Exercise-1

> Marked questions are recommended for Revision.

PART - I : SUBJECTIVE QUESTIONS

Section (A_I + A_{II}) : Elements: Occurence & Isolation

- A_I-1. Name the compound which is used to obtain fluorine gas on electrolysis. At which electrode does F₂ appears?
- **A**_I-2. Name the valuable halogen impurities present in chile salt petre (NaNO₃).
- AII-3. What idea lead to the discovery of Xenon fluorides?

Section (B_I) : Based on Periodic Trends

- **B**_I-1. Considering the parameters such as bond dissociation enthalpy, electron gain enthalpy and hydration enthalpy, compare the oxidizing power of F₂ and Cl₂.
- BI-2. Write all the common oxidation states of halogens.
- **B**_I-3. Write and explain the order of X–X bond energy for halogen down the group.

Section (C_I + C_{II}) : Based on Chemical Bonding

- **C-1.** Draw the Lewis dot structures of the following compounds : HCIO₃, XeOF₄, XeO₂F₂, ICl₂⁻, ICl₄⁻.
- **C₁-2.** Draw the Lewis dot structures of the following multicentred compounds: I_2O_5 , CI_2O_7 .
- **C₁-3.** Give the formula and describe the structure of a noble gas species which is isostructural with: (i) ICl_4^- (ii) IBr_2^- (iii) BrO_3^-
- **C**_{II}-4. Arrange the XeF₂, XeF₄ in decreasing order of Xe–F bond length, give reason also.

Section $(D_I + D_{II})$: Properties of elements

- D_{II}-1. Answer the following with relevant reason.
 (i) The boiling points of noble gases increase with increase in atomic number.
 (ii) Why helium and neon do not form clathrate compounds with quinol ?
- DI-2. Why are halogens coloured ?
- D_{I} -3. Write the reactions of F_2 and Cl_2 with water.
- DI-4. State what happens when halogens react with a cold dilute solution of NaOH ?
- DI-5. State what happens when halogens (X = CI / Br / I) react with hot and conc. solution of NaOH ?
- **D**_I-6. Which halogen is oxidised by conc. HNO₃? Give reaction.

Section (E₁) : Oxides, Hydroxides & Oxyacids

- **E**_I-1. Write chemical reactions involved in preparation of HCIO₃ & HCIO₄ by displacement from their salts.
- E_I-2. When a blue litmus is dipped into a solution of hypochlorous acid, it turns red and then gets decolourised. Explain.
- EI-3. Explain why fluorine forms only one oxyacid, HOF.

p-Block Elements (Halogen & Noble Gases)

- E1-4. Predict the products when the following reactions are carried out : (i) In acidic medium when SO₂ is passed through NaClO₃. (ii) HCl + KIO₃ + KI - \rightarrow
- What happen when CIO₂ dissolves in NaOH? E₁-5.

Section (F_I) : Hydracids

- Arrange the following in the order of : (i) Acidic strength (ii) Reducing behaviour Fr-1. (HI, HBr, HCI & HF)
- How can you prepare Cl₂ from HCl and HCl from Cl₂? Write reactions only. F₁-2.
- F₁-3. HI can not be prepared by heating Nal with concentrated H₂SO₄. Give the method which is preferred for the preparation of HI.
- What is agua regia? Write its reaction product with gold and platinum. F₁-4.
- F₁-5. Explain the following with proper reason : (i) Anhydrous HCl is a bad conductor of electricity while aqueous HCl is a good conductor. (ii) HF is not stored in glass bottles but kept in wax lined bottles. (iii) HF has a greater electronegativity difference and more ionic character than HCI, HBr and HI but it is the weakest acid.
- F₁-6. Fill in the blanks : (i) Among halogen acids (hydrogen halides) is the strongest reducing agent. (ii) $H_2SO_4 + HI \longrightarrow +$ +
- Predict the products when the following reactions are carried out : **F**_I-7. (i) Red lead is boiled with concentrated HCI. (ii) SiO₂ + HF —

Section (G_{II}) : Halides & Oxyhalides

- Write the method of preparation of XeF₂, XeF₄ & XeF₆. G_{II}-1.
- G₁₁-2. How is XeOF₄ prepared ?
- Gn-3. Does the hydrolysis of XeF₄ lead to a redox reaction ?
- G₁₁-4. Write the complete and the partial hydrolysis product of XeF₆.
- Complete the following reactions : GII-5. (ii) XeF₆ + SiO₂ \rightarrow (i) XeF₂ + H₂ \rightarrow

(iii) XeF₆ + SbF₅ \rightarrow

(Excess)

Section (H₁) : Other compounds (Inter halogens, Bleaching powder, Pseudo halides & Poly halides)

- H_I-1. Complete the following reactions : (a) $Cl_2 + F_2 \xrightarrow{473 \text{ K}}$ (b) $I_2 + 3CI_2 \longrightarrow$ (c) $Br_2 + 3F_2 \longrightarrow$ (d) $Br_2 + 5F_2 -$ (Equal volume) (Excess)
- Why ICI is more reactive than I₂. H_I-2.
- (a) Name two interhalogens of AB₃ type. H₁-3. (b) Write the hydrolysis product of ICI ?
- Explain the following with proper reason : H_I-4. (i) Bleaching of flowers by chlorine is permanent while after bleaching with SO₂, the colour returns. (ii) lodine dissolves more in KI solution than in water.
- H₁-5. What happens when ? (Give balanced equations)
 - (i) Sodium iodate is treated with sodium bisulphite solution.
 - (ii) Chlorine is passed over slaked lime.

PART - II : ONLY ONE OPTION CORRECT TYPE

Section (A_I + A_{II}) : Elements : Occurence and Isolation

A ⊪-1 .	Which of the following g (A) chlorine	jaseous molecules is mo (B) helium	onoatomic ? (C) oxygen	(D) nitrogen
A ₁₁ -2.	Which one of the follow (A) Rn	ing noble gases is not fo (B) Kr	und in atmosphere ? (C) Ne	(D) Ar
A ₁₁ -3.	The inert gas abundant (A) Ar	ly found in atmosphere is (B) Kr	s : (C) He	(D) Xe
A _I -4.	Electrolysis of aqueous (A) Cl ₂	solution of Brine (NaCl) (B) H ₂	will give: (C) NaOH	(D) all of these

AI-5.The catalyst used in the Deacon's process for the manufacture of chlorine is :(A) Cu(B) An alloy of copper(C) CuCl2(D) CuS

Section (B₁+ B₁₁) : Based on Periodic Trends

- **BII-1.** Which one of the following configuration represents a noble gas ?(A) $1s^2 2s^2 p^6$, $3s^2$ (B) $1s^2 2s^2 p^6$, $3s^1$ (C) $1s^2 2s^2 p^6$ (D) $1s^2 2s^2 p^6$, $3s^2 p^6$, $4s^2$
- **B**_I**-2.** Astatine is the element below iodine in the group VIIA of the periodic table. Which of the following statements is not true for astatine ?
 - (A) It is less electronegative than iodine.
 - (B) It will exhibit only -1 oxidation state.

(C) Intermolecular forces between the astatine molecules will be larger than that between iodine molecules.

(D) None of these.

BI-3. Which is wrong statement ?

- (A) Basic nature of X⁻ is in order $F^- > CI^- > Br^- > I^-$
- (B) Electron gain enthalpy in order F > CI > Br > I.
- (C) The ionic character of M—X bond decreases in the order M—F > M—CI > M—Br > M—I
- (D) Among F⁻, Cl⁻, Br⁻ and l⁻, F⁻ has the highest enthalpy of hydration.

Section ($C_I + C_{II}$) : Based on Chemical Bonding

C_I-1. Which of the following structure is correct for BrF_3 ?



(A) XeF2: linear(B) XeF4: square planar(C) XeF6: distorted octahedral(D) XeO3: trigonal planar

Section (D_I) : Properties of elements

D _I -1.	Correct order of boiling	point of halogens is		
	(A) $F_2 < CI_2 < Br_2 < I_2$	(B) $Cl_2 > F_2 > Br_2 > I_2$	(C) $F_2 > Cl_2 > Br_2 > l_2$	(D) (

(D) $Cl_2 < F_2 < Br_2 < l_2$

- D_{II} -2. Which of the following statement is correct ?
 - (A) Helium has abnormal behaviour on liquefication
 - (B) lodine is readily soluble in CS2 and the solution is purple in colour
 - (C) Helium do not form any clathrate
 - (D) All of these
- **DI-3.** Chlorine gas is dried over :
 - (A) CaO (B) NaOH (C) conc. H_2SO_4 (D) dil. H_2SO_4

