Exercise-1

Marked Questions may have for Revision Questions.

OBJECTIVE QUESTIONS

Section (A) : Physical and Chemical properties of Group 17th elements

A-1. The halogens are :
(1) transition elements (2) inner-transition elements
(3) noble elements (4*) representative elements

A-2. All halogens are coloured. This is due to :
(1) Large negative value of electron gain enthalpy.
(2*) Absorption of radiations in visible region.
(3) Large electronegativity and higher ionization enthalpy.
(4) Absorption of radiations in ultra-violet region.

A-3. The order of negative electron gain enthalpy of halogens is :
(1) F > Cl > Br > I (2) Cl > Br > F > I (3*) Cl > F > Br > I (4) I > Br > Cl > F

A-4. The halogen-halogen bond length is longest for :
(1) fluorine (2) chlorine (3) bromine (4*) iodine

A-5. Which statement is correct about halogens ?
(1*) They are all diatomic and form univalent ions
(2) They are all capable of exhibiting several oxidation states
(3) They are all diatomic and form divalent ions
(4) They can mutually displace each other from the solution of their compounds with metals.

A-6. Oxidising action increases in the following order :
(1) Cl < Br < I < F (2) Cl < I < Br < F (3) I < F < Cl < Br (4*) I < Br < Cl < F

A-7. Which of the following hydrogen halides is most volatile ?
(1*) HCl (2) HF (3) HI (4) HBr

A-8. The strongest reducing agent is :
(1) F^- (2) Cl^- (3) Br^- (4*) I^-

A-9. The common positive oxidation states exhibited by the halogens are
(1) +2, +4, +6 (2*) –1, +1, +3, +5 (3) +1, +2, +3 (4) +1 to +7

A-10. Fluorine does not show positive oxidation states due to the absence of :
(1*) d-orbitals (2) s-orbitals (3) p-orbitals (4) none

A-11. Fluorine is a stronger oxidising agent than chlorine in aqueous solution. This is attributed to many factors except :
(1) heat of dissociation (2) electron affinity
(3*) ionization potential (4) heat of hydration

A-12. Which one of the following is most basic ?
(1*) F^- (2) Cl^- (3) Br^- (4) I^-

A-13. Which of the following has highest bond strength :
(1) HI (2) HCl (3*) HF (4) HBr

Section (B) : Halogens and their Compounds

B-1. Which of the following reactions does not give chlorine as one of the products ?
fuEu esa ls dkSulh vfHkfØ;k mRikn ds :i esa Dyksjhu ugha nsrh gS\
(1) $KMnO_4$ (s) + HCl (lkUnz) (2) HCl (g) + O_2 (g) + $CuCl_2$(s) 723 K ij
(3*) NaCl (s) + $K_2Cr_2O_7$ (s) + H_2SO_4 (lkUnz) (4) NaCl (s) + MnO_2(s) + H_2SO_4 (lkUnz)

Sol. (1) $2KMnO_4$ (s) + 16 HCl (aq) $\longrightarrow$ 2KCl + $2MnCl_2$ + $8H_2O$ + $5Cl_2$
(2) 4HCl (g) + O_2 (g) $\xrightarrow[723]{CuCl_2}$ $2Cl_2$ + $2H_2O$
(3) $4Cl^-$ (s) + $Cr_2O_7^{2-}$ + $6H^+$ $\longrightarrow$ $2CrO_2Cl_2$ + $3H_2O$
(4) NaCl (s) + MnO_2(s) + H_2SO_4 (Conc.) (lkUnz) $\longrightarrow$ $MnCl_2$ + $4NaHSO_4$ + $2H_2O$ + Cl_2

B-2. The correct chemical composition of bleaching powder is :
(1) $Ca(OCl)_2CaCl_2$ (2*) $Ca(OCl)_2.CaCl_2.Ca(OH)_2.2H_2O$
(3) $Ca(OCl)_2.2H_2O$ (4) None

B-3. HCl gas is dried by passing through :
(1) Na_2SO_3 (2*) Concentrated H_2SO_4
(3) Na_2CO_3 (4) Ammonia solution

B-4. Chlorine gas is dried over :
(1) CaO (2) NaOH (3*) H_2SO_4 (4) NH_3 (ℓ)

B-6. When cold NaOH reacts with Cl_2 which of the following is formed ?
(1*) NaClO (2) $NaClO_2$ (3) $NaClO_3$ (4) $NaClO_4$

B-7. ClO_2 is the anhydride of :
(1) HOCl (2) $HClO_2$ (3) $HClO_3$ (4*) $HClO_2$ vkSj $HClO_3$

B-8. The following acids have been arranged in the order of decreasing acid strength. Identify the correct order. ClOH(I) BrOH(II) IOH (III) :
(1*) I > II > III (2) II > I > III (3) III > II > I (4) I > III > II

B-9. Chlorine acts as a bleaching agent only in presence of :
(1) dry air (2*) moisture (3) sunlight (4) pure oxygen

B-10. Which can do glass etching ?
(1) HIO_4 (2*) HF (3) HNO_3 (4) SiF_4

B-11. ClO_3 is the mixed anhydride of :
(1) $HClO_2$ and $HClO_3$ (2*) $HClO_3$ and $HClO_4$ (3) $HClO_2$ and $HClO_4$ (4) $HClO_2$ and $HClO_3$

Section (C) : Physical and Chemical properties of Group 18th elements

C-1. The formation of O_2^+ $[PtF_6]^-$ is the basis for the formation of xenon fluorides. This is because :
(1) O_2 and Xe have comparable sizes.
(2) both O_2 and Xe are gases.
(3*) O_2 and Xe have comparable ionisation energies.
(4) O_2 and Xe have comparable electronegativities.

