CBSE Test Paper-02

Class - 12 Chemistry (The p - Block Elements)

1. When chlorine is passed through concentrated hot solution of KOH, the compound formed is
   a. $KClO_2$
   b. KClO
   c. $KClO_4$
   d. $KClO_3$
2. The crystals of ferrous sulphate on heating gives
   a. $Fe_2O_3 + H_2SO_4 + H_2O$
   b. $FeO + H_2O + SO_2$
   c. $FeO + SO_3 + H_2SO_4 + H_2O$
   d. $Fe_2O_3 + SO_2 + SO_3 + H_2O$
3. Formula of oleum is
   a. H_2SO_5
   b. $H_2S_2O_6$
   c. $H_2S_2O_8$
   d. $H_2S_2O_7$
4. Most metal oxides are
   a. None of these
   b. Acidic in nature
   c. Covalent in nature
   d. Ionic in nature
5. Available chlorine is librated from bleaching powder when
   a. It is reacted with alkali
   b. It is heated
   c. It is reacted with dilute acid
   d. It is reacted with water
6. Give an example of a compound in which oxidation state of chlorine is +7.

7. What are the common oxidation states of 15^{th} group?
8. Write a balanced equation for the hydrolytic reaction of PCl_5 in heavy water.
9. What happens when PCl_5 is heated?
10. Give reason for the following.: Among the noble gases only Xenon is well known to form chemical compounds.
11. Why does $R_3P=O$ exist but $R_3N=O$ does not (R = alkyl group)?
12. How are xenon fluorides XeF_2, XeF_4 and XeF_6 obtained?
13. Draw the structures of the following:
    i. Peroxodisulphuric acid
    ii. Bromine trifluoride.
14. Why are halogens strong oxidising agents?
15. How is SO_2 an air pollutant?

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Solutions

1. d. $KClO_3$

   Explanation: >Cl_2 on treatment with conc. Base form ClO_3^- ion.

   Cl_2 + 6KOH →5KCl + $KClO_3$ + 3H_2O

2. d. Fe_2O_3 + SO_2 + SO_3 + H_2O

   Explanation: $FeSO_4$ on heating gives $Fe_2O_3 + SO_2 + SO_3 + H_2O$.

   At 300 ^oC, hydrated ferrous sulphate becomes anhydrous and colourless. This salt when strongly heated breaks up to form ferric oxide with the evolution of SO_2 and SO_3.

   $FeSO_4.7H_2O$→ $FeSO_4$ → Fe_2O_3 + SO_2 ↑ + SO_3 ↑

3. d. $H_2S_2O_7$

   Explanation: Oleum is pyrosulphuric acid ($H_2S_2O_7$)

4. d. Ionic in nature

   Explanation: In general, metal oxides are basic and ionic in nature.

5. c. It is reacted with dilute acid

   Explanation: Bleaching powder when reacts with dilute acids liberates chlorine.

   $Ca(OCl)_2$ +4 HCl →$CaCl_2$ + H_2O + 2Cl_2↑

   The main constituent of bleaching powder is calcium hypochlorite which supplies chlorine with dilute acids.

6. In $HClO_4$, Cl shows the oxidation state of +7.

7. Since the general electronic configuration of 15^{th} is [Noble gas] ns^2 np^3. So, The common oxidation states of the group are -3, +3 & +5.

8. PCl_5 + 4D_2O $\rightarrow$ D_3PO_4 + 5DCl

9. PCl_5 has less stable Arial bonds break to form PCl_3 when it is heated.

   $PCl_5 \xrightarrow{heat} PCl_3 + Cl_2$

10. The atomic size of Xe is largest (Radon being radioactive is not considered) and has higher polarizing power. its ionisation enthalpy is minimum among noble gases. Therefore, Xenon can form compounds with electronegative elements like F and O.

11. N(unlike P) lacks the d-orbital. This restricts nitrogen to expand its coordination number beyond four. Hence, $R_3N{=}O$ does not exist.

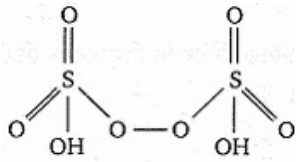
12. XeF_2, XeF_4 and XeF_6 are obtained by a direct reaction between Xe and F_2. The conditions under which the reaction is carried out determines the product.

    $\underset{(Excess)}{Xe_{(g)}} + F_{2(g)} \xrightarrow{673K,\ 1bar} XeF_{2(s)}$

    $\underset{(1{:}5\ ratio)}{Xe_{(g)}} + 2F_{2(g)} \xrightarrow{873K,\ 7bar} XeF_{4(s)}$

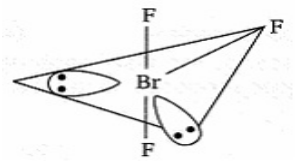
    $\underset{(1{:}20\ ration)}{Xe_{(g)}} + 3F_{2(g)} \xrightarrow{573K,\ 60-70bar} XeF_{6(s)}$

13. i. The structure of $H_2S_2O_8$ peroxydisulphuric acid is shown below:



Peroxydisulphuric acid ($H_2S_2O_8$)

ii. The structure of BrF_3 is shown below:



Bromine trifloride (BrF_3)

14. The general electronic configuration of halogens is np^5, where n = 2-6. Thus, halogens need only one more electron to complete their octet and to attain the stable noble gas configuration. Also, halogens are highly electronegative with low dissociation energies and high negative electron gain enthalpies. Therefore, they have a high tendency to gain

an electron. Hence, they act as strong oxidizing agents.
The relative oxidising power is; F_2 > Cl_2 > Br_2 > I_2.

15. Sulphur dioxide causes harm to the environment in many ways:
    i. It combines with water vapour present in the atmosphere to form sulphuric acid. This causes acid rain. Acid rain damages soil, plants, and buildings, especially those made of marble.
    $SO_2 + \frac{1}{2}O_2 + H_2O \rightarrow H_2SO_4$
    $CaCO_3 + H_2SO_4 \rightarrow CaSO_4 + H_2O + CO_2$
    ii. Even in very low concentrations, SO_2 causes irritation in the respiratory tract. It causes throat and eye irritation and can also affect the larynx to cause breathlessness.
    iii. It is extremely harmful to plants. Plants exposed to sulphur dioxide for a long time lose colour from their leaves. This condition is known as chlorosis. This happens because the formation of chlorophyll is affected by the presence of sulphur dioxide.