

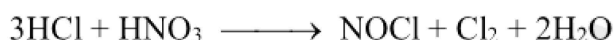
SHORT QUESTIONS

Q.1 How nitrogen differ from other elements of its group?

- Ans.**
- (i) Nitrogen is gas while other elements of group V-A are solids.
 - (ii) Nitrogen has no allotropic form while other member have allotropic forms.
 - (iii) Oxidation states of nitrogen are -3 , $+1$, $+2$, $+3$, $+4$ and $+5$ in its compound while other elements have -3 , $+3$ and $+5$ oxidation states.
 - (iv) Nitrogen does not use its d-orbitals for bond formation while other elements uses their empty d-orbitals for bond formation.
 - (v) It exists in diatomic state (N_2) while phosphorous exists as P_4 .

Q.2 How does aqua regia dissolves gold and platinum?

- Ans.** Aqua Regia is 3 parts of concentrated HCl and one part of concentrated HNO_3 . Metals like gold and platinum can dissolve in aqua regia by the formation of their chlorides.



This liberated chlorine gas converts noble metals to their chlorides.



Over all reaction is as follows:



Q.3 Write down the equation for the reaction between concentrated HNO_3 and copper. Explain what type of reaction it is?

- Ans.** $Cu + 4HNO_3 \longrightarrow Cu(NO_3)_2 + 2NO_2 + 2H_2O$

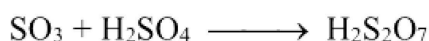
It is a redox reaction in which HNO_3 acts as oxidizing agent and Cu acts as reducing agent. Oxidation state of copper changes from zero to $+2$. Oxidation state of nitrogen changes from $+5$ to $+4$ and it is reduced.

Q.4 What is meant by fuming nitric acid and fuming sulphuric acid?

- Ans.** The mixture of HNO_3 and NO_2 is called fuming nitric acid. The mixture of H_2SO_4 and SO_3 is called fuming sulphuric acid.

Q.5 Why is SO_3 dissolved in H_2SO_4 and not in water in contact process?

- Ans.** In contact process, SO_3 is dissolved in conc. H_2SO_4 to form oleum.



A measured quantity of water can be added to liquid oleum to change it into H_2SO_4 .



When SO_3 is directly dissolved in water, the reaction is highly exothermic and metallic fog is formed in the chamber.

Q.6 How ring test is performed for nitrate radical?

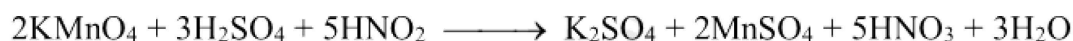
Ans. In this test, some drops of freshly prepared FeSO_4 are added to metal nitrate solution. Then few drops of concentrated H_2SO_4 are added along the side of test tube. A brown coloured ring is formed at the junction of acid and aqueous solution. This brown ring is chemically $\text{FeSO}_4 \cdot \text{NO}$.

Q.7 Give one reaction of HNO_2 in which it behave as oxidising agent and one reaction in which it behave as reducing agent?

Ans. HNO_2 acts as oxidising agent as well as reducing agent. HNO_2 when reacts with HI and oxidation state of N changes from +4 \rightarrow +2. HNO_2 acts as oxidising agent.



HNO_2 when reacts with aqueous bromine, the oxidation state of nitrogen changes from +4 to +5. In this reaction, HNO_2 acts as reducing agent.

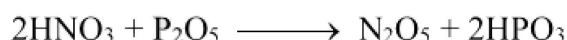


Q.8 Why white phosphorus is more reactive than red phosphorus?

Ans. White phosphorus consists of individual P_4 molecules. The bond angle of P.P.P. in P_4 molecule is of 60° . Due to smaller angle it has strain and more reactive because bond can be broken down easily. Red phosphorus is less reactive. It is macromolecule formed by the combination of P_4 molecules.

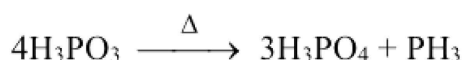
Q.9 P_2O_5 is a good dehydrating agent. Justify this statement by some reactions.

Ans. The substance which is used to remove water from a substance is called dehydrating agent.

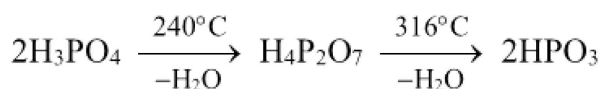


Q.10 What is effect of heat on H_3PO_3 and H_3PO_4 ?

Ans. H_3PO_3 on heating changes to orthophosphoric acid and phosphine.



H_3PO_4 on heating changes to pyrophosphoric acid and finally to metaphosphoric acid.



Orthophosphoric
acid

Pyrophosphoric
acid

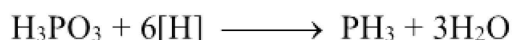
Metaphosphoric
acid

Q.11 H_3PO_3 acts as reducing as well as oxidising agent. Give one reaction to support this statement.