C-2. Of the following species, one which is non-existent :

(1) XeF_6 (2*) XeF_5 (3) XeF_4 (4) XeF_2

C-3. Among noble gases (from He to Xe) only xenon reacts with fluorine to form stable fluorides because xenon :
(1) has the largest size. (2*) has the lowest ionization enthalpy.
(3) has the highest heat of vaporization. (4) is the most readily available noble gas.

C-4. Which of the noble gas has highest polarizability ?
(1) He (2) Ar (3) Kr (4*) Xe

Section (D) : Noble gases and their Compounds

D-1. The element which has not yet been reacted with F_2 is :
(1*) Ar (2) Xe (3) Kr (4) Rn

D-2. XeF_4 on partial hydrolysis produces :
(1) XeF_2 (2*) $XeOF_2$ (3) $XeOF_4$ (4) XeO_3

D-3. XeF_6 on complete hydrolysis gives :
(1) Xe (2) XeO_2 (3*) XeO_3 (4) XeO_4

D-4. Helium is added to oxygen used by deep sea divers because :
(1*) It is less soluble in blood than nitrogen under high pressure
(2) It is lighter than nitrogen
(3) It is readily miscible with oxygen
(4) It is less poisonous than nitrogen

D-5. The coloured discharge tubes for a advertisement mainly contain :
(1) xenon (2) helium (3*) neon (4) argon

D-6. What are the products formed in the reaction of xenon hexafluoride with silicon dioxide ?
(1) $XeSiO_4 + HF$ (2) $XeF_2 + SiF_4$ (3*) $XeOF_4 + SiF_4$ (4) $XeO_3 + SiF_2$

Exercise-2

Marked Questions may have for Revision Questions.

OBJECTIVE QUESTIONS

Group 17th

1. Which of the following is weakest oxidising agent ?
(1) F_2 (2) Cl_2 (3) Br_2 (4*) I_2

2. Which of the following is not oxidised by MnO_2 ?
(1*) F^- (2) Cl^- (3) Br^- (4) I^-

3. In the preparation of HBr or HI , NaX (X = Br, I) is treated with H_3PO_4 and not by concentrated H_2SO_4 since,
(1) H_2SO_4 makes the reaction reversible
(2*) H_2SO_4 oxidises HX to X_2 (Br_2 , I_2)
(3) Na_2SO_4 is water soluble and Na_3PO_4 is water insoluble
(4) Na_3PO_4 is water insoluble and Na_2SO_4 is water soluble

4. The isoelectronic pair is :
(1) Cl_2O, ICl_2^- (2) ICl_2^-, ClO_2 (3) IF_2^+ , I_3^- (4*) ClO_2^- , ClF_2^+

5. Which of the following orders is not correct with respect to the property indicated against each ?
(1) F < Cl < Br < I –→ covalent radius
(2) F^- > Cl^- > Br > I^- –→ enthalpy of hydration
(3*) F_2 > Cl_2 > Br_2 > I_2 –→ bond dissociation enthalpy
(4) F_2 < Cl_2< Br_2 < I_2 –→ X–X bond length (pm)

6. Which of the following reactions is not correctly matched with the products actually obtained in the reaction?
(1) $Cl_2(g) + H_2O(\ell) \longrightarrow HCl(aq) + HOCl(aq)$
(2*) $2Br_2(g) + 2H_2O(\ell) \longrightarrow 4HBr(aq) + O_2(s)$
(3) $4I^-(aq) + 4H^+(aq) + O_2(g) \longrightarrow 2I_2(s) + 2H_2O(\ell)$
(4) $2F_2(g) + 2H_2O(\ell) \longrightarrow 4H^+(aq) + 4F^-(aq) + O_2(g)$

7. Which of the following is false about O_2F_2 ?
(1) It is a strong fluorinating agent (2) It oxidises plutonium to P_4F_6
(3) The oxidation state of oxygen is +2 in O_2F_2 (4*) None

8. Hydrolysis of XX'_5 yields : (X′ is smaller halogen and X is bigger halogen) :
(1) HX′ and HOX (2*) HX′ and HXO_3 (3) HX' and HXO_4 (4) HX and $HX'O_3$

9. Which of the following is not true ? **[AIPMT 2003]**
(1) Among halide ions, iodide ion is the most powerful reducing agent
(2) Fluorine is the only halogen which does not show a variable oxidation state
(3) HOCl is a stronger acid than HOBr
(4*) HF is a stronger acid than HCl

