

CHEMISTRY STUDY MATERIALS FOR CLASS 12

(NCERT Based Reasoning of Chapter -07)

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P – block elements

Question 21: Why does NO_2 dimerise?

Answer: NO_2 contains odd number of valence electrons. It behaves as a typical odd molecule. On dimerisation, it is converted to stable N_2O_4 molecule with even number of electrons.

Question 22: Why is ICl more reactive than I_2 ?

Answer: ICl is more reactive than I_2 because I-Cl bond is weaker than I-I bond of I_2 .

Question 23: Why is BiH_3 the strongest reducing agent amongst all the hydrides of group 15 elements?

Answer:

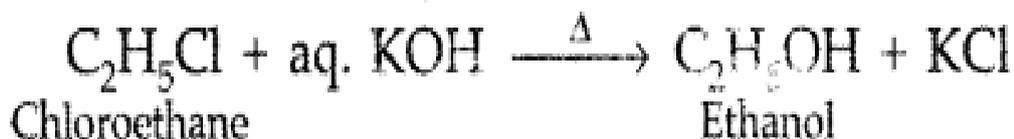
Reducing nature depends upon the stability of M- H bond. As the stability of the bond decreases from N to Bi hydrides, BiH_3 is the strongest reducing agent.

Question 24: What is the covalency of nitrogen in N_2O_5 ?

Answer: The covalency of nitrogen in N_2O_5 is 4 because each nitrogen atom has four shared pairs of electrons.

Question 26: What happens when ethyl chloride is treated with aqueous KOH ?

Answer:



Question 27: Name two poisonous gases which can be prepared from chlorine gas

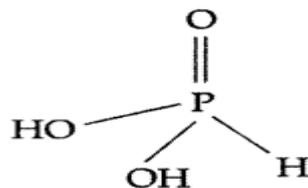
Answer: (i) Phosgene gas (COCl_2) and (ii) Chloropicrin or tear gas (CCl_3NO_2).

Question 28: Which aerosol depletes ozone layer?

Answer: Aerosols like foams; sprays etc. contain Freons which are responsible for depletion of ozone layer.

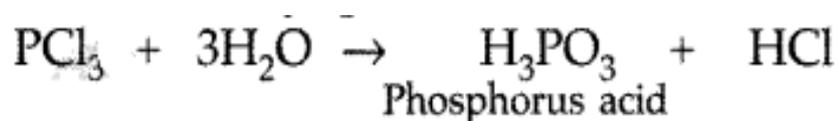
Question 29: What is the basicity of H_3PO_5 and why?

Answer: The basicity of H_3PO_5 is 2 because it contains only two ionizable H-atoms which are present as OH groups.



Question 30: Why does PCl_3 fume in moisture?

Answer: Phosphorus trichloride reacts readily with water giving phosphorus acid and hydrochloric acid. Reaction is very quick and exothermic



Question 31: Draw the structure of H_3PO_2 molecule.

Answer: $\text{Cl}_2 + \text{H}_2\text{O} \rightarrow [\text{HCl} + \text{HOCl}] \rightarrow 2\text{HCl} + [\text{O}]$

Question 32 : Fluorine exhibits only -1 oxidation state whereas other halogens exhibit +1, +3, +5 and +7 oxidation states also. Why is it so?

Answer: It is because fluorine is the most electronegative element and it does not have d-orbitals.

Question 33:

Though nitrogen exhibits +5 oxidation states, it does not form pentahalide. Why?

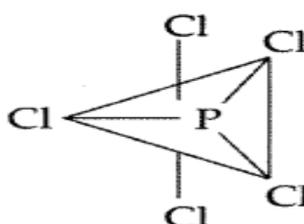
Answer: Due to absence of d-sub shell in N atom.

Question 34; Bond enthalpy of fluorine is lower than that of chlorine. Why?

Answer: Because F_2 is very small and its interelectronic repulsions between the lone pairs of electrons are very large.

Question 35: Write the structural formula of $\text{PCl}_5(\text{s})$.

Answer: $\text{PCl}_5(\text{s})$



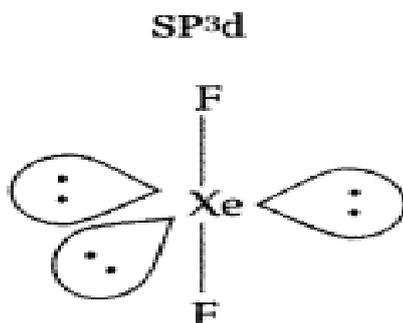
Sp^3d hybridisation
Shape : Trigonal bipyramidal

Question 36: HF is a weaker acid than HCl. Why?