<u>p-Blo</u>	ck Elements (Halogen	& Noble Gases) /		
Dī-4.	F ₂ reacts with H ₂ O as f $F_2 + H_2O \longrightarrow$ Which of the following	ollows : H⁺ + F⁻ + O₂ halogens shows same rea	action but in opposite dire	ection ?
Dı-5.	(A) Br₂Chlorine acts as a blea(A) dry air	(B) Cl ₂ ching agent only in prese (B) moisture	(C) I2 ence of : (C) sunliaht	(D) All
Sectio	on (E _I) : Oxides, Hy	droxides & Oxyacid	ls	(-)
Eī-1.	Select the incorrect sta (A) Perchloric acid is a (B) Only one oxyacid [I (C) The most stable ox (D) None of these	tement : stronger acid than sulphu HOF] is formed by fluoring y-acid of chlorine is perch	uric acid ə nloric acid	
E _I -2.	Cl ₂ O ₆ reacts with water (A) Only sodium chlora (C) Both sodium chlora	and alkali to give : te te and sodium perchlorat	e	(B) Only sodium perchlorate(D) None of these
E _I -3.	On heating KClO ₃ we g (A) KClO ₂ + O ₂	get : (B) KCl + O ₂	(C) KCl + O ₃	(D) KCl + O ₂ + O ₃
Eı-4.	The following acids hav CIOH (I), (A) I > II > III	ve been arranged in orde BrOH (II), (B) II > I > III	r of decreasing acid strer IOH (III) (C) III > II > I	ngth. Identify the correct order.
Eı-5.	CIO ₃ ⁻ ion leads with I ₂ t (A) CIO ₄ ⁻	to form (B) IO₃ [_] and Cl₂	(C) ICI and O ₂	(D) ICI and O ₃
Eı-6.	The strongest acid amo (A) HClO ₄	ongst the following is : (B) HClO3	(C) HCIO ₂	(D) HCIO
Section	on (F _I) : Hydracids			
Fī-1.	Which of the following (A) HF	halogen hydrides will hav (B) HCl	ve the weakest conjugate (C) HBr	e base ? (D) HI
Fī-2.	Concentrated H ₂ SO ₄ ca (A) reduces HBr (C) disproportionates H	annot be used to prepare IBr	HBr from NaBr, because (B) oxidises HBr (D) reacts slowly with N	e it : aBr
F _I -3.	Hydrogen bromide is d (A) quick line (C) potassium hydroxic	ried by passing the gas th le pellet	nrough : (B) anhydrous calcium ((D) con. H₂SO₄	chloride
F1-4.	Which one of the hydra (A) HF	acid does not form any pro (B) HCl	ecipitate with AgNO₃ ? (C) HBr	(D) HI
Fī-5	Which can do glass etc (A) HIO4	ching ? (B) HF	(C) HNO ₃	(D) SiF ₄
Fı-6.	Identify A and B in follo (A) Br_2 , SO_3	wing reaction, H ₂ SO ₄ + I (B) Br ₂ , S	$HBr \longrightarrow A + B + H_2O$ (C) BrO ₃ ⁻ , SO ₃	(D) Br ₂ , SO ₂
Fī- 7 .	Which of the following (A) AuCl ₄	is obtained when gold is t (B) AuCl₃	reated with aquaregia. (C) [AuCl₄]⁻	(D) [AuCl₄]+
Fī-8. Fī-9.	Which of the following (A) HCI Which of the following (A) HI	hydrogen halide is most v (B) HF has maximum bond stren (B) HCl	/olatile. (C) HI gth : (C) HF	(D) HBr (D) HBr
Fī-10.	Which of the following (A) HBr	is the strongest acid ? (B) HF	(C) H ₂ S	(D) PH ₃

p-Block Elements (Halogen & Noble Gases) Section (G_{II}) : Halides and oxyhalides The number of lone pairs on central atom in XeF_2 , XeF_4 and XeF_6 are : G_{II}-1. (B) 3,2,1 (A) 1,2,3 (C) 2,2,1 (D) 1,3,2 Of the following species, one which is non-existent : Gn-2. (A) XeF₆ (B) XeF₅ (C) XeF₄ (D) XeF₂ XeF₂ on complete hydrolysis gives : Gn-3. (A) Xe (C) XeO_2F_2 (D) XeO₄ (B) XeO₂ Hydrolysis of XeF₄ and CaCN₂ gives respectively : G_{II}-4. (A) XeO₃ and CaCO₃ (B) XeO₂ and Ca(OH)₂ (C) XeOF₃ and Ca(OH)₂ (D) XeOF₂ and CaCO₃ Xenon hexafluoride undergoes hydrolysis in strong alkaline medium: GII-5. 2 XeF₆ + 16 OH⁻ \longrightarrow 8H₂O + 12F⁻ + A + B + C then reaction product may be: (C) Xenon (A) perxenate ion (B) O₂ (D) All of the above Section (H_i) : Other compounds (Inter halogens, Bleaching powder, Pseudo halides & Poly halides) H₁-1. In the inter halogen compounds of AB₃/AB₅ form which is correct : (A) A is large size halogen (B) B is large size halogen (C) B is small size halogen (D) Both (A) & (C) H_I-2. Which one of the following is not a pseudohalide ? (A) CNO-(B) RCOO-(C) OCN-(D) NNN⁻ Which of the following behaves like pseudohalogen compound: H_I-3. (A) NCCN (B) CN-(C) N₃-(D) I₃-Which of the following statement is correct. H_I-4. (A) All interhalogen compounds are gas at room temperature. (B) Interhalogen are either gas or liquid at room temperature. (C) Interhalogens can be solid or liquid or gas at room temperature. (D) All interhalogen compounds are liquid at room temperature.

PART - III : MATCH THE COLUMN

1. Match the reactions listed in column-I with the product(s) listed in column-II.

	Column-l		Column-II (X = Halogen)
(A)	$NH_3 + F_2 \longrightarrow$	(p)	N ₂
(B)	NH_3 (excess.) + $CI_2 \longrightarrow$	(q)	HX
(C)	$NH_3 + Br_2$ (excess.) \longrightarrow	(r)	NH ₄ X
(D)	NH_3 (aq.) + $I_2 \longrightarrow$	(s)	Explosive

2. Match the reactions listed in column-I with the product(s) listed in column-II.

	Column - I		Column - II
(A)	CI_2O_6 + H_2O \rightarrow	(p)	CIO ₂
(B)	NaClO ₄ (s) + HCl(conc.) \rightarrow	(q)	HCIO ₃
(C)	$\text{KCIO}_3 + (\text{COOH})_2 \rightarrow$	(r)	Cl ₂ O
(D)	HgO + Cl ₂ $\xrightarrow{573K}$	(s)	HCIO ₄

3. Match the compounds listed in column-I with characteristic(s) / type of reaction(s) listed in column-II.

	Column–I		Column–II
(A)	XeF ₂	(p)	Undergoes hydrolysis with water.
(B)	XeF ₄	(q)	Acts as oxidising agent.
(C)	XeF ₆	(r)	Undergoes addition reaction.
(D)	XeO ₃	(S)	Has lone pair(s) of electrons.
		(t)	Gives disproportionation reaction with H ₂ O or OH [−] .

Exercise-2

A Marked questions are recommended for Revision.

PART - I : ONLY ONE OPTION CORRECT TYPE

- 1. The X – X bond dissociation energy is minimum in : $(A) F_2$ (B) Cl₂ (C) Br₂ (D) I₂ 2. lodine is liberated from KI solution when treated with : (A) ZnSO₄ (B) CuSO₄ (C) NiSO₄ (D) FeSO₄ 3. Which of the following is not oxidised by MnO₂? (D) I-(A) F⁻ (B) CI-(C) Br- F_2 + dil NaOH \longrightarrow A + NaF + H₂O 4. F_2 + conc. NaOH \longrightarrow B + NaF + H₂O A and B respectively are : (A) OF_2 and O_2 (B) O₂ and OF₂ (C) Both O₂ (D) Both OF₂ 5. When thiosulphate ion is oxidised by iodine, the new product formed is : (A) SO32-(B) SO42-(C) S₄O₆²⁻ (D) S₂O₆²⁻ 6. $NH_3(excess) + Cl_2 \longrightarrow NH_4Cl + A(gas)$ $NH_3 + Cl_2(excess) \longrightarrow B + HCl$ Incorrect statement regarding A and B. (A) A is highly reactive gas at room temperature. (B) Bond order of gas 'A' is same as C_2^{2-} . (C) Compound 'B' is explosive. (D) Bond angle of compound B is greater than bond angle of NF₃. Which amongst the following reactions cannot be used for the respective preparation ? 7. (A) $2KBr + H_2SO_4$ (conc.) $\longrightarrow K_2SO_4 + 2HBr$ (B) $NaCl + H_2SO_4$ (conc.) $\longrightarrow NaHSO_4 + HCl$ (D) $CaF_2 + H_2SO_4(conc.) \longrightarrow CaSO_4 + 2HF$ (C) NaHSO₄ + NaCl \longrightarrow Na₂SO₄ + HCl 8. $\Delta H_{vaporisation}$ (KJ/mol) are given for the hydrides of halogens in the following graph. The hydride HF will correspond to (A) P $\Delta H^{\circ}{}_{vap}$ (B) Q (C) R R (D) S Hydrides 9. Alkali metal hydrogen fluorides have a formula M[HF2]. They are found to contain a linear symmetrical anion having an overall F-H-F distance of 2.26 Å which may be compared with the H-F bond length of 0.92 Å in the moment. Which of the following is false for the anion ?
 - (A) Hydrogen bonding plays a significant role in the existence of the anion
 - (B) Average bond length (H–F) is 1.13 Å in the anion HF_2^-
 - (C) The stretching of the H–F bond in the anion is 0.21 Å
 - (D) H-atom is bonded to two F-atoms through two T bonds in the anion.
- **10.** A certain hypohalite on treating with hot and conc. NaOH forms anions P and Q. More stable anion among P and Q can be obtained by neutralizing its conjugate acid X.

Upon heating X to very high temperature, a compound Y is formed, which is used in estimation of a toxic gas which have 300 times stronger affinity for haemoglobin than dioxygen. Then which of the following statements are true.

- (A) X is HI.
- (B) Y is Cl₂O₅
- (C) Final product Y, has total no. of bonds 5.

(D) Y on reacting with toxic gas produces a gas which is used in fire extinguisher.