10. In BrF_3 molecule, the lone pairs occupy equatorial positions to minimise **[AIPMT 2004]**
(1) lone pair-bond pair repulsions only
(2) bond pair-bond pair repulsion only
(3*) lone pair-lone pair and lone pair-bond pair repulsons
(4) lone pair-lone pair repulsions only

11. Which one of the following arrangements represents the correct order of electron gain enthalpy (with negative sign) of the given atomic species ? **[AIPMT 2005]**
(1) F < Cl < O < S (2) S < O < Cl < F (3*) O < S < F < Cl (4) Cl < F < S < O

12. Which inert gas has abnormal behaviour on liquefaction ? **[AIPMT 2006]**
(1) Xe (2*) He (3) Ar (4) Kr

13. In which of the following molecules, are all the bonds not equal ? **[AIPMT 2006]**
(1) NF_3 (2*) ClF_3 (3) BF_3 (4) AlF_3

14. Which of the following orders is not in accordance with the property stated against it ? **[AIPMT 2006]**
(1*) F_2 > Cl_2 > Br_2 > I_2 ; bond dissociation energy (2) F_2 > Cl_2 > Br_2 > I_2; oxidising power
(3) HI > HBr > HCl > HF; acidic property in water (4) F_2 > Cl_2 > Br_2 > I_2; electronegativity

15. Which two of the following salts are used for preparing iodized salt ? **[AIIMS 2006]**
(i) KIO_3, (ii) KI, (iii) I_2, (iv) HI

(1*) (i) and (ii) (2) (i) and (iii) (3) (ii) and (iv) (4) (iii) and (iv)

16. The order of solubility of lithium halides in non-polar solvents follows the order : **[AIIMS 2013]**

(1*) LiI > LiBr > LiCl > LiF (2) LiF > LiI > LiBr > LiCl

(3) LiCl > LiF > LiI > LiBr (4) LiBr > LiCl > LiF > LiI

17. Iodine reacts with hypo to give :

(1) $Na_2S_2O_3$ (2) Na_2SO_3 (3*) $Na_2S_4O_6$ (4) Na_2SO_4

18. $Cl_2 + NH_3(excess) \longrightarrow A + B$

Select the incorrect option.

(1) One of the product is also obtained by decomposition of $(NH_4)_2Cr_2O_7$.

(2) Bond order in one of the product is 3

(3*) Both products contain chlorine.

(4) If Br_2 is used instead of Cl_2, one of product remain same

$Cl_2 + NH_3(vkf/kD;) \longrightarrow A + B$

19. Which of the following statement is incorrect.

(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 MnO_2 and H_2SO_4 , no gas is evloved but in case of HCl, HBr and HI acids evolved gases.

(d) HF is not oxidised by strong oxidising agent but other halogen acid are oxidised.

20. A pungent smelling gas X after being dried by concentrated H_2SO_4 was dissolved in water to give strongly acidic solution. The gas also gives dense white fumes with NH_3. X is also a constituent of aqua-regia. Which of the following is false for X ?

(1) X is HCl

(2*) X is Cl_2

(3) X is the most volatile among the hydrides of halogens

(4) Solution of X in water can liberate CO_2 from the solution of sodium hydrogencarbonates.

21. Among the following which reactions is impossible.

(1) $F_2 + H_2O \longrightarrow HF + O_2$ (2) $Cl_2 + H_2O \longrightarrow HCl + HClO$

(3) $Br_2 + H_2O \longrightarrow HBr + HBrO$ (4*) $I_2 + H_2O \longrightarrow HI + HIO$

22. Which of the following statements is false : **(Made by ABN Sir_2015, mod.) (PBC-H&N) (sec-D)**

(1) Strength of oxyacids : $HClO_4 > HClO_3 > HClO_2 > HClO$

(2) Strength of oxyacids : $HClO_4 > HBrO_4 > HIO_4$

(3) Number of $p\pi$-$p\pi$ bonds : $HClO_4 > HClO_3 > HClO_2 > HClO$

(4*) Percentage s-character of central atom : $HClO_4 > HClO_3 > HClO_2 > HClO$.

23. Which of the following interhalogen compounds is impossible :

(1) ClF_3 (2) IF_5 (3*) FCl_3 (4) BrF_5

24. **Asserion:** In general, interhalogen compounds are more reactive than halogens (exclude fluorine) because

Reason : X–X' (different halogen) in interhalogens is weaker than X–X bond in halogens.

