

CBSE Test Paper-03
Class - 12 Chemistry (The p - Block Elements)

1. Ozone reacts with KOH solution to form
 - a. KO_3
 - b. O_2
 - c. O_3 and KO_2
 - d. O_2 and KO_2
2. Which one of the following acts as an antichlor?
 - a. MnO_2
 - b. KMnO_4
 - c. NaHSO_3
 - d. $\text{K}_2\text{Cr}_2\text{O}_7$
3. N_2O_3 is
 - a. A basic oxide and the anhydride of HNO_2
 - b. An acidic oxide and an anhydride of HNO_2
 - c. A neutral oxide and the anhydride of HNO_3
 - d. An acidic oxide and the anhydride of $\text{H}_2\text{N}_2\text{O}_2$
4. The geometry of XeOF_2 is:
 - a. Tetrahedral
 - b. T-shaped
 - c. Octahedral
 - d. Pyramidal
5. Pure N_2 is prepared in the laboratory by heating a mixture of :
 - a. NH_4Cl and NaOH
 - b. NH_4OH and NaCl
 - c. NH_4Cl and NaNO_3
 - d. NH_4Cl and NaNO_2

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6. Write different isotopes of oxygen.
 7. Which compound led to the discovery of the compounds of noble gas?
 8. Explain why inspite of nearly the same electronegativity oxygen forms hydrogen bonding while chlorine does not?
 9. Why does chlorine water lose its yellow colour on standing?
 10. Write the chemical equation for the reactions which occur when sodium iodate $[\text{NaIO}_3]$ is reduced with sodium hydrogen sulphite.
 11. All five bonds in PCl_5 are not equal. Give an equation in support of this statement.
 12. Write the characteristics of pure Ozone.
 13. Mention three areas in which H_2SO_4 plays an important role.
 14. a. Draw the structural formulae of the following molecules:
 - i. $\text{P}_4\text{O}_{10}(\text{S})$
 - ii. $\text{XeO}_3(\text{S})$b. Draw the structural formula of $\text{SF}_4(\text{g})$.
 15. Assign reasons for the following:
 - i. When a moist blue litmus paper is dipped in a solution of HOCl , it first turns red and then later gets decolourised. Explain.
 - ii. Iodine is liberated when KI is added to the solution of Cu^{2+} ions but Cu^{2+} is not liberated when KCl is added to a solution of Cu^{2+} ions. Why?
 - iii. Name a compound of fluorine which shows +1 oxidation state. How is this compound prepared? Is this a disproportionation reaction?

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Solutions

1. a. KO_3

Explanation: O_3 reacts with KOH to form KO_3 potassium ozonide which is orange coloured solid and contains paramagnetic O^{3-} ion. $2\text{KOH} + 5\text{O}_3 \rightarrow 2\text{KO}_3 + 5\text{O}_2 + \text{H}_2\text{O}$

2. c. NaHSO_3

Explanation: NaHSO_3 act as antichlor. Antichlor is a substance used to decompose residual hypochlorite.

An antichlor is a substance used to remove the excess of chlorine. Antichlors include sodium bisulfite, potassium bisulfite, sodium metabisulfite, sodium thiosulfate, and hydrogen peroxide.

3. b. An acidic oxide and an anhydride of HNO_2

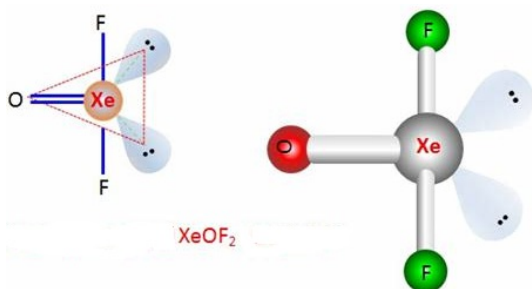
Explanation: $\text{N}_2\text{O}_3 + \text{H}_2\text{O} \rightarrow 2\text{HNO}_2$

it is also called nitrous anhydride or nitrogen sesquioxide.

4. b. T-shaped

Explanation: It has 1 pi bond. Total number of electron pairs is 6 and 2 lone pairs.

So it is sp^3d hybridised and has T shaped geometry.