Answer: Because of higher bond dissociation energy and strong H-bonding in HF.

Question 37: Draw the structure of XeF₂ molecule

Answer: XeF₂ :

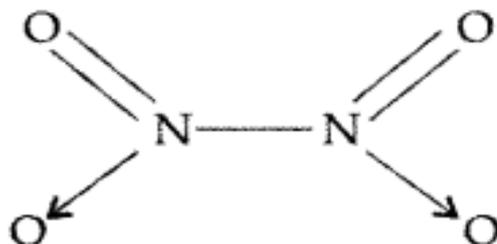


Question 38: What is the basicity of H₃PO₃?

Answer: Basicity of H₃PO₃ = 2, because basicity is the number of replaceable H⁺ ions in an acid and H₃PO₃ is a Dibasic acid.

Question 39: Why does NO₂ dimerise?

Answer: NO₂ contains 7 + 2 × 8 i.e. 23 odd electrons. In the valence shell N has seven electrons and hence less stable. To acquire stability it dimerises to form N₂O₄.

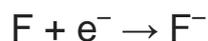


Question 40: Why does NH₃ act as a Lewis base?

Answer: Due to presence of lone pair on nitrogen NH₃ acts as a Lewis base.

Question 41: Why is F₂ a stronger oxidising agent than Cl₂?

Answer: Due to low bond dissociation enthalpy and high electronegativity of Fluorine, it has strong tendency to accept electrons and thus get reduced.

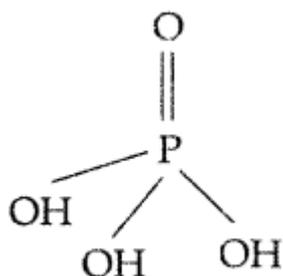


Therefore F₂ acts as strong oxidising agent, while Cl₂ is weak oxidising agent due to low electronegativity.

Question 42: What is the basicity of H₃PO₄? (Delhi 2015)

Answer:

Since there are 3 OH groups present in H_3PO_4 , its basicity is 3.



Question 43: Write the formulae of any two oxoacids of sulphur.

Answer: H_2SO_3 and H_2SO_4

Question 44: On adding NaOH to ammonium sulphate, a colourless gas with pungent odour is evolved which forms a blue coloured complex with Cu^{2+} ion. Identify the gas.

Answer: The gas with a pungent odour is Ammonia (NH_3) and the blue coloured complex is Tetra-ammine copper (II) sulphate monohydrate.

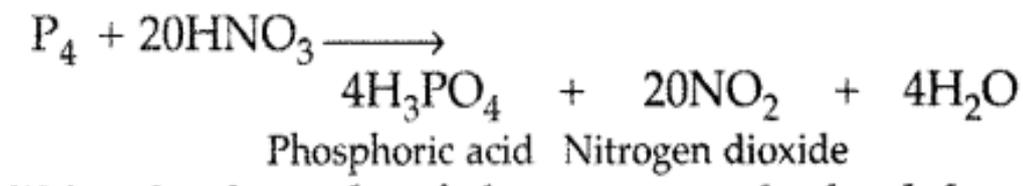
Question 45: $\text{Pb}(\text{NO}_3)_2$ on heating gives a brown gas which undergoes dimerisation on cooling. Identify the gas.

Answer: The brown gas is nitrogen dioxide (NO_2) which can dimerize to N_2O_4



Question 46: Write the formula of the compound of phosphorus which is obtained when cone. HNO_3 oxidizes P_4 .

Answer:



Question 47: Write the formula of the compound of sulphur which is obtained when cone. HNO_3 oxidizes S_8

Answer: $\text{S}_8 + 48\text{HNO}_3 \rightarrow 8\text{H}_2\text{SO}_4 + 48\text{NO}_3 + 16\text{H}_2\text{O}$

Question 48: Write the formula of the compound of iodine which is obtained when cone. HNO_3 oxidizes I_2 .

Answer: $\text{I}_2 + 10\text{HNO}_3 \rightarrow 2\text{HIO}_3 + 10\text{NO}_2 + 4\text{H}_2\text{O}$