(1*) Both assertion and reason are correct, and the reason is the correct explanation for the assertion

(2) Both assertion and reason are correct, but the reason is not the correct explanation for the assertion

(3) The assertion is incorrect, but the reason is correct
(4) Both are assertion and reason are incorrect

Group 18th

25. Consider following properties of the noble gases.
I : They readily form compounds which are colourless.
II : They generally do not form ionic compounds.
III : Xenon has variable oxidation states in its compounds.
IV : the smaller He and Ne do not form clathrate compounds.
Select correct properties.
(1) I, II , III (2*) II , III, IV (3) I, III, IV (4) All

26. Which one of the following configuration represents a noble gas ?
(1) $1s^2\ 2s^2\ p^6,\ 3s^2$ (2) $1s^2\ 2s^2\ p^6,\ 3s^1$ (3*) $1s^2\ 2s^2\ p^6$ (4) $1s^2\ 2s^2\ p^6,\ 3s^2\ p^6\ ,\ 4s^2$

27. In Kroll and I.M.I process of the production of titanium, the inert gas used is :
(1) Ne (2*) Ar (3) Kr (4) Xe

28. The product of the reaction between one mole of XeO_3 and two mole of XeF_6 is :
(1) XeO_2F_2 (2*) $XeOF_4$ (3) XeO_3F_2 (4) XeO_4

29. $[HXeO_4]^- + OH^- \longrightarrow [X] + [Y] + O_2 + H_2O$
The products [X] and [Y] in unbalanced reaction are :
(1*) $[XeO_6]^{4-}$ & Xe (2) $[XeO_6]^{4-}$ & XeO_3 (3) XeO_3 & Xe (4) H_2XeO_4 & Xe

30. Which of the following is planar ? **[AIPMT 2000]**
(1) XeO_4 (2) XeO_3F (3) XeO_2F_2 (4*) XeF_4

31. Among the following, the pair in which the two species are not isostructural is : **[AIPMT 2004, Kerala PET 2007]**
(1*) SiF_4 and SF_4 (2) IO_3^- and XeO_3 (3) BH_4^- and NH_4^+ (4) PF_6^- and SF_6

32. Noble gases are used in discharge tubes to give different colours. Reddish-orange glow is due to : **[AFMC 2006]**
(1) Ar (2*) Ne (3) Xe (4) Kr

33. Among the following molecules, **[AIIMS 2005]**
(i) XeO_3 (ii) $XeOF_4$ (iii) XeF_6
those having same number of lone pairs on Xe are
(1) (i) and (ii) only (2) (i) and (iii) only (3) (ii) and (iii) only (4*) (i), (ii) and (iii)

34. Which of the following inert gas does not form clathrate compoud with quinol ?
(1*) Helium (2) Xenon (3) Krypton (4*) Neon

35. Which of the following options is false for XeF_6 ?
(1*) Its partial hydrolysis gives XeO_3.
(2) Its reaction with silica gives $XeOF_4$

(3) It is prepared by the reaction of XeF_4 and O_2F_2.

(4) Its reaction with XeO_3 gives $XeOF_4$.

XeF_6 ds fy, dkSulk fodYi xyr gSa \

36. **Asserion :** Chlorine and sulphur dioxide both are bleaching agents.

Reason : The bleaching action of chlorine and sulphur dioxide is performed through the process of oxidation.

(1) Both assertion and reason are correct, and the reason is the correct explanation for the assertion

(2) Both assertion and reason are correct, but the reason is not the correct explanation for the assertion

(3*) The assertion is correct, but the reason is incorrect

(4) Both are assertion and reason are incorrect

37. **Asserion :** Hydrolysis of XeF_6 represents a redox reaction.

Reason : The products of hydrolysis are $XeOF_4$ and XeO_3 where the oxidation states of all the elements remain the same as it was in the reacting state.

(1) Both assertion and reason are correct, and the reason is the correct explanation for the assertion

(2) Both assertion and reason are correct, but the reason is not the correct explanation for the assertion

(3*) The assertion is incorrect, but the reason is correct

(4) Both are assertion and reason are incorrect

Exercise-3

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

OFFLINE JEE-MAIN

1. In case of nitrogen, NCl_3 is possible but no NCl_5 while in case of phosphorus, PCl_3 as well as PCl_5 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 HCl 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.

3. The substance used in holmes singnals of the ship is a mixture of : **[AIEEE-2003, 3/225]**

(1*) $CaC_2 + Ca_3P_2$ (2) $Ca_3(PO_4)_2 + Pb_3O_4$ (3) $H_3PO_4 + CaCl_2$ (4) $NH_3 + HOCl$

4. What would happen when a solution of potassium chromate is treated with an excess of dilute nitric acid ? **[AIEEE-2003, 3/225]**

(1) Cr^{3+} and $Cr_2O_7^{2-}$ are formed (2*) $Cr_2O_7^{2-}$ and H_2O 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 > HCl > HF (2*) HF > HCl > HBr > HI
(3) HCl < HF < HBr < HI (4) HI > HCl < HF < HBr

8. Which of the following statements is true? **[AIEEE 2006, 3/165]**
(1) H_3PO_3 is a stronger acid than H_2SO_3 (2) In aqueous medium HF is a stronger acid than HCl
(3) $HClO_4$ is a weaker acid than $HClO_3$ (4*) HNO_3 is a stronger acid than HNO_2

9. What products are expected from the disproportionation reaction of hypochlorous acid? **[AIEEE 2006, 3/165]**
(1) $HClO_3$ and Cl_2O (2) $HClO_2$ and $HClO_4$ (3) HCl and Cl_2O (4*) HCl and $HClO_3$

10. Identify the incorrect statement among the following. **[AIEEE 2007, 3/120]**
(1) Cl_2 reacts with excess of NH_3 to give N_2 and HCl.
(2*) Br_2 reacts with hot and strong NaOH solution to give NaBr, $NaBrO_4$ and H_2O.
(3) Ozone reacts with SO_2 to given SO_3.
(4) Silicon reacts with $NaOH_{(aq)}$ in the presence of air to give Na_2SiO_3 and H_2O.

