P block elements -17th group answers

1.	Why halogens have maximum negative electron gain enthalpy? Halogens have the smallest size in their respective periods and therefore high effective nuclear charge. As a consequence, they readily accept one electron to acquire noble gas electronic configuration.
2.	Why Electron gain enthalpy of fluorine is less negative than chlorine? It is due to small size of fluorine atom. As a result, there are strong interelectronic repulsions in the relatively small 2*p* orbitals of fluorine and thus, the incoming electron does not experience much attraction.
3.	Why halogens are coloured? This is due to absorption of radiations in visible region which results in the excitation of outer electrons to higher energy level. By absorbing different quanta of radiation, they display different colours.
4.	Although electron gain enthalpy of fluorine is less negative as compared to chlorine , fluorine is a stronger oxidising agent than chlorine. Why? It is due to (i) low enthalpy of dissociation of F-F bond (ii) high hydration enthalpy of F
5.	Give two examples to show anomalous behaviour fluorine and state the reason for that. i) It shows only one oxidation state (-1) ii) Forms only one oxo acid HOF iii) HF alone is liquid others are gases. Reason: The anomalous behaviour of fluorine is due to its small size, highest electronegativity, low F-F bond dissociation enthalpy, and non availability of *d* orbitals in valence shell.
6.	Write the uses of ClO_2 and I_2O_5 ClO_2 is used as a bleaching agent for paper pulp and textiles and in water treatment. I_2O_5 is a very good oxidising agent and is used in the estimation of carbon monoxide.
7.	What happens when chlorine is treated with a. cold and dil.NaOH b. Excess ammonia a. $2NaOH + Cl_2 \rightarrow NaCl + NaOCl + H_2O$ (cold and dilute) b. $3Cl_2$ + 2Excess NH_3 ------→ $2NCl_3$ + 6HCl
8.	Explain Deacon process. *Deacon's process*: By oxidation of hydrogen chloride gas by atmospheric oxygen in the presence of $CuCl_2$ (catalyst) at 723 K. $_2$ CuCl2 $_{2\,2\,2}\,4HCl + O_2 \longrightarrow 2Cl_2 + 2H_2O$
9.	Write two poisonous gases obtained from chlorine Mustard gas and phosgene/tear gas
10.	Why Bond dissociation enthalpy of fluorine is lower than chlorine? The smaller enthalpy of dissociation of F_2 compared to that of Cl_2 is due to smaller size of fluorine atom and large electron-electron repulsion among the lone pairs in F_2 molecule.
11.	Why chlorine water loses its yellow colour on standing? Chlorine water on standing loses its yellow colour due to the formation of HCl and HOCl. Hypochlorous acid (HOCl) so formed, gives nascent oxygen which is responsible for oxidising and bleaching properties of chlorine.
12.	Give reason for the bleaching action of chlorine. Chlorine is a powerful bleaching agent; bleaching action is due to oxidation. It bleaches vegetable or organic matter in the presence of moisture.Bleaching effect of chlorine is permanent. $Cl_2 + H_2O \rightarrow 2HCl + O$ Coloured substance + O → Colourless substance
13.	What happens when Iron is treated with HCl?