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р-Віо	ck Elements (Halogen & Noble Gases)		
11.	When F ₂ is passed into a solution of m treating with slaked lime forms "Z". When (A) Blue colour (C) White in colour	hineral acid X, a greenish Red litmus is kept in conta (B) No change in c (D) None of these	yellow gas Y is formed. Which on act with Z, it changes into olour
12.	Which statement regarding iodine trichlor (A) It forms dimer in gaseous state. (B) In dimer I_2CI_6 , the bridge bonds are lo (C) In solid state, it exist as planar molecu (D) On hydrolysis, it gives a mixture of iod	ide is incorrect. Inger than the terminal bon ule. dous acid and hydrochloric	ds. acid.
13.	The order of solubility of noble gases in w (A) He > Ar > Kr > Ne > Xe (C) Xe > Ar > Kr > He > Ne	vater is (B) He > Ne > Ar > (D) Xe > Kr > Ar >	Kr > Xe Ne > He
14.	Consider following properties of the noble I : They readily form compounds which ar II : They generally do not form ionic comp III : Xenon has variable oxidation states in IV : the smaller He and Ne do not form cla Select correct properties. (A) I, II, III (B) II, III, IV	e gases. re colourless. pounds. n its compounds. athrate compounds. (C) I, III, IV	(D) All
15.	The formation of O_2^+ [PtF ₆] ⁻ is the basis for (A) O_2 and Xe have comparable sizes. (B) both O_2 and Xe are gases. (C) O_2 and Xe have comparable ionisatio (D) O_2 and Xe have comparable electron	or the formation of xenon fl n energies. egativities.	uorides. This is because :
16.	$ [HXeO_4]^- + OH^- \longrightarrow [X] + [Y] + O_2 + H_2O_2 $ The products [X] and [Y] in unbalanced re (A) [XeO_6]^{4-} & Xe (B) [XeO_6]^{4-} & Xe) eaction are : eO₃ (C) XeO₃ & Xe	(D) H ₂ XeO ₄ & Xe
	PART - II : SINGLE AND	DOUBLE VALUE	INTEGER TYPE
1.	The total number of electrons present in 4	4 th shell of Astatatine (₈₅ At)	are :
2.	How many of the following properties of h (a) Number of valence electron (d) Atomic radii (g) Electronegativities (i) Oxidising nature.	halogen increases with incr (b) Metallic nature (c) (e) Density (f) (h) Reactivity (j) Δ_{eg} H (magnitude wise)	ease in atomic number.) Boiling points Inoisation enthalpies
3.	A gas P is obtained at anode during the NH_3 released a diatomic gas Q. Find the	e electrolysis of brine. The value of $(x - y)$ where $x \& y$	gas P when treated with excess of y are the molar mass of P and Q.
4.	How many orders are correct : (a) $H-F < H-CI < H-Br < H-I$ (Bond lengt (b) $H-F < H-I < H-Br < H-I$ (Acidic streng (c) $H-I < H-Br < H-CI < H-F$ (Bond streng (d) $H-F > H-CI > H-Br > H-I$ (Thermodyr (e) $H-F < H-CI < H-Br < H-I$ (Reducing p (f) $H-F > H-I > H-Br > H-CI$ (Boiling point)	th) gth) namic stability) power) nt)	
5.	$HCI + HNO_3 \longrightarrow$		
5.	$HCI + HNO_{3} \longrightarrow$ (Conc.) (Conc.) (Conc.)	er of N is	
5. 6.	$\begin{array}{c} HCI + HNO_{3} \longrightarrow \\ HCI + HNO_{(Conc.)} & \longrightarrow \\ How many of the following reaction numb \\ How many of the following reactions would (a) CH_{4} + Cl_{2} \longrightarrow \\ (c) l_{2} + Cl_{2} + H_{2}O \longrightarrow \\ (e) H_{2}O + SO_{2} + Cl_{2} \longrightarrow \\ (g) NaCl(aq) \xrightarrow{Electrolysis} \\ (i) Cl_{2} + NaOH(conc.) \longrightarrow \end{array}$	er of N is Id have HCl as one of the p (b) FeSO ₄ + H ₂ SO ₄ (d) Cl ₂ + H ₂ O \longrightarrow (f) SO ₃ + Cl ₂ \longrightarrow (h) Cl ₂ O ₇ + H ₂ O	products ? ₄ + Cl ₂ → →

- 8. Br₂ + F₂ (excess) \longrightarrow A $\xrightarrow{Hydrolysis}$ B + C The summation of atomicities of compound A, B and C is :
- 9. The number of lone pairs of electrons present in central atom of CIF₃ is :
- **10.** Which of the following interhalogens exist at room temperature and have central atom hybridization $sp^{3}d^{2}$ (a) CIF₃ (b) CIF₅ (c) BrCl₃ (d) IF₃

(a) CIF₃	(b) CIF₅	(c) BrCl₃	(d) IF₃
(e) IF ₅	(f) BrF₅	(g) IF ₇	(h) ICl₅
(i) IBr ₅	(j) BrF₃	(k) ClBr₅	

- **11.** How many of the following properties of noble gases would increase from Helium to Radon ? Boiling point, First Ionisation enthalpy, Atomic volume, Abundance in atmosphere, Density at STP, Valence electrons, Critical temperature.
- **12.** The number of compounds/elements oxidised by XeF₂ among following is: HF, HBr, HCl, HI, NH₃, CrF₂, Pt, S₈
- **13.** The oxidation state of xenon in perxenate ion is +n. Give the value of 'n'.
- $14. \qquad Xe + O_2F_2 \longrightarrow A + B$

Hydrolysis B + C + Xe

The summation of total no. of lone pairs and σ bonds in in species (A, B and C) is.

15. How many of the given compounds can produce XeO₃. XeF₆, XeF₄, XeO₂F₂, XeOF₄

PART - III : ONE OR MORE THAN ONE OPTIONS CORRECT TYPE

1. Which of the following salts will evolve halogen on treatment with conc. H₂SO₄ ? (A) NaCl (B) KI (C) NaBr (D) none of these 2. Which of the following reactions are correct? (A) NalO₃ + 5Nal + $6H_2SO_4 \longrightarrow 6NaHSO_4 \ 3H_2O + I_2$ (B) $2KBr + MnO_2 + 3H_2SO_4 \longrightarrow 2KHSO_4 + MnSO_4 + 2H_2O + Br_2 \uparrow$ (C) $K_2Cr_2O_7 + 14HCI \longrightarrow 2 \ KCI + 2CrCl_3 + 7H_2O + 3Cl_2$ (D) $2K_2MnF_6 + 4SbF_5 \longrightarrow 4KSbF_6 + MnF_3 + F_2$ Which of the following will not displace the halogen from the solution of the halide ? 3. (A) Br₂ added to Nal (B) Br₂ added to NaCl (C) F₂ added to KCl (D) Cl₂ added to NaF lodine reacts with hypo to give : 4. (A) Nal (B) Na_2SO_3 (C) $Na_2S_4O_6$ (D) Na₂SO₄ 5. $Cl_2 + NH_3(excess) \longrightarrow A + B$ (A) One of the product is also obtained by decomposition of $(NH_4)_2Cr_2O_7$. (B) Bond order in one of the product is 3 (C) Both products contain chlorine. (D) If Br₂ is used instead of Cl₂, one of product remain same In which of the following case disproportionation reaction take place. 6. (A) F_2 + Hot water \longrightarrow products (B) Cl_2 + Cold and dilute NaOH \longrightarrow products (C) Cl_2 + Hot and conc. NaOH \longrightarrow products (D) $Cl_2 + NH_3(excess) \longrightarrow products$ 7. In which following statement are correct. (a) Anhydrous hydrogen fluroide is a liquid at ordianry temperature while other halogen acid are gases. (b) Lead acetate does not form any precipitate with HF acid but other halogen acid from precipitates. (c) HF is heated with a mixture of MnO₂ and H₂SO₄, no gas is evloved but in case of HCI, HBr and HI acids evolved gases. (d) HF is not oxidised by strong oxidising agent but other halogen acid are oxidised. (D) d (A) a (B) b (C) c