11 Which one of the following reactions of Xenon compounds is not feasible ? **[AIEEE 2009, 4/144]**
(1) $3XeF_4 + 6H_2O \rightarrow 2Xe + XeO_3 + 12HF + 1.5O_2$
(2) $2XeF_2 + 2H_2O \rightarrow 2Xe + 4HF + O_2$
(3) $XeF_6 + RbF \rightarrow Rb[XeF_7]$
(4*) $XeO_3 + 6HF \rightarrow XeF_6 + 3H_2O$

12. Which among the following is the most reactive ? **[JEE-Main 2015, 4/120]**
(1) Cl_2 (2) Br_2 (3) I_2 (4*) ICl

13. The products obtained when chlorine gas reacts with cold and dilute aqueous NaOH are : **[JEE-Main 2017, 4/120]**
(1) ClO_2^- and ClO_3^- (2*) Cl^- and ClO^- (3) Cl^- and ClO_2^- (4) ClO^- and ClO_3^-

ONLINE JEE-MAIN

1. Shapes of certain interhalogen compounds are stated below. Which one of them is not correctly stated ? **[JEE(Main) 2014 Online (11-04-14), 4/120]**
(1) IF_7 : pentagonal bipyramid (2*) BrF_5 : trigonal bipyramid
(3) BrF_3 : planar T-shaped (4) ICl_3 : planar dimeric

2. Which of the following xenon-OXO compounds may not be obtained by hydrolysis of xenon fluorides ? **[JEE(Main) 2014 Online (12-04-14), 4/120]**
(1) XeO_2F_2 (2) $XeOF_4$ (3) XeO_3 (4*) XeO_4

3. The least number of oxyacids are formed by: **[JEE(Main) 2015 Online (10-04-15), 4/120]**
(1) Nitrogen (2*) Fluorine (3) Chlorine (4) Sulphur

4. Chlorine water on standing loses its colour and forms :**[JEE(Main) 2015 Online (11-04-15), 4/120]**
[17 group]
(1) HCl only (2) HCl and $HClO_2$ (3*) HCl and HOCl (4) HOCl and $HOCl_2$

5. XeF_6 on partial hydrolysis with water produces a compound 'X'. The same compound 'X' is formed when XeF_6 reacts with silica. The compound 'X' is : **[JEE(Main) 2017 Online (09-04-17), 4/120]**

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

1. The set with correct order of acidity is : **[JEE 2001 (S) , 3/35]**
(A*) HClO < $HClO_2$ < $HClO_3$ < $HClO_4$ (B) $HClO_4$ < $HClO_3$ < $HClO_2$ < HClO
(C) HClO < $HClO_4$ < $HClO_3$ < $HClO_2$ (D) $HClO_4$ < $HClO_2$ < $HClO_3$ < HClO

2. The reaction, $3ClO^-$ (aq) → ClO_3^- (aq) + $2Cl^-$ (aq) is an example of : **[JEE 2001 (S) , 3/35]**
(A) oxidation reaction (B) reduction reaction
(C*) disproportionation reaction (D) decomposition reaction

3. 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 = Cl_2 (B) X = Cl_2, Y = CO_2 (C*) X = Cl_2 , Y = H_2 (D) X = H_2 , Y = Cl_2

Section (D) : Group 18th

Paragraph for Question Nos. 4 to 6

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.

4. Argon is used in arc welding because of its : **[JEE 2007, 4 /162]**
(A*) low reactivity with metal (B) ability to lower the melting point of metal
(C) flammability (D) high calorific value

5. The structure of XeO_3 is : **[JEE 2007, 4 /162]**
(A) linear (B) planar (C*) pyramidal (D) T-shaped

6. XeF_4 and XeF_6 are expected to be : **[JEE 2007, 4 /162]**
(A*) oxidizing (B) reducing (C) unreactive (D) strongly basic

Paragraph for Question Nos. 7 to 8

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**.

