



## CHEMISTRY

### BOOKS - CENGAGE CHEMISTRY (HINGLISH)

#### P-BLOCK GROUP 17 ELEMENTS - THE HALOGEN FAMILY

##### Illustration

1. (a) Halogens have maximum negative gain enthalpy in the respective periods of the periodic table. Why?

(b) Although electron gain enthalpy of fluorine is less