8.	 A pungent smelling gas X after being dried by concentrated H₂SO₄ was dissolved in water to give strongly acidic solution. The gas also gives dense white fumes with NH₃. X is also a constituent of aqua-regia. Which of the following is/are true for X ? (A) X is HCI (B) X is Cl₂ (C) X is the most volatile among the hydrides of halogens (D) Solution of X in water can liberate CO₂ from the solution of sodium hydrogencarbonates. 					
9.	Among the following which reactions are possi (A) $F_2 + H_2O \longrightarrow HF + O_2$ (C) $Br_2 + H_2O \longrightarrow HBr + HBrO$	ble (B) Cl ₂ (D) l ₂ +	+ H ₂ O \longrightarrow HCl · H ₂ O \longrightarrow Hl + H	+ HCIO IIO		
10.	Which of the following statements are true : (A) Strength of oxyacids : $HCIO_4 > HCIO_3 > HCIO_3 > HCIO_4 > HCIO_4 > HBrO_4 > HI(B) Strength of oxyacids : HCIO_4 > HBrO_4 > HCIO_3 >(C) Number of p\pi-p\pi bonds : HCIO_4 > HCIO_3 >(D) Percentage s-character of central atom : H$	CIO2 > HC O4 HCIO2 > CIO4 > HC	10 HCIO CIO3 > HCIO2 > H	łCIO.		
11.	Which of the following interhalogen compounds (A) CIF_3 (B) IF_5	s is/are po (C) FCl	ssible : 3	(D) BrF₅		
12.	Which of the following statement are true regard (A) Thermal stability order IF > BrF > CIF (B) Hydrolysis of IF ₇ produces H_5IO_6 and HF as (C) Interhalogen compounds are diamagnetic in (D) IF ₇ have pentagonal bipyramidal structure.	reding inte s products n nature.	erhalogens : 6.			
13.	Which of the following inert gas(es) form(s) cla (A) Helium (B) Xenon	thrate con (C) Kry	npoud(s) with qu pton	inol ? (D) Neon		
14.	Consider the following reactions $Xe + F_2 \xrightarrow{Ni} A$ 2 : 1 $Xe + F_2 \longrightarrow B$ 1 : 20 $Xe + F_2 \longrightarrow C$ 1 : 5 Select incorrect statements : (A) A, B and C all are non-polar and planner m (C) The order of Xe-F bond length is $A > C > B$	olecule	(B) B has no lor (D) A, B and C a	ne pair of electrons are act as lewis base.		
15.	Which of the following statements(s) is /are true (A) Its partial hydrolysis gives XeOF ₄ . (C) It is prepared by the reaction of XeF ₄ and C	e for XeFe	(B) Its reaction (D) Its reaction	with silica gives $XeOF_4$ with XeO_3 gives $XeOF_4$.		
Read th	FART - IV . CO	ne questi	ons.			
Compre	ehension # 1		-			
-	A red liquid (A) when treated with sodium ca solution in which (C) contains oxygen. The	rbonate g mixture	jives a mixture o then on acidific	of two salts (B) and (C) in the ation with sulphuric acid and		

- distillation produces the red liquid (A) again. Select the correct statement for the liquid (A).
- (A) It acts as an oxidising agent,
 - (B) It is sparingly soluble in water
 - (C) It converts the yellow-dye stuff fluorescein (I) into red colour compound
 - (D) All of these

1.

- 2. Which of the following statement is false for salt (B) ?
 - (A) Its solution in water gives pale yellow precipitate with silver nitrate solution
 - (B) Its solution in water gives white precipitate with lead nitrate solution
 - (C) Its acidified solution (with conc. H₂SO₄) liberates a coloured gas which produces orange red spots on starch paper
 - (D) None

p-Block Elements (Halogen & Noble Gases) **3.** Which of the fall is

3.	Which of the following statement is correct ? (A) Liquid (A) undergoes disproportionation reaction in aqueous solution of sodium carbonate (B) The anion of compound (C) has sp ³ hybridisation and is trigonal pyramidal in shape (C) (A) and (B) both (D) None of these							
Comp 4.	Pseudo halides are anions having resemblance with halide ions. Group I metals can form salts with pseudo halides. Pseudo halogens can acts as ligands and form coordinate complexes. Their hydrides are weakly acidic and can be prepared in analogous way as halogen hydrides are prepared. Azides, cyanides, selonocyanides are example of pseudo halides. Cyanide, CN ⁻ is a pseudo halide. When cyanogen is heated with alkali solution, the products are : (A) HCN, H ₂ O (B) NH ₃ , (NH ₄) ₂ CO ₃ (C) NaCN, NaOCN (D) HCOONa, NH ₃							
5.	When (A) HC (C) (C	NaCN rea CN and Na N)2 and Na	cts with 2SO4 a2SO4.H	H_2SO_4 , the products I_2O	s are : (E (I	3) HCN and NaHSO4 D) None of these		
6.	When (A) Na	sodium ps Cl	eudo h	alides are dissolved (B) NaBr	in wat ((er, it resembles with : C) NaF	(D) Nal	
7.	(CN)2 (A) Na	when reac CN	t with N	a metal, the product (B) Na_2C_2 and N_2	is : ((C) NaN₃ and C black	(D) Na(CN) ₂ -	
Comp	The ionisation energy of dioxygen (O ₂) is very close to that of Xenon. Also F and O have the highest electronegativity and consequently can oxidise Xe among rare gases. So Xe forms a large number of compounds with F and O. Xe and F ₂ are mixed and reacted at different temperatures to give XeF ₂ , XeF ₄ and XeF ₆ . Xe also forms an unstable gaseous XeO ₄ and solid XeO ₃ which is a very powerful explosive at higher temperatures. Some of the rare gases form clathrates or cage compounds by being entrapped in the cages of cystals laiitice of water, phenol of quinols. Helium can form intersitital compounds with transition metals. Bigger members of rare gases do not form such compounds because of their large size.							
8.	Xenon (i) oxy (ii) ioni (iii) ion (iv) lov (A) (i),	forms the gen and flu isation ene isation ene v dissociat (ii), (iii)	larges uorine h ergy of 2 ergy of ion ene	number of compound ave very high electro Ke is the largest amo Xe is low compared rgy of fluorine molec (B) (i), (iii), (iv)	ds onl onega ong rai to thos ule co ((y with oxygen and fluc tivity. e gases. se of other rare gases mpared to those of C C) (iii), (iv)	brine because : 5. I ₂ and Br ₂ (D) (i), (iv)	
9.	XeF₀ c (A) Xe	annot be r + 3F ₂ —	Drepare 175–532 K 50 atm	d by the method : \rightarrow XeF ₆	(E	3) XeF ₂ + 2F ₂	$\rightarrow XeF_6$	
	(C) Xe	F4 + F2 —	^{4/5 K} →	XeF ₆])	D) XeO ₃ + 6HF <u>475 k</u>	\rightarrow XeF ₆ + 3H ₂ O	
10.	 He and Ne do not form any clathrates because : (A) He and Ne are very large in size. (B) being neutral they cannot form any polar bonds with the host molecules. (C) being too small, they cannot be entrapped in the cages of water, phenol or quinol. (D) clathrated with He and Ne are highly explosive. 							
Comp	rehensi Answe the foll	on # 4 er Q.11, Q lowing tabl	.12 and le.	Q.13 by appropriat	ely ma	atching the informatio	n given in the three columns of	
	Obse State	of CI while	ree colu e colum	umns in which colun in-3 represents facts	nn-1 r	epresents Oxy acid, o	column-2 represents Oxidation	
	Co	lumn-1		Column-2		Co	lumn-3	
	(U)		(DXIC)	+ 1	(i)	Chlorine has highes	t electron affinity	
	(II)	HCIO ₃	(Q)	+ 3	(ii)	Fluorine never exhit	bit oxidation state > 0	
	(III)	HCIO ₄	(R)	+ 5	(iii)	HI is strong hydra a	cid	
	(IV)	HCIO	(S)	+7	(iv)	The decreasing orde	er of thermal stability is	

p-Block Elements	(Halogen	& Noble	Gases)
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11.	Which o (A) I–(s)	f the follow —(i)	ing se	et of combination is (B) (II)–R–(ii)	s correct? (C) (III)–Q–(iii) (D) (IV)–R–(iv)					
12.	Which o (A) (I)–C	f the follow Q—(iv)	wing set of combination is (B) (II)–R–(iii)			ect? (C) (III)–P–(ii)	(D) (IV)–P–(i)			
13.	Which o (A) (IV)-	f the follow -S–(i)	ing se	et of combination is (B) (III)–S–(iii)	corre (ct? (C) (II)–Q–(ii)	(D) (I)–Q–(iv)			
Compr	 Comprehension # 5 Answer Q.14, Q.15 and Q.16 by appropriately matching the information given in the three columns of the following table. Observe the three columns in which column-1 represents Compounds, column-2 represents Hybridiation while column 2 represents factor. 									
	Col (Com	umn-1 pounds)	()	Column-2 lybridisation)	Column-3		ımn-3			
	(I)	XeF ₄	(P)	sp ³ d ³	(i)	Neon is used in fluore	escent bulbs.			
	(II)	XeF ₂	(Q)	sp ³ d ²	(ii)	Helium do not form cl	atharate compounds			
	(III)	XeF ₆	(R)	sp³d	(iii)	XeOF ₄ has square pyramidal structure				
	(IV)	XeO ₃	(S)	sp ³	(iv)	Reacts with H ₂ produce	ces Xe & HF.			

14.	Which of the following s (A) (I)–(S)–(iv)	et of combination is corre (B) (II)–(R)–(iii)	ect? (C) (III)–(Q)–(ii)	(D) (IV)–(P)–(i)
15.	Which of the following s (A) (IV)– (S)–(i)	et of combination is inco (B) (III)–(P)–(ii)	rrect? (C) (II)–(R)–(iii)	(D) (I)–(S)–(iv)
16.	Which of the following s (A) (II)–(Q)–(ii)	et of combination is corre (B) (III)–(R)–(iii)	ect? (C) (IV)–(S)–(iv)	(D) (I)–(P)–(i)

Exercise-3

* Marked Questions may have more than one correct option.