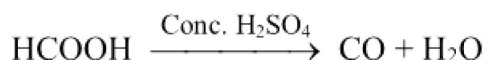
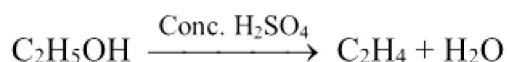
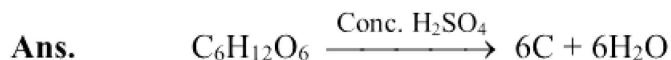
Ans. H_3PO_3 acts as reducing agent when reacts with aqueous copper sulphate.



H_3PO_3 acts as oxidising agent when reacts with nascent hydrogen.



Q.12 H_2SO_4 acts as dehydrating agent. Give three reactions to support this statement.



Q.13 H_2SO_4 acts as oxidising agent. Give some examples?



Q.14 Sulphuric acid is dibasic acid. Explain it.

Ans. The acid which furnishes two protons when dissolved in water is called dibasic acid. H_2SO_4 , H_2S and oxalic acid are examples.



Q.15 What is poisoning of catalyst? How V_2O_5 is prevented from poisoning in contact process?

Ans. The phenomenon in which catalytic activity of a substance is reduced is called poisoning of catalyst. Vanadium pentoxide is poisoned by arsenic. Before going to contact chamber, the gases are passed through arsenic purifier which contains $\text{Fe}(\text{OH})_3$ to remove arsenic.

Q.16 Which gases cannot be dried over sulphuric acid?

Ans. H_2SO_4 is good dehydrating agent and can be used to dry many gases. However, H_2S , SO_3 and NH_3 cannot be dried with H_2SO_4 because these gases react with conc. H_2SO_4 .

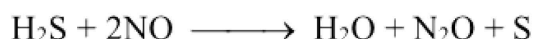


Q.17 Why HNO_3 and H_2SO_4 acts as oxidising agents and never reducing agents? Give reason for it.

Ans. Oxidation of N in HNO_3 is +5 and S in H_2SO_4 is +6. During redox reaction charge of S or N always reduces or decreases and they always acts as oxidising agent. Maximum oxidation state of the element is equal to its group No. Nitrogen belongs to group VA and sulphur belongs to group VIA.

Q.18 Give two chemical reactions in which NO behave as oxidising agent.

Ans. Oxidation state of N in NO is +2. If charge of nitrogen reduces, it is called reduction. In these reactions, NO acts as oxidising agent and H_2S or H_2SO_3 are reducing agents.



Q.19 Give two chemical reactions of NO, in which it behaves as reducing agent.

Ans. Oxidation state of N in NO is +2. If in a chemical reaction, the oxidation number of nitrogen increases then NO will be a reducing agent.



FORMULAS OF ORES OF SULPHUR

(i)	Galena	PbS	
(ii)	Zinc blende	ZnS	
(iii)	Cinnabar	HgS	
(iv)	Stibinite	Sb_2S_3	
(v)	Copper pyrites	$\text{Cu}_2\text{S}, \text{Fe}_2\text{S}_3$	(CuFeS_2)
(vi)	Iron pyrites	FeS_2	(Fool's gold)
(vii)	Heavy spar	BaSO_4	
(viii)	Gypsum	$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$	

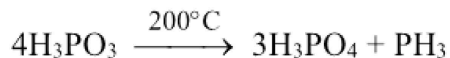
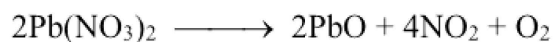
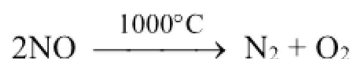
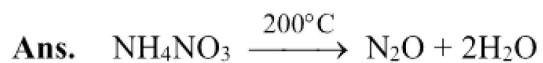
Q.1 Formula of the ores of phosphorous.

Ans.	Phosphate rock	$\text{Ca}_3(\text{PO}_4)_2$
	Fluor-apatite	$\text{CaF}_2 \cdot 3\text{Ca}_3(\text{PO}_4)_2$
	Chlor-apatite	$\text{CaCl}_2 \cdot 3\text{Ca}_3(\text{PO}_4)_2$

Q.2 Complete and balance the following:

Ans.	$2\text{P} + 5\text{NO}_2 \longrightarrow \text{P}_2\text{O}_5 + 5\text{NO}$
	$2\text{NO} + \text{Cl}_2 \longrightarrow 2\text{NOCl}$
	$\text{H}_2\text{S} + 2\text{NO} \longrightarrow \text{S} + \text{N}_2\text{O} + 2\text{H}_2\text{O}$
	$2\text{NO}_2 + \text{H}_2\text{O} \longrightarrow \text{HNO}_2 + \text{HNO}_3$
	$\text{NO}_2 + \text{H}_2\text{SO}_4 \longrightarrow \text{H}_2\text{SO}_4 + \text{NO} + [\text{O}]$

Q.3 Action of heat on the following:



Q.4 What is the effect of temperature on NO_2 ?

Ans. There is equilibrium between NO_2 and N_2O_4 . When temperature of the gas is increased, then it is in the NO_2 state. At lower temperature it is in the N_2O_4 state.



Q.5 Complete and balance the following.