7. **P** and **Q**, respectively, are the sodium salts of : **[JEE(Advanced) 2013, 3/120]**

(A*) hypochlorus and chloric acids (B) hypochlorus and chlorus acids

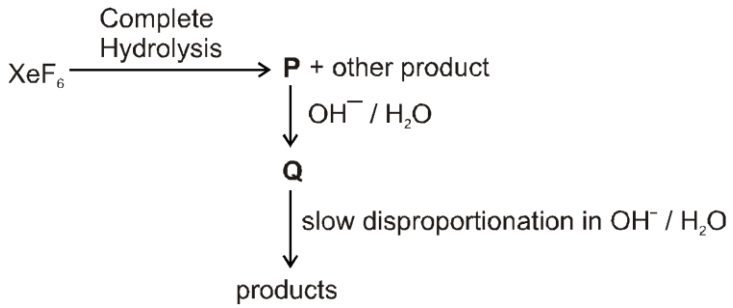
(C) chloric and perchloric acids (D) chloric and hypochlorus acids

8. **R, S** and **T**, respectively, are : **[JEE(Advanced) 2013, 3/120]**

(A*) SO_2Cl_2, PCl_5 and H_3PO_4 (B) SO_2Cl_2, PCl_3 and H_3PO_3

(C) $SOCl_2$, PCl_3 and H_3PO_2 (D) $SOCl_2$, PCl_5 and H_3PO_4

9. Under ambient conditions, the total number of gases released as products in the final step of the reaction scheme shown below is : **[JEE(Advanced) 2014, 3/120]**



(A) 0 (B) 1 (C*) 2 (D) 3

Additional Problems For Self Practice (APSP)

PART - I : PRACTICE TEST PAPER

Max. Marks : 120 **Max. Time : 1 Hr.**

Important Instructions

1. The test is of **1 hour** duration.

2. The Test Booklet consists of **30** questions. The maximum marks are **120.**

3. Each question is allotted **4 (four)** marks for correct response.

4. Candidates will be awarded marks as stated above in Instructions No. 3 for correct response of each question.
¼ (one fourth) marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.

5. There is only one correct response for each question. Filling up more than one response in any question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instructions 4 above.

---

1. The manufacture of fluorine is done by :
(1) heating anhydrous HF and MnO_2.
(2) electrolysis of aqueous HF.
(3*) electrolysis of anhydrous HF mixed with KHF_2.
(4) heating a mixture of KF, MnO_2 and conc. H_2SO_4.

2. The catalyst used in Decons process is :
(1*) $CuCl_2$ (2) Cu (3) $CuSO_4$ (4) CuS

3. Which electrolyte is used in Dennis method for the preparation of fluorine ?
(1*) KHF_2 in anhydrous HF (2) molten cryolite
(3) pure dry molten KHF_2 (4) none of these

4. Chlorine is liberated when we heat :
(1) $KMnO_4$ + NaCl (2) $K_2Cr_2O_7$ + MnO_2 (3) $Pb(NO_3)_2$ + MnO_2 (4*) $K_2Cr_2O_7$ + HCl

5. An easy way of obtaining Cl_2 gas in the laboratory is :
(1) by heating NaCl and concentrated H_2SO_4. (2) by heating NaCl and concentrated MnO_2.
(3*) by mixing HCl and $KMnO_4$. (4) by passing F_2 through NaCl solution.

6. When chlorine reacts with turpentine oil, the product formed is :
(1) carbon (2*) carbon and HCl (3) turpentine chloride (4) none of these

7. Which of the following does not decolourise iodine ?
(1) Na_2SO_3 (2) $Na_2S_2O_3$ (3*) NaCl (4) NaOH

8. In the reaction, $3Br_2 + 6CO_3^{2-} + 3H_2O \longrightarrow 5Br^- + BrO_3^- + 6HCO_3^-$:
(1) bromine is oxidised and carbonate is reduced (2*) bromine is both oxidised and reduced
(3) bromine is reduced and water is oxidised (4) bromine is neither oxidised nor reduced

9. A greenish yellow gas reacts with an alkali metal hydroxide to form a halate which can be used in fire works and safety matches. The gas and halate respectively are :
(1) Br_2 , $KBrO_3$ (2*) Cl_2 , $KClO_3$ (3) I_2 , $NaIO_3$ (4) none

10. Two gases X & Y bring about bleaching of flowers, X bleaches by reducing the colouring matter. White Y bleaches due to oxidation of dye. X and Y are respectively

(Made by YSJ Sir_2015) (PBC-H&N) (sec-B)

(1*) SO_2, Cl_2 (2) Cl_2, SO_2 (3) SO_2, O_2 (4) None of these

11. Which of the following gases can be dried by concentrated H_2SO_4 ?

(1*) HCl (2) HBr (3) HI (4) H_2S

12. H_2SO_4 cannot be used for obtaining HBr from KBr because :

(1) HBr oxidises H_2SO_4. (2*) HBr reduces H_2SO_4.

(3) HBr undergoes disproportionation. (4) KBr reacts very slowly.

13. Which of the following is weakest acid ? **(VIJ) (PBC-H&N) (sec-B) (M) (SCQ)**

(1*) HF (2) HCl (3) HBr (4) HI

14. Among the following which reaction is not correct : **(VIJ) (PBC-H&N) (sec-B) (M) (SCQ)**

(1) $NaAlO_2 + HCl + H_2O \longrightarrow NaCl + Al(OH)_3$

(2) $Ca_3N_2 + HCl \longrightarrow CaCl_2 + NH_3$

(3*) $Au + H+ NO_3^- + Cl^- \longrightarrow AuCl_3^- + NO + H_2O$

(4) $Pt + H^+ + NO_3^- + Cl^- \longrightarrow PtCl_6^{2-} + NO + H_2O$

15. Order of boiling point is **(ABN) (PBC-H&N) (sec-B) (M) (SCQ)**

(1*) HF > HI > HBr > HCl (2) HF > HBr > HI > HCl

(3) HCl > HBr > HI > HF (4) HCl > HI > HBr > HF

16. Euchlorine is : **(ANB) (PBC-H&N) (Sec-D) (M) (SCQ)**

(1) obtained by heating perchlorate with conc. HCl.