PART - I : JEE (ADVANCED) / IIT-JEE PROBLEMS (PREVIOUS YEARS)

Section (A) : Group 17th

1. Give an example of oxidation of one halide by another halogen. Explain the feasibility of reaction.

[JEE 2000 (M), 2/100]

2. The set with correct order of acidity is : (A) $HCIO < HCIO_2 < HCIO_3 < HCIO_4$ (C) $HCIO < HCIO_4 < HCIO_3 < HCIO_2$ [JEE 2001 (S) , 3/35] (B) HCIO₄ < HCIO₃ < HCIO₂ < HCIO (D) HCIO₄ < HCIO₃ < HCIO₂ < HCIO

- (D) $HCIO_4 < HCIO_2 < HCIO_3 < HCIO$
- 3.The reaction, $3CIO^{-}(aq) \rightarrow CIO_{3^{-}}(aq) + 2CI^{-}(aq)$ is an example of :[JEE 2001 (S), 3/35](A) oxidation reaction(B) reduction reaction(C) disproportionation reaction(D) decomposition reaction
- 4. A gas 'X' is passed through water to form a saturated solution. The aqueous solution on treatment with silver nitrate gives a white precipitate. The saturated aqueous solution also dissolves magnesium ribbon with evolution of a colourless gas 'Y'. Identify 'X' and 'Y'. [JEE 2002 (S), 3/90] (A) $X = CO_2$, $Y = CI_2$ (B) $X = CI_2$, $Y = CO_2$ (C) $X = CI_2$, $Y = H_2$ (D) $X = H_2$, $Y = CI_2$

Section (B) : Group 18th

Paragraph for Question Nos. 5 to 7

The noble gases have closed-shell electronic configuration and are monoatomic gases under normal conditions. The low boiling points of the lighter noble gases are due to weak dispersion forces between the atoms and the absence of other interatomic interactions.

The direct reaction of xenon with fluorine leads to a series of compounds with oxidation numbers +2, +4 and +6. XeF_4 reacts violently with water to give XeO_3 . The compounds of xenon exhibit rich stereochemistry and their geometries can be deduced considering the total number of electron pairs in the valence shell.

Argon is used in arc welding because of its :
 (A) low reactivity with metal
 (C) flammability

[JEE 2007 (P-I), 4 /81]

(B) ability to lower the melting point of metal(D) high calorific value

- 6. The structure of XeO₃ is : (A) linear (B) planar
- (C) pyramidal

(C) unreactive

(D) T-shaped

(D) strongly basic

[JEE 2007 (P-I), 4/81]

[JEE 2007 (P-I), 4 /81]

- 7. XeF₄ and XeF₆ are expected to be : (A) oxidizing (B) reducing
- 8. All the compounds listed in Column I react with water. Match the result of the respective reactions with the appropriate options listed in Column II. [JEE 2010, (P-II) 8/79]

Column I	Column II
(A) (CH ₃) ₂ SiCl ₂	(p) Hydrogen halide formation
(B) XeF ₄	(q) Redox reaction
$(C) Cl_2$	(r) Reacts with glass
(D) VCl ₅	(s) Polymerization
	$(t) O_2$ formation

Paragraph for Questions 9 to 10

The reactions of Cl_2 gas with cold-dilute and hot-concentrated NaOH in water give sodium salts to two (different) oxoacids of chlorine, **P** and **Q**, respectively. The Cl_2 gas reacts with SO_2 gas, in presence of charcoal, to give a product **R**. **R** reacts with white phosphours to give a compound **S**. On hydrolysis, **S** gives an oxoacid of phosphours **T**.

- 9. **P** and **Q**, respectively, are the sodium salts of :
 - (A) hypochlorus and chloric acids
 - (B) hypochlorus and chlorus acids
 - (C) chloric and perchloric acids
 - (D) chloric and hypochlorus acids
- **10. R, S** and **T**, respectively, are : (A) SO₂Cl₂, PCl₅ and H₃PO₄ (C) SOCl₂, PCl₃ and H₃PO₂

[JEE(Advanced) 2013, 3/120]

[JEE(Advanced) 2013, 3/120]

(B) SO₂Cl₂, PCl₃ and H₃PO₃ (D) SOCl₂, PCl₅ and H₃PO₄

11. The unbalanced chemical reactions given in List I show missing reagent or condition (?) which are provided in List II. Match List I with List II and select the correct answer using the code given below the lists : [JEE(Advanced) 2013, 3/120]

		List-	I				List-	11	
P. Pl	bO2 + H	2 SO 4 —	$\xrightarrow{?}$ Pbs	SO4 +	D ₂ + other produc	t	1. N	C	
Q. N	$a_2S_2O_3$	+ H ₂ O –	$\xrightarrow{?}$ Na	aHSO4	+ other product		2 . I ₂		
R. N	2 H ₄ —?	$\rightarrow N_2 +$	other pr	oduct			3. V	/arm	
S. Xe	eF2?	→ Xe +	⊦ other p	roduct			4. CI	2	
Code	es:								
	Р	Q	R	S		Р	Q	R	S
(A)	4	2	3	1	(B)	3	2	1	4
(C)	1	4	2	3	(D)	3	4	2	1

1.

12. Under ambient conditions, the total number of gases released as products in the final step of the reaction scheme shown below is : Complete $XeF_6 \xrightarrow{\text{Complete}} P + \text{other product} \xrightarrow{\text{OH}^- / H_2O} Q$ q $slow disproportionation in OH^- / H_2O$ (A) 0 (B) 1 (C) 2 (D) 3

PART - II : JEE (MAIN) / AIEEE PROBLEMS (PREVIOUS YEARS)

JEE(MAIN) OFFLINE PROBLEMS

In case of nitrogen, NCI₃ is possible but no NCI₅ while in case of phosphorus, PCI₃ as well as PCI₅ are

possible. It is due to : [AIEEE-2002, 3/225] (1) availability of vacant d-orbital in P but not in N. (2) lower electronegativity of P then N. (3) lower tendency of H bond formation in P than N. (4) occurrence of P in solid while N in gaseous state at room temperature. 2. Concentrated hydrochloric acid when kept in open air sometimes produces a cloud of white fumes. This is due to : [AIEEE-2003, 3/225] (1) strong affinity of HCI gas for moisture in air results in forming of droplets of liquid solution which appears like a cloudy smoke. (2) strong affinity for water, conc. HCl pulls moisture of air towards self. The moisture forms droplets of water and hence the cloud. (3) conc. HCl emits strongly smelling HCl gas all the time. (4) oxygen in air reacts with emitted HCl gas to form a cloud of chlorine gas. The substance used in holmes singnals of the ship is a mixture of : [AIEEE-2003, 3/225] 3. (2) $Ca_3(PO_4)_2 + Pb_3O_4$ (3) $H_3PO_4 + CaCl_2$ (1) $CaC_2 + Ca_3P_2$ (4) $NH_3 + HOCI$ What would happen when a solution of potassium chromate is treated with an excess of dilute nitric 4. acid? [AIEEE-2003, 3/225] (1) Cr^{3+} and $Cr_2O_7^{2-}$ are formed (2) Cr₂O₇²⁻ and H₂O are formed (3) CrO_4^{2-} is reduced to + 3 state of Cr (4) CrO_4^{2-} is oxidized to + 7 state of Cr 5. Which one of the following statements regarding helium is incorrect ? [AIEEE-2004, 3/225] (1) It is used to produce and sustain powerful superconducting magnets (2) It is used as a cryogenic agent for carrying out experiments at low temperatures (3) It is used to fill gas balloons instead of hydrogen because it is lighter and non-inflammable (4) It is used in gas-cooled nuclear reactors 6. Which among the following factors is the most important in making fluorine the strongest oxidizing halogen? [AIEEE-2004, 3/225] (1) Hydration enthalpy (2) Ionization enthalpy (3) Electron affinity (4) Bond dissociation energy 7. The correct order of the thermal stability of hydrogen halides (H-X) is : [AIEEE-2005, 3/225] (1) HI > HBr > HCI > HF(2) HF > HCI > HBr > HI(3) HCI < HF < HBr < HI (4) HI > HCI < HF < HBr[AIEEE 2006, 3/165] 8. Which of the following statements is true? (1) H₃PO₃ is a stronger acid than H₂SO₃ (2) In aqueous medium HF is a stronger acid than HCI (3) HCIO₄ is a weaker acid than HCIO₃ (4) HNO₃ is a stronger acid than HNO₂ 9. What products are expected from the disproportionation reaction of hypochlorous acid? [AIEEE 2006, 3/165] (1) $HCIO_3$ and CI_2O (2) HClO₂ and HClO₄ (3) HCl and Cl₂O (4) HCI and HCIO3

