (1)
 (ii) Suggest any two examples of interhalogen compounds. (1) [March 2016]
16. a) What are interhalogen compounds? Write any two examples. (2)
 b) Write a method of preparation of phosphine from white phosphorus. (1)
 c) Write the name or formula of oxoacid of chlorine, in which chlorine possess oxidation number +7. (1)
 d) Draw the structures of XeO_3 and XeF_6 . (1) [SAY 2015]
17. Some elements in p-block show allotropy.
 a) What are the allotropic forms of sulphur? (1)
 b) i) How will you manufacture Sulphuric acid by contact process? (3)
 ii) What are interhalogen compounds? (1)
18. a) Name two oxoacids of sulphur. (1)
 b) i) How will you manufacture ammonia by Haber process? (3)
 ii) Write any two uses of inert gases. (1) [March 2015]
19. Compounds of nitrogen, phosphorus and sulphur such as ammonia, phosphoric acid and sulphuric acid are used in fertilizer industry.
 a) Describe Haber process for the manufacture of ammonia. (2)
 b) Write the chemical equation for the preparation of phosphoric acid (H_3PO_4) from orthophosphorous acid (H_3PO_3) (1)
 c) Describe contact process for the manufacture of sulphuric acid. (2) [March 2014]
20. Ammonia and Nitric acid are two industrially important compounds.
 a) Write any two uses of ammonia. (1)
 b) Complete the following equations. (Balancing is not required)
 i) $\text{NH}_3 + \text{O}_2 \xrightarrow{\text{Pt, 500K, 9 bar}}$
 ii) $\text{Cu} + \text{Conc. HNO}_3 \longrightarrow$
 iii) $\text{Zn} + \text{dil. HNO}_3 \longrightarrow$
 iv) $\text{NH}_3 + \text{excess Cl}_2 \longrightarrow$ (1 x 4 = 4) [SAY 2014]
21. a) Phosphorus forms a number of oxoacids. Write the name or formulae of any two dibasic oxoacids of phosphorus. (1)
 b) Account for the following:
 i) PCl_3 fumes in moist air.
 ii) Nitrogen does not form a penta halide.
 iii) Boiling point of PH_3 is less than that of NH_3 .
 iv) NO_2 undergoes dimerisation. (1 x 4 = 4) [SAY 2014]
22. a) Name the products obtained when copper reacts with conc. Nitric acid. (1)



- b) Write down the chemical reaction between conc. HNO_3 and aluminium. (1)
- c) What is the basicity of H_3PO_3 ? ($\frac{1}{2}$)
- d) How do you account for the basicity of H_3PO_3 ? ($\frac{1}{2}$)
- e) Write down the main three steps involved in the manufacture of H_2SO_4 by contact process? ($1\frac{1}{2}$)
- f) Write any 2 important uses of noble gas elements. ($\frac{1}{2}$) [SAY 2013]
23. a) Nitrogen forms a number of oxides in the different oxidation states. Write the names and structural formulae of any four oxides of nitrogen. (2)
- b) Boiling point of H_2O (373K) is very much greater than that of H_2S (213K). Give reason. (1)
- c) Suggest a method for the quantitative estimation of ozone (O_3). (2) [March 2013]
24. i) What are the products obtained when copper reacts with conc. Nitric acid? (1)
- ii) Name two important xenon fluorides. (1)
- iii) Give the structure of the above xenon fluorides. (1) 
- iv) Inter halogen compounds are compounds formed by combination of different halogen atoms. Which are more reactive – Halogens or Inter halogen compounds? Give reason. (2) [SAY 2012]
25. a) In the manufacture of sulphuric acid, the final product obtained is oleum.
- i) What is oleum? ($\frac{1}{2}$)
- ii) Write chemical equation for the conversion of oleum to sulphuric acid. (1)
- b) Important allotropic forms of phosphorus are white phosphorus, red phosphorus and black phosphorus. Among these which allotropic form is more reactive? Why? ($1\frac{1}{2}$)
- c) Name the halogen which forms only one oxo acid and also write the formula of the oxo acid of that halogen. (1)
- d) Which element among inert gases forms maximum number of compounds? Write the formula of one of the compounds formed by the element. (1) [March 2012]
26. Discovery of Haber's process for the manufacture of ammonia is considered to be one of the principal discoveries of twentieth century.
- a) Which is the promoter used in the earlier process when iron was used as catalyst? ($\frac{1}{2}$)
- b) What is the temperature condition for maximum yield of ammonia? Justify. ($1\frac{1}{2}$)
- c) Explain how can you convert NH_3 to HNO_3 , on a large scale commercially. (3) [March 2011]
27. Phosphorus of group 15 and Sulphur of group 16 are two industrially important P block elements. Their compounds are also industrially important.
- a) $4\text{H}_3\text{PO}_3 \xrightarrow{\text{heat}} 3\text{H}_3\text{PO}_4 + \text{PH}_3$. Show that this is a disproportionation reaction. (1)
- b) PCl_3 fumes in moisture. Give reason. (1)
- c) Sulphuric acid can be manufactured from sulphur using V_2O_5 as catalyst.
- i) Give the name of the method.
- ii) Outline the principle. (3) [SAY 2011]
28. Elements in groups 13 to 18 in the periodic table constitute the 'P' block elements.
- i) Name the most important oxo acid of nitrogen. ($\frac{1}{2}$)
- ii) How will you prepare the above oxo acid on large scale? ($2\frac{1}{2}$)
- iii) In general, noble gases are least reactive. Why? (2) [March 2010]
29. Group 16 elements form hydrides with hydrogen.
- a) Write the order of thermal stability and reducing nature of the hydrides of group 16 elements. (2)
- b) Why is water a liquid and H_2S a gas?
- c) Say whether the 1st ionisation enthalpy of 16th group elements is lower than that of 15th group elements. Why? (1) [March 2010]
30. Nitrogen and phosphorus belong to group 15 of the periodic table.

- a) Phosphorus can form 2 series of halides of the type PX_3 and PX_5 . Nitrogen does not form pentahalides (NX_5). Why? ($\frac{1}{2}$)
- b) Name two oxo acids of Phosphorus and represent their structures. (2)
- c) Name the compound of phosphorus similar to ammonia. ($\frac{1}{2}$)
- d) Suggest a method for preparing the above compound in the laboratory. Write the balanced chemical equation. (2)

[March 2009]

31. Phosphorus is an essential constituent of both plants and animals.

- a) Phosphorus is stored under water. Give reason. (1)
- b) Write allotropic forms of phosphorus. ($1\frac{1}{2}$) [March 2008]

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