(2) a chloride of evropium

(3) a mixture of Cl_2 and Cl_2O_7

(4*) a mixture of Cl_2 and Cl_2O_2

17. Consider the oxy acids $HClO_4$ series here value of n is 1 to 4, then incorrect statement regarding these oxyacids is : **(ANB) (PBC-H&N) (Sec-D) (M) (SCQ)**

(1) Acidic chaloride of oxy acids increases with increasis n.

(2) Oxidising power of oxy acids increases with decreasis n.

(3*) Thermal stability acids decreases with increasis n.

(4) Cl–O bond order decreases with decreasis n.

18. How many of the following are correctly match : **(US) (PBC-H&N) (Sec-P) (M) (SCQ)**

(1) Cl_2O - (a) yellow-brown gas (b.p. 10ºC).

(2) ClO_2 - (b) React with O_3 gives Cl_2O_6 (dark red) it is a mixed anhydride of $HClO_3$ and $HClO_4$.

(3) Cl_2O_7 - (c) It is anhydride of $HClO_4$ (only).

(4) Cl_2O_7 - (d) Oily explasive colourless liquid.

(5) Cl_2O_7 - (e) has 2 type of O–Cl bond length.

(6) I_2O_5 - (f) Obtained by reaction between I_2 and CO.

(1*) (1) - (a); (2) - (b); (3) - (c); (4) - (d) (2) (3) - (b); (4) - (e); (5) - (d); (6) - (f)

(3) (1) - (b); (2) - (a); (3) - (c); (4) - (d) (4) (2) - (c); (3) - (b); (4) - (d); (5) - (e)

19. The strongest acid amongst the following is :

(1*) $HClO_4$ (2) $HClO_3$ (3) $HClO_2$ (4) HClO

20. Which of the following is not the characteristic of interhalogen compounds ?
(1) They are more reactive than halogens.
(2) They are quite unstable but none of them is explosive.
(3) They are covalent in nature.
(4*) They have low boiling points and are highly volatile.

21. Which of the following statement is correct. **(HAR) (PBC-H&N) (sec-E) (M) (SCQ)**
(1) All interhalogen compounds are gaseous at room temperature.
(2) Interhalogen are either gaseous or liquid at room temperature.
(3*) Interhalogens can solid or liquid or gaseous at room temperature.
(4) Interhalogen compounds are liquid at temperature.

22. In which following statement are incorrect **(Made by SJ Sir_2015) (PBC-H&N) (sec-F)**
(1) Pseudohalogen ions are not spherical
(2) Pseudohalides are generally less electronegative than the lighter halide (F^-, Cl^-)
(3*) OCN^-, NNN^- pseudohalide are bidentate ligands
(4) Pseudohalogens form dimers and form molecular compound with non metal and Ionic compounds with alkali metal.

23. Ionisation energy values are given for Xenon (Xe) and Radius (Rn)

Element	IE(KJ/mol)
Xe	1169
Rn	1036

Predict a suitable reason for the fact that the chemistry of Rn has not been studied significantly while that of Xe has been extensively studied.
(1) Rn appears to be more reactive (2) Xe is less reactive than Rn
(3*) Rn isotopes have shorter lifetimes (4) Rn is heavior than Xe.

24. In the clathrates of xenon with water, the nature of bonding between xenon and water molecule is :
(1) covalent (2) hydrogen bonding
(3) co-ordinate (4*) dipole-induced dipole interaction

25. Among noble gases (from He to Xe) only xenon reacts with fluorine to form stable fluorides because xenon :
(1) has the largest size. (2*) has the lowest ionization enthalpy.
(3) has the highest heat of vaporization. (4) is the most readily available noble gas.

26. What are the products formed in the reaction of xenon hexafluoride with silicon dioxide ?
(1) $XeSiO_4 + HF$ (2) $XeF_2 + SiF_4$ (3*) $XeOF_4 + SiF_4$ (4) $XeO_3 + SiF_2$

27. Which of the following are partial hydrolysis gives $XeOF_2$. **(SRN) (PBC-H&N) (Sec-H) (M) (SCQ)**
(1) XeF_2 (2*) XeF_4 (3) XeF_6 (4) $XeOF_4$

28. The ratio of total number of lonepairs in XeF_2 and XeF_4 are : **(SRN) (PBC-H&N) (Sec-H) (M) (SCQ)**
(1) 3 : 2 (2*) 9 : 14 (3) 14 : 19 (4) 9 : 19