<u>p-Bio</u> 10.	Identify the incorrect si (1) Cl ₂ reacts with exce (2) Br ₂ reacts with hot (3) Ozone reacts with (4) Silicon reacts with	tatement among the followers of NH ₃ to give N ₂ and and strong NaOH solution SO ₂ to given SO ₃ . NaOH _(aq) in the presence	wing. I HCI. n to give NaBr, NaBrO4 of air to give Na₂SiO₃ a	[AIEEE 2007, 3/120] and H ₂ O. nd H ₂ O.
11	Which one of the follow (1) $3XeF_4 + 6H_2O \rightarrow 2$ (2) $2XeF_2 + 2H_2O \rightarrow 2$ (3) $XeF_6 + RbF \rightarrow Rb[$ (4) $XeO_3 + 6HF \rightarrow XeF_3$	ving reactions of Xenon of Xe + XeO ₃ + 12HF + 1.5 Xe + 4HF + O ₂ XeF ₇] F_6 + 3H ₂ O	compounds is not feasib O ₂	le ? [AIEEE 2009, 4/144]
12.	Which among the follo (1) Cl ₂	wing is the most reactive (2) Br ₂	(3) I2	[JEE(Main) 2015, 4/120] (4) ICl
13.	The products obtained	when chlorine gas react	s with cold and dilute aq	ueous NaOH are : [JEE(Main) 2017, 4/1201
	(1) CIO_2^- and CIO_3^-	(2) Cl ⁻ and ClO ⁻	(3) Cl⁻and ClO ₂	(4) CIO ⁻ and CIO $_3^-$
		JEE(MAIN) ONL	INE PROBLEMS	
1.	Shapes of certain inter	halogen compounds are	stated below. Which on	e of them is not correctly stated?
	(1) IF7 : pentagonal bip (3) BrF3 : planar T-sha	oyramid ped	(2) BrF₅ : trigonal bipy (4) ICl₃ : planar dimerio	ramid c
2.	Which of the following	xenon-OXO compounds	may not be obtained by	hydrolysis of xenon fluorides ? 2014 Online (12-04-14) 4/1201
	(1) XeO ₂ F ₂	(2) XeOF ₄	(3) XeO ₃	(4) XeO ₄
3.	The least number of ox (1) Nitrogen	kyacids are formed by: (2) Fluorine	[JEE(Main) (3) Chlorine	2015 Online (10-04-15), 4/120] (4) Sulphur
4.	Chlorine water on stan (1) HCl only	ding loses its colour and (2) HCl and HClO ₂	forms: [JEE(Main) (3) HCl and HOCl	2015 Online (11-04-15), 4/120] (4) HOCl and HOCl ₂
5.	The non-metal that do	es not exhibit positive oxi	idation state is :	
	(1) Fluorine	(2) Oxygen	[JEE(Main) (3) Chlorine	2016 Online (09-04-16), 4/120] (4) lodine
6.	The following statement	nts concern elements in t	he periodic table. Which	of the following is true?
	 (1) The Group 13 elem (2) All the elements in (3) Elements of Group corresponding periods (4) For Group 15 elem 	ents are all metals. Group 17 are gases. 16 have lower ionization ents, the stability of +5 or	enthalpy values compa	red to those of Group 15 in the down the group.
7.	XeF ₆ on partial hydro when XeF ₆ reacts with (1) XeO ₃	lysis with water produce silica. The compound 'X' (2) XeF4	es a compound 'X'. The ' is : [JEE(Main) (3) XeF ₂	e same compound 'X' is formed 2017 Online (09-04-17), 4/120] (4) XeOF ₄
8.	Xenon hexafluoride or the oxidation state of X (1) XeOF ₄ (+6) and Xe (3) XeOF ₄ (+6) and Xe	n partial hydrolysis produ Ke are respectively : O ₃ (+6) O ₂ F ₂ (+6)	uces compounds 'X' and [JEE(Main) (2) XeO ₂ (+4) and XeO (4) XeO ₂ F ₂ (+6) and X	Y'. Compounds 'X' and 'Y' and 2018 Online (15-04-18), 4/120] O ₃ (+6) eO ₂ (+4)
9.	Among the following re	eactions of hydrogen with	halogens, the one that [JEE(Main)	requires a catalyst is: 2019 Online (10-01-19). 4/1201
	(1) H ₂ + F ₂ \rightarrow 2HF	(2) H ₂ + Cl ₂ \rightarrow 2HCl	$(3) H_2 + I_2 \rightarrow 2HI$	$(4) H_2 + Br_2 \rightarrow 2HBr$
10.	Chlorine on reaction w	ith hot and concentrated	sodium hydroxide gives	
	(1) CIO_3^- and CIO_2^-	(2) Cl ⁻ and ClO ⁻	[JEE(Main) (3) Cl⁻ and ClO ₃ ⁻	(4) Cl ⁻ and ClO ₂ ⁻

Answers

EXERCISE - 1

PART - I

A_I-1. A solution of potassium hydrogen fluoride (KHF₂) in anhydrous HF. KF + HF \longrightarrow K [HF₂] $\xrightarrow{\text{electrolysis}}$ H₂ + F₂

- **A**_I-2. It contains trace amounts of NaIO₃ and NaIO₄. An important property of chile salt petre is that it is soluble in water while its impurities are not.
- **A**_{II}-3. Neil Bartlett obtained an orange yellow solid from the reaction of xenon with PtF₆to have Xe⁺[PtF₆]⁻. He noticed earlier that O₂ with PtF₆ reacts to give O₂⁺[PtF₆]⁻ and since ionisation enthalpies of O₂ and Xe were close to each other (Xe = 1170, O₂ = 1175 kJ mol⁻¹), he could succeed to prepare Xe⁺[PtF₆]⁻ from Xe and PtF₆.
- **B**_I-1. The electrode potential of F_2 (+2.87 V) is much higher than that of Cl_2 (+1.36 V).

	F ₂	Cl ₂	Order
Bond dissociation enthalpy/kJmol-1	158.8	242.6	$F_2 < Cl_2$
Magnitude of E.A/kJmol ⁻¹	333	349	$F_2 < Cl_2$
Magnitude of ∆H°Hyd./kJmol ^{_1}	515	381	$F_2 > Cl_2$
Oxidizing power			$F_2 > Cl_2$

Therefore F₂ is much stronger oxidising agent than Cl₂.

- **B_i-2.** F : -1, 0 Cl : -1, 0, +3, +5, +7 Br : -1, 0, +3, +5, +7 I : -1, 0, +3, +5, +7
- **B**_I-3. Enthalpy of dissociation (x-x)/kJ mol⁻¹

CI-CI > Br-Br > F-F > I-I, Smaller enthalpy of dissociation of F_2 is due to relatively large electronselectrons repulsion among the lone pairs in F_2 molecule.





C_I-3. (i) Structure of ICl_4^-

No. of electrons in the valence shell of the central I atom = 7. No. of electrons provided by four Cl atoms = $4 \times 1 = 4$ Charge on the central atom = 1 \therefore Total no. of electrons around the central atom = 7 + 4 + 1 = 12 Total no. of electron pairs around the central atom = 12/2 = 6But the no. of bond pairs = 4 (\Box there are four I-Cl bonds)

 \therefore No. of lone pairs = 6 – 4 = 2

Thus, I in ICl_4^- has 4 bond pairs and 2 lone pairs. Therefore, according to VSEPR theory, it should be square planar.



Square planar

Now a noble gas compound having 12 electrons in the valence shell of the central atom is XeF_4 (8 + 1 × 4 = 12). Like ICl_4^- , it also has 4 bond pairs and 2 lone pairs. Therefore, like, XeF_4 is also square planar.

No. of electrons in the valence shell of the central I atom = 7 No. of electrons provided by two Br atoms = $2 \times 1 = 2$ Charge on the central I atom is = 1 \therefore Total no. of electrons around the central I atom = 7 + 2 + 1 = 1But the no. of bond pairs = $2 (\Box$ there are two I – Br bonds) \therefore No. of lone pairs = 5 - 2 = 3



Thus, I in IBr_2^- has two bond pairs and three lone pairs, Therefore, according to VSEPR theory, it should be linear.

Now a noble gas compound having 10 electrons in the valence shell of the central atom is XeF_2 (8 + 1 × 2 =10). Like IBr⁻, it also has 2 bond pairs and 3 lone pairs. (iii) **Structure of** BrO₂⁻.

In BrO_3^- , since O is more electronegative than Br, therefore, -ve charge stays on the O atom.



PYRAMIDAL

Therefore, in BrO_3^- , there are two Br = O bonds and one bond $Br - O^-$ bond.

Now according to VSEPR theory, double bonds do not contribute any electron while single bonds contribute one electron towards the total number of the central atom. However, both double and single bonds contribute one bond pair. Thus, total number of electrons is the valence shell of the central Br atom = $7 + 2 \times 0 + 1 \times 1 = 8$

 \therefore No. of electron pairs around Br atom = 8/2 = 4

But total number of bond pairs = 2×1 (Br = 0) + 1×1 (Br - O⁻) = 3 and lone pairs = 4 - 3 = 1.

Thus, BrO_3^- has 3 bond pairs and one lone pair. Therefore, according to VSEPR theory, it should be pyramidal.

Now a noble gas compound having 8 electrons in the valence shell of the central atom is XeO₃ (8 × 1 + 3 × 0 = 8). Like BrO_3^- , it also has 3 bond pairs and one lone pair. Therefore, like BrO_3^- , XeO₃ is also pyramidal.

p-Block Elements (Halogen & Noble Gases)

- CII-4. XeF₂ > XeF₄ 2.00 Å 1.94 Å (Order of Xe–F bond length) XeF₂ : sp³d, axial bonds are long & weak XeF₄ : sp³d² square planar : all bonds identical.
- D_{II}-1. (i) Van der Waal's forces of attraction among molecules increase with the increase of atomic masses. Thus, higher energy is required to separate these molecules as to get gaseous state. Hence, the boiling points increase with increase of atomic masses.
 (ii) The size of cavities formed during crystallisation of quinol is more than the size of helium and neon atoms.
- **D**_I-2. All the halogens are coloured. The colour is due to the allowed $\pi \rightarrow \sigma^*$ molecular orbital transitions. The colour of halogen is actually the colour of transmitted light.



- **D₁-5.** $X_2 + 2NaOH \xrightarrow{Hot} NaX + NaXO_3 + H_2O$
- **D**_I-6. I₂, I₂ + HNO₃ (conc.) \longrightarrow HIO₃ + NO₂ + H₂O
- $D_{\rm I}\mbox{-}7.$ (i) The standard reduction potential of fluorine is maximum.

 $: \ddot{F} + e^{-} \longrightarrow : \ddot{F} \cdot \vec{-}$

Thus, it cannot be oxidised by any other reagent. F- ion is very stable due to small size and high electronegativity of fluorine atom.

(ii) F-does not have empty d-orbital liked other halogen. The formation of X_{3^-} ions involves sp³d-hybridizaion.