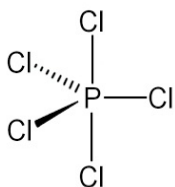


5. d. NH_4Cl and NaNO_2

Explanation: Nitrogen gas can be prepared in the laboratory by heating a mixture of ammonium chloride and sodium nitrite in a test tube over a Bunsen burner

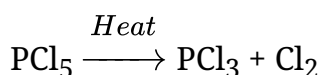


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6. The isotopes of oxygen are ^{16}O , ^{17}O , ^{18}O .
7. Bartlett prepared the compound $\text{Xe}^+[\text{PtF}_6]^-$ from oxidation of Xe with PtF_6 . This led to the discovery of compounds of Xe.
8. Although O and Cl have about the same electronegativity, yet their atomic size (Covalent radii) are much different O = 66 pm and Cl = 99 pm. As a result, electron density per unit volume on oxygen atom is much higher than that of chlorine atom. Therefore, oxygen forms hydrogen bonds while chlorine does not even though both have almost same electronegativity.
9. Chlorine water loses its yellow colour on standing due to the formation of HCl and HClO
 $\text{Cl}_2 + \text{H}_2\text{O} \rightarrow \text{HCl} + \text{HClO}$
10. When sodium iodate $[\text{NaIO}_3]$ is reduced with sodium hydrogen sulphite, sodium hydrogen sulphate is formed along with sodium iodide as shown in chemical equation.
 $\text{NaIO}_3 + 3\text{NaHSO}_3 \rightarrow 3\text{NaHSO}_4 + \text{NaI}$
11. The structure of PCl_5 is trigonal bipyramidal as shown below:



In PCl_5 , axial bonds are generally longer than the equatorial bonds.

When heated, PCl_5 loses a chlorine molecule.



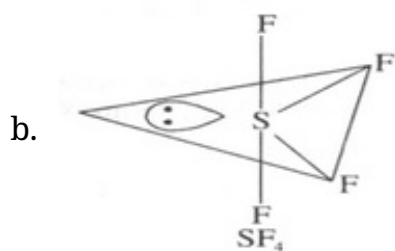
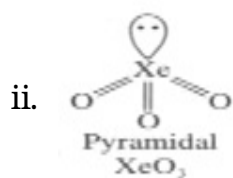
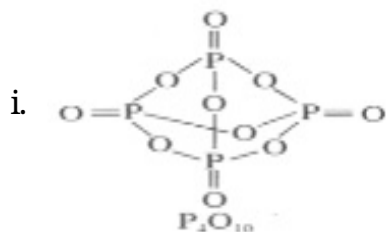
This shows that two P-Cl bonds are weaker and hence longer than others.

12. The characteristics of Pure ozone is given below:
- Ozone is pale blue gas with a characteristic pungent smell.
 - Upon cooling by liquid air, it condenses to form a deep blue liquid. On further cooling, the liquid changes to violet-black solid.
 - Ozone is heavier than air.
13. Sulphuric acid is an important industrial chemical and is used for a lot of purposes. Some

important uses of sulphuric acid are given below.

- i. It is used in fertilizer industry. It is used to make various fertilizers such as ammonium sulphate and calcium super phosphate.
- ii. It is used in the manufacture of pigments, paints, and detergents.
- iii. It is used in the manufacture of storage batteries.

14. a. Structure of the compounds are given below:



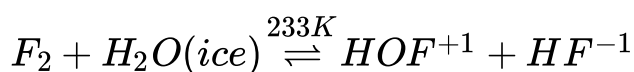
15. i. HOCl acts as an acid and, hence, turns blue litmus red. $HOCl \rightarrow H^+ + OCl^-$ It also works as a bleaching agent, and thus decolourised red litmus by nascent oxygen. $HOCl \rightarrow HCl + [O]$

ii. The I⁻ ion being a strong reducing agent reduces Cu^{2+} to Cu^+ and itself gets oxidised to I_2



Since Cl^- ion does not act as reducing agent, therefore, Cl_2 is not liberated when KCl is added to a solution of Cu^{2+} ions.

iii. The compound of F which shows an oxidation state +1 is HOF. It is prepared by passing F_2 over ice at 233 K.



This is a disproportionation reaction since the oxidation state of F decreases from zero in F_2 to -1 in HF and increased to +1 in HOF.