	Its reaction with iron produces H_2. $Fe + 2HCl \rightarrow FeCl_2 + H_2$ Liberation of hydrogen prevents the formation of ferric chloride.
14.	What is meant by aqua regia? Write its one use with equation. When three parts of concentrated HCl and one part of concentrated HNO_3 are mixed, aqua regia is formed which is used for dissolving noble metals, e.g., gold, platinum $Au + 4H^+ + NO_3^- + 4Cl^- \rightarrow AuCl_4^- + NO + 2H_2O$ $3Pt + 16H^+ + 4NO_3^- + 18Cl^- \rightarrow 3[PtCl_6]^{4-} + 4NO + 8H_2O$
15.	Draw the structure of HOCl and $HClO_4$ TXT BK
16.	What are interhalogen compounds? How are they prepared? When two different halogens react with each other, interhalogen compounds are formed. They can be assigned general compositions as XX', XX_3', XX_5' and XX_7' where X is halogen of larger size and X' of smaller size and X is more electropositive than X. $Cl_2 + F_2 \xrightarrow{437K} 2ClF$; $Br + 5F \rightarrow 2BrF_5$
17.	Why interhalogen compounds are more reactive than halogens? This is because X–X′ bond in interhalogens is weaker than X–X bond in halogens except F–F bond.
18.	Draw the shape of a. BrF_3 b. IF_7 c. BrF_5 TXT BK
19.	Why are halogens strong oxidising agents? The ready acceptance of an electron to attain noble gas configuration is the reason for the strong oxidising nature of halogens. (ns2np5 to ns2 np6)
20.	Name one oxoacid formed by Fluorine HOF
21.	Complete the following: a. $F2 + H2O \rightarrow .O_2 + 2HF$ b. $4NaCl + 4H_2SO_4 + MnO_2 \rightarrow Cl_2 + MnCl2 + 4NaHSO_4 + 2 H2O$ c. $Cl_2 + 2NaI \rightarrow 2NaCl + I_2$ d. $NaHCO_3 + HCl \rightarrow NaCl + H_2O + CO_2$ e. $Cl2 + H2O \rightarrow HOCl + HCl$ f. $2Ca(OH)_2 + 2Cl_2 \rightarrow Ca(OCl)2 + CaCl_2 + 2H_2O$
22.	Arrange the following in the order of property indicated for each set: a. F_2 I_2 Br_2 Cl_2 (increasing order of BDE) Ans : $I_2 < F_2 < Br_2 < Cl_2$ b. HF HCl HBr HI (increasing acidic strength) Ans: HF<HCL<HBr<HI **Reason** : as we go down the group bde decreases c. HOCl HClO2 HClO3 HClO4 (increasing acid strength) Ans: HOCl<HClO2<HClO3<HClO4 **Reason: as the oxygen atoms increase electron withdrawing nature increases(-I effect) so act as stronge acid**
23.	Why are pentahalides are more covalent tfhan trihalides? As the oxidation state increases, according to fajan's rule polarising ability increases, so covalent character increases.
24.	Account for the following: a. ClF_3 exists but FCl_3 does not. They can be assigned general compositions as XX', XX_3', XX_5' and XX_7

	′ where X is halogen of larger size and X′ of smaller size and X is more electropositive. In the above compound F is smaller size than Chlorine and also F is more electronegative in nature. b. HF is stored in wax coated bottles. Because HF reacts with bottle (Sodium silicate) . so it can't be stored in bottles. c. Bleaching action of chlorine is permanent. Chlorine is a powerful bleaching agent; bleaching action is due to oxidation. So Bleaching effect of chlorine is permanent d. NCl3 is hydrolysed but NF_3 does not. NCl_3 is hydrolysed because Cl has got vacant d orbitals but in the case of NF_3, neither N nor F has got vacant d orbitals so cant get hydrolysed. e. $SnCl_4$ is more covalent than $SnCl_2$ In $SnCl_4$, Oxidation state of Sn is +4, In $SnCl_2$, O.s of Sn is +2 As the o.s increases, acc to fajan's rule polarising ability increases, inturn covalent character increases. f. Fluorine does not exhibit any positive oxidation state. It is the most electronegative element, does not possess d orbital so it can't have + O.S g. ICl is more reactive than Iodine BDE of ICl is smaller than Iodine because of EN difference polarity increases ,reactivity also increases.
25.	With what neutral molecule is ClO^- isoelectronic? Is that molecule a lewis base? ClF (tot no electrons = 26) yes it is a lewis base.
26.	A greenish yellow gas A is obtained by treating Manganese dioxide with sodium salt with conc.sulphuric acid. A reacrs with Hydrogen forms B , when B is treated with ammonia forms white dense fumes. A also reacts with hot and concentrated NaOH forms C and D.Identify A,BC and D . write the equations involved. Ans: A=Cl_2 B= HCl C= $NaClO_3$ D=NaCl $4NaCl + MnO_2 + 4H_2SO_4 \rightarrow MnCl_2 + 4NaHSO_4 + 2H_2O + Cl_2$ $H_2 + C_2$ -----→ 2HCl $6\ NaOH + 3Cl_2 \rightarrow 5NaCl + NaClO_3 + 3H_2O$ (hot and conc.)