- **E**_I-1. Ba $(CIO_3)_2 + H_2SO_4 \longrightarrow BaSO_4 \downarrow + 2HCIO_3$ KCIO₄ + H₂SO₄ \longrightarrow KHSO₄ + HCIO₄
- **E**_I-2. HOCl acts as an acid, HOCl \longrightarrow H⁺ + OCl⁻, and thus turns blue litmus to red. It also work as bleaching agent, HOCl \longrightarrow HCl + [O], and the red litmus is decolorized by nascent oxygen.
- **E**_I-3. Chlorine, bromine and iodine form four series of oxyacids of the general formula HOX, HOXO, HOXO₂ and HOXO₃ in which the oxidation states of halogen (X = Cl, Br or I) is + 1, + 3, and + 5 and + 7 respectively. However, due to high electronegativity, small size and absence of d-orbitals, F cannot act as central atom in higher oxacids such as HOFO. HOFO₂ and HOFO₃ In which the oxidation state of F would be + 3, + 5 and + 7. It just forms one oxoacid. i.e., HOF in which the oxidation state of F is –1 and oxygen is in +1.
- $\begin{array}{ll} \textbf{E_{I}-4.} & (i) \ 2NaClO_3 + SO_2 + H_2SO_4 \longrightarrow 2NaHSO_4 + 2ClO_2 \\ & (ii) \ 5I^- + IO_3^- + 6H^+ \longrightarrow 3I_2 + 3 \ H_2O \end{array}$
- E₁-5. CIO₂ (s) is a mixed anhydride of HCIO₂ and HCIO₃ because on dissolving in water it gives a mixture of these two acids.

 $2CIO_2 + 2NaOH \longrightarrow NaCIO_2 + NaCIO_3 + H_2O$

 $\label{eq:FI-1.} \begin{array}{ll} (i) \mbox{ HI > HBr > HCl > HF ;} & \mbox{Due to decrease in bond energy} \\ (ii) \mbox{ HI is the strongest reducing agent.} \end{array}$

p-Block Elements (Halogen & Noble Gases)

F _I -2.	Conc. HCl can $K_2Cr_2O_7$, etc. MnO_2 + Cl_2 can reduced H_2 + Cl	be oxidized to Cl_2 by he + 4 HCl \longrightarrow MnCl ₂ + Cl ₂ d to HCl by its reaction w 2 $\xrightarrow{\text{Diffused sunlight}}$ 2 HCl	ating with a number of oxidizing agents such as MnO_2 , $KMnO_4$, + 2 H ₂ O ith H ₂ in presence of diffused sunlight.
F1-3.	HI is a strong re 3NaI + conc. H	educing agent and, there $_{3}PO_{4} \xrightarrow{\Lambda} K_{3}PO_{4} + HI$	fore, reduces H_2SO_4 to SO_2 and itself get oxidised to I_2 .
F _I -4.	Aqua regia is th 2Au + 11HCl + 8HCl + 2HNO ₃	hree parts of concentrate $3HNO_3 \longrightarrow 2H[AuCl_4] +$ $+ Pt \longrightarrow H_2[PtCl_6] + 2NG_4$	d HCl and one part of concentrated HNO ₃ . - 3NOCl + 6H ₂ O OCl + 4H ₂ O
F1-5.	 (i) In anhydrou molecule to form (ii) HF attacks ((iii) The weake High bond di HF has conjutaccept back H* 	Is state, HCl is a coval m H ₃ O ⁺ and Cl ⁻ ions. HCl (g) + H ₂ O(□) \longrightarrow H glass bottles. The sodium Na ₂ SiO ₃ + 6HF \longrightarrow Na st acidic nature of HF is of issociation enthalpy of HI ugate base F ⁻ . Small size	lent molecule. In aqueous solution, HCI combines with water H_3O^+ (aq) + Cl ⁻ (aq) n and potassium silicates are converted into flurosilicates $a_2 SiF_6 + 3H_2O$ due to : F bond. e and concentrated charge make F ⁻ a Lewis base. Hence, it can
F ı-6 .	(i) HI (hydroger	n iodide) (ii) I ₂ +	$SO_2 + H_2O$
Fī-7.	(i) Pb ₃ O ₄ + 8HC (ii)	$CI \longrightarrow 3PbCl_2 + 4H_2O + 3 [SiO_2 + 4HF \longrightarrow SiF_4 3SiF_4 + 3H_2O \longrightarrow 2H_2SiF_4 + 3H_2O \longrightarrow 2H_2SiF_4 $	Cl ₂ 4 + 2H ₂ O] SiF ₆ + H ₂ SiO ₃
	Overall :	$3SiO_2 + 12HF \longrightarrow 2H$	2SiF ₆ + H ₂ SiO ₃ +3H ₂ O White waxy deposit
G _{II} -1.	$Xe(g) + F_2(g) -$ (Xenon in excess) $Xe(g) + 2F_2(g)$ (1 : 5 ratio) $Xe(g) + 3F_2(g) -$ (1 : 20 ratio)	$\xrightarrow{673 \text{ K, 1 bar}} \text{XeF}_2(\text{s})$ $\xrightarrow{873 \text{ K, 7 bar}} \text{XeF}_4(\text{s})$ $\xrightarrow{573 \text{ K, 60-70 bar}} \text{XeF}_6(\text{s})$)
G ⊪-2 .	Partial hydrolys XeF ₆ +	is of XeF ₆ gives XeOF ₄ . H ₂ O \longrightarrow XeOF ₄ + 2 HF	
G11-3.	Yes, hydrolysis 6XeF ₄ + 12 H ₂ 0	of XeF ₄ leads to a redox $D \longrightarrow 4 \text{ Xe} + 2\text{XeO}_3 + 2\text{ A}$	reaction(disproportination) 4 HF + 3O ₂
Gп-4.	XeF ₆ + 3 H ₂ O - XeF ₆ + H ₂ O XeF ₆ + 2H ₂ O		
Gп-5.	$\begin{array}{llllllllllllllllllllllllllllllllllll$	$\begin{array}{l} H_2 \rightarrow Xe + 2HF \\ + \operatorname{SiO}_2 \rightarrow 2XeOF_4 + \operatorname{SiF}_4 \\ + \operatorname{SiO}_2 \rightarrow 2XeO_2F_2 + S \\ F_2 + \operatorname{SiO}_2 \rightarrow 2XeO_3 \ (Expl) \\ \mathrm{SbF}_5 \rightarrow [XeF_5]^+ \ [SbF_6]^- \end{array}$; iF₄ losive) + SiF₄ [Addition ionic product is formed]
H _I -1.	(a) $Cl_2 + F_2 - Cl_2 + F_2$ (c) $Br_2 + 3F_2$	$\xrightarrow{473 \text{ K}} 2\text{CIF}$ $\longrightarrow 2\text{BrF}_3$	(b) $I_2 + \underset{(Excess)}{3Cl_2} \longrightarrow 2ICI_3$ (d) $Br_2 + \underset{(Excess)}{5F_2} \longrightarrow 2BrF_5$

p-Block Elements (Halogen & Noble Gases)

- ICI is more reactive than I₂ because I-CI bond is weaker than I-I bond. Consequently, ICI breaks easily H_I-2. to form halogen atoms which readily bring about the reactions.
- H_I-3. (a) Chlorine trifluoride (CIF₃); iodine trichloride (ICl₃ or I₂Cl₆) (b) $ICI + H_2O \longrightarrow HCI + HOI$
- (i) Chlorine bleaching action is due to oxidation while that of sulphur dioxide is due to reduction. Hence, H₁-4. the substance bleached by SO_2 is reoxidised by the oxygen of the air to its original state.
 - Cl₂ bleaches coloured material by oxidation and thus bleaching is permanent.

 $Cl_2 + H_2O \longrightarrow 2HCI + [O]$

Coloured material + $[O] \longrightarrow$ Colourless

On the other hand beaching by SO₂ is by reduction and thus temporary because colourless articles are further oxidised by air.

$$SO_2 + 2H_2O \longrightarrow 2H_2SO_4 + 2[H]$$

Coloured material + [H] \longrightarrow Colourless $\xrightarrow{[O]}$ coloured

(ii) I₂ is a covalent molecule. Thus, its solubility is less in polar solvent, i.e., water. Potassium iodide combines with iodine and forms a polyhalide which is an ionic compound. Being ionic, KI₃ is more soluble.

 $KI + I_2 \longrightarrow KI_3 (K^+ I_3^-)$ brown solution

 $2NaIO_3 + 5NaHSO_3 \longrightarrow 3 NaHSO_4 + 2Na_2SO_4 + H_2O + I_2$ H₁-5. (i)

 $Ca(OH)_2 + Cl_2 \longrightarrow Ca(OCI)CI + H_2O$ (ii)

PART - II

A ₁₁ -1.	(B)	A 11 -2.	(A)	A11-3.	(A)	A _I -4.	(D)	A 1-5.	(C)
B11-1.	(C)	B _I -2.	(B)	B ₁ -3.	(B)	Cı-1.	(C)	C11-2.	(D)
C11-3.	(D)	D _I -1.	(A)	D11-2.	(D)	D _I -3.	(C)	D ₁ -4.	(C)
Dı-5.	(B)	E _I -1.	(D)	E1-2.	(C)	E _I -3.	(B)	E _I -4.	(A)
E _I -5.	(B)	Eı-6.	(A)	Fı-1.	(D)	F _I -2 .	(B)	F1-3.	(B)
F _I -4.	(A)	F1-5	(B)	F 1-6.	(D)	F1-7.	(C)	F1-8.	(A)
Fī-9.	(C)	Fı-10.	(A)	Gɪɪ-1.	(B)	G11-2.	(B)	G11-3.	(A)
G11-4.	(A)	G11-5.	(D)	Hı-1.	(D)	Hı-2.	(B)	Hı-3.	(A)
Hī-4.	(C)								

PART - III

2.