29. Xenon reacts with PtF_6 to form **(Made by YSJ Sir_2015) (PBC-H&N) (sec-H)**
(1) XeF_2 (2*) $Xe^+ [PtF_6]^-$
(3) $Xe^-[Pt\ F_6]^+$ (4) XeF_4

30. Which among the following statement is incorrect. **(SJ) (PBC-H&N) (sec-H) (M) (MCQ)**
(1) XeF_4 and SbF_5 combine to form salt
(2) XeF_6 on complete hydrolysis gives XeO_3
(3*) XeF_6 react with H_2 Produce XeF_2 and HF
(4) Xenon hexaflouride react with silica to from a Xenon compound and this Xemon compound have

Practice Test Paper (JEE-Main Pattern)

OBJECTIVE RESPONSE SHEET (ORS)

Que.	1	2	3	4	5	6	7	8	9	10
Ans.										
Que.	11	12	13	14	15	16	17	18	19	20
Ans.										
Que.	21	22	23	24	25	26	27	28	29	30
Ans.										

PART - II : PRACTICE QUESTIONS

1. Acid used for making permanent markings on the glass surface is: **(NSEC 2001)**
(1) HNO_3 (2*) HF (3) HIO_3 (4) H_2SO_4

2. One gas bleaches the colour of flowers by reduction while the other by oxidation. The gases are **(NSEC 2002)**
(1*) SO_2, Cl_2 (2) CO, Cl_2 (3) H_2S, Br_2 (4) NH_3, SO_3

3. Which pseudo-halogen does not have dimeric nature **(NSEC 2002)**
(1) cyanogen (2*) azide (3) thiogene (4) selenothigen.

4. Which gas is mixed with oxygen by sea-divers at the high underwater pressure ? **(NSEC 2002)**
(1) Nitrogen (2) Neon (3*) Helium (4) Argon.

5. Of the interhalogen compounds, ClF_3 is more reactive than BrF_3 has higher conductance in the liquid state. The reason is that **(NSEC 2011-12)**
(1) BrF_3 has higher molecular weight (2) ClF_3 is volatile
(3*) BrF_3 dissociates into BrF^{2-} more easily (4) ClF_3 is most reactive

6. Which of the following is a ''super acid'' **(NSEC 2008-09)**
(1*) (HF + SbF_5) in SO_2 (2) (H_2SO_4+ SO_3) in SO_2
(3) (HNO_3 + BF_3) in SO_2 (4) (H_3PO_4 + PF_5) in SO_2

7. The interhalogen compound that cannot exist is **(NSEC 2003)**
(1) IBr_5 (2) ICl_7 (3*) IF_4 (4) BrF_5

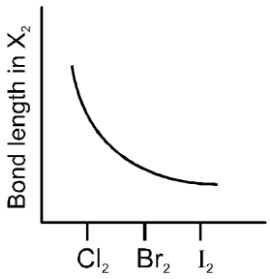
8. The compound that cannot be formed by xenon is **(NSEC 2003)**
og ;kSfxd tks ftukWu }kjk ugha cuk;k tkrk gS
(1) XeO_3 (2) XeF_4 (3*) $XeCl_4$ (4) $XeOF_4$

9. Hydrogen fluoride is a liquid at room temperature due to **(NSEC 2005-06)**
(1) dimerisation (2) dissociation followed by aggregation.
(3*) association (4) polymerisation

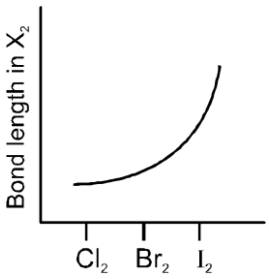
10. Concentrated sulphuric acid on reaction with NaCl, NaBr and NaI produces HCl, bromine and iodine respectively. What order of oxidizing ability of halogens with reference to sulphuric acid can be established on the basis of this reaction ? **(NSEC 2007-08)**

11._ Which graph correctly describes a trend found in the halogen group?

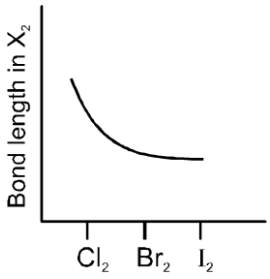
(1)



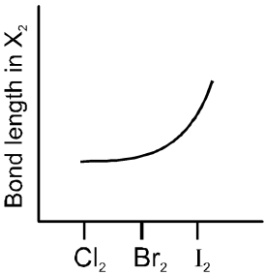
(2*)



(3)



(4)



12._ Which behave like pseudohalide in following **(Made by SJ Sir_2015) (PBC-H&N) (sec-F)**

(1) $(CN)_2$ (2) $(SCN)_2$ (3*) N_3^- (4) I_3^-

13._ Which of the following on treatment with XeF_6 gives Xe?

(1) H_2 (2) HCl (3) OH^- (conc) (4*) All of these

14. Radioactive inert gas is : **(NSEC 2011-12)**

(1) technetium (2*) radon (3) xenon (4) curium

15. The gas which liberates bromine from a solution of KBr is **(NSEC 2013-14)**

(1*) Cl_2 (2) I_2 (3) SO_2 (4) HI