1. (A - p,q); (B - p,r); (C - q,s); (D - p,q,r,s)

(C)

(A - q,s); (B - s); (C - p); (D - r)

3. (A - p,q,r,s); (B - p,q,r,s,t); (C - p,q,r,s); (D - q,s,t)

				EXER	CISE - 2	2			
				PA	RT - I				
1.	(D)	2.	(B)	3.	(A)	4.	(A)	5.	(C)
6.	(A)	7.	(A)	8.	(A)	9.	(D)	10.	(D)
11.	(C)	12.	(A)	13.	(D)	14.	(B)	15.	(C)
16.	(A)								
				РА	RT - II				
1.	32	2.	4	3.	43	4.	6	5.	2
6. 11.	5 4	7. 12.	3 7	8. 13.	13 8	9. 14.	2 20	10. 15.	3 4
				PA	RT - III				
1.	(BC)	2.	(ABCD)	3.	(BD)	4.	(AC)	5.	(ABD)

6.	(BC)	7.	(ACD)	8.	(ACD)	9.	(ABC)	10.	(ABC)
11.	(ABD)	12.	(ABCD)	13.	(BC)	14.	(AB)	15.	(ABCD)
				PA	RT - IV				
1.	(D)	2.	(D)	3.	(C)	4.	(C)	5.	(A)
6.	(C)	7.	(A)	8.	(B)	9.	(D)	10.	(C)
11.	(B)	12.	(C)	13.	(B)	14.	(B)	15.	(D)
16.	(C)								
				EXER	CISE – 3				
				PA	RT - I				
	Similarly,								
2.	Similarly, 2I ⁻ Cl ₂ 2I ⁻ (A)	$\begin{array}{c} (aq.) \longrightarrow \\ (g) + 2e^{-} \end{array}$	$\begin{array}{c} I_2(s) + 2e^- \\ \longrightarrow 2CI^-(aq) \\ \hline (g) \longrightarrow I_2(s) \\ \hline (C) \end{array}$	+ 2CI⁻ (aq 4 .). (C)	5.	(A)	6.	(C)
2. 7.	Similarly, 2I ⁻ Cl ₂ 2I ⁻ (A) (A)	$\begin{array}{c} (aq.) \longrightarrow \\ (g) + 2e^{-} \end{array}$	$I_{2} (s) + 2e^{-} \longrightarrow 2CI^{-} (aq)$ $(g) \longrightarrow I_{2} (s) (C)$ $(A - p, s) : (I)$	+ 2CI⁻ (aq 4. 3 - p. q. r.). (C) t); (C - p, g) ; ;	5. (D - p)	(A)	6. 9.	(C) (A)
2. 7. 10.	Similarly, 2I- Cl ₂ 2I- (A) (A) (A)	(aq.) → (g) + 2e ⁻ - (aq) + Cl ₂ 3. 8. 11.	$I_{2} (s) + 2e^{-}$ $\longrightarrow 2CI^{-} (aq)$ $(g) \longrightarrow I_{2} (s) + (C)$ $(A - p, s) ; (I)$ (D)	+ 2CI⁻ (aq 4. B - p, q, r, 12.). (C) t); (C - p, q) ; (C)	5. (D - p)	(A)	6. 9.	(C) (A)
2. 7. 10.	Similarly, 2I ⁻ Cl ₂ 2I ⁻ (A) (A) (A)	a (aq.) → a (g) + 2e ⁻ - (aq) + Cl ₂ 3. 8. 11.	$\begin{array}{c} I_2 (s) + 2e^- \\ \longrightarrow 2CI^- (aq) \end{array}$ $(g) \longrightarrow I_2 (s) + \\ (C) \\ (A - p, s) ; (I) \\ (D) \end{array}$	+ 2CI⁻ (aq 4. 3 - p, q, r, 12. PA I). (C) t); (C - p, q) ; (C) RT – II	5. (D - p)	(A)	6. 9.	(C) (A)
2. 7. 10.	Similarly, 2I ⁻ Cl ₂ 2I ⁻ (A) (A) (A)	(aq.) → (g) + 2e ⁻ - (aq) + Cl ₂ 3. 8. 11.	$I_{2} (s) + 2e^{-} \rightarrow 2CI^{-} (aq)$ $(g) \longrightarrow I_{2} (s) \rightarrow (C)$ $(A - p, s) ; (I)$ (D) $JEE(MA)$	+ 2CI⁻ (aq 4. 3 - p, q, r, 12. PAI). (C) t); (C - p, q) ; (C) RT – II FLINE PRO	5. (D - p) BLEMS	(A)	6. 9.	(C) (A)
2. 7. 10.	Similarly, 2I- Cl ₂ (A) (A) (A) (A) (A)	(aq.) → (g) + 2e ⁻ - (aq) + Cl ₂ 3. 8. 11. 2.	$I_{2} (s) + 2e^{-} \rightarrow 2CI^{-} (aq)$ $(g) \longrightarrow I_{2} (s) \rightarrow (C)$ $(A - p, s) ; (I)$ (D) $JEE(MA)$ (4)	+ 2CI⁻ (aq 4. 3 - p, q, r, 12. PAI <u>NIN) OFF</u> 3.). (C) t); (C - p, q) ; ((C) RT – II FLINE PRO (1)	5. (D - p) BLEMS 4.	(A) (2)	6. 9. 5.	(C) (A) (3)
2. 7. 10. 1.	Similarly, 2I- Cl ₂ (A) (A) (A) (A) (A) (1)	(aq.) → (g) + 2e ⁻ - (aq) + Cl ₂ 3. 8. 11. 2. 7.	$I_{2} (s) + 2e^{-} \rightarrow 2CI^{-} (aq)$ $(g) \longrightarrow I_{2} (s) \rightarrow (C)$ $(A - p, s) ; (I)$ (D) $JEE(MA$ (4) (2)	+ 2CI⁻ (aq 4. 3 - p, q, r, 12. PAI <u>\IN) OFF</u> 3. 8.). (C) t); (C - p, q) ; ((C) RT – II FLINE PRO (1) (4)	5. (D - p) BLEMS 4. 9.	(A) (2) (4)	6. 9. 5. 10.	(C) (A) (3) (2)
2. 7. 10. 1. 6.	Similarly, 2I- Cl ₂ (A) (A) (A) (A) (A) (1) (1) (1) (4)	(aq.) → (g) + 2e ⁻ - (aq) + Cl ₂ 3. 8. 11. 2. 7. 12.	$I_{2} (s) + 2e^{-} \rightarrow 2CI^{-} (aq)$ $(g) \longrightarrow I_{2} (s) \rightarrow (C)$ $(A - p, s) ; (I)$ (D) $JEE(MA$ (4) (2) (4)	+ 2CI⁻ (aq 4. B - p, q, r, 12. PAI <u>NIN) OFF</u> 3. 8. 13.). (C) t); (C - p, q) ; ((C) RT – II FLINE PRO (1) (4) (2)	5. (D - p) BLEMS 4. 9.	(A) (2) (4)	6. 9. 5. 10.	(C) (A) (3) (2)
2. 7. 10. 1. 6. 11	Similarly, 2I- Cl ₂ (A) (A) (A) (A) (1) (1) (1) (4)	(aq.) → (g) + 2e ⁻ - (aq) + Cl ₂ 3. 8. 11. 2. 7. 12.	$I_{2} (s) + 2e^{-}$ $\rightarrow 2CI^{-} (aq)$ $(g) \longrightarrow I_{2} (s) + 2e^{-}$ $(C) + 2e^{-}$	+ 2CI⁻ (aq 4. B - p, q, r, 12. PAI <u>AIN) OFF</u> 3. 8. 13.). (C) t); (C - p, q) ; ((C) RT – II FLINE PRO (1) (4) (2) LINE PRO	5. (D - p) BLEMS 4. 9. BLEMS	(A) (2) (4)	6. 9. 5. 10.	(C) (A) (3) (2)
2. 7. 10. 1. 6. 11	Similarly, 2I- Cl ₂ 2I- (A) (A) (A) (A) (1) (1) (1) (4) (2)	(aq.) → (g) + 2e ⁻ - (aq) + Cl ₂ 3. 8. 11. 2. 7. 12. 2.	$\begin{array}{c} I_{2}(s) + 2e^{-} \\ \rightarrow 2CI^{-}(aq) \\ \hline \\ (g) \longrightarrow I_{2}(s) + 2e^{-} \\ (C) \\ (C) \\ (A - p, s) + 1e^{-} \\ (D) \\ \hline \\ \hline \\ (D) \\ \hline \\ \hline \\ JEE(MA + 1e^{-} \\ (A) \\ (A) \\ \hline \\ \\ (A) \\ \hline \\ (B) \\ (A) \\ \hline \\$	+ 2CI⁻ (aq 4. B - p, q, r, 12. PAI <u>AIN) OFF</u> 3. 8. 13. AIN) ON 3.). (C) t); (C - p, q) ; ((C) RT – II FLINE PRO (1) (4) (2) LINE PROE (2)	5. (D - p) BLEMS 4. 9. BLEMS 4.	(A) (2) (4) (3)	6. 9. 5. 10.	(C) (A) (3) (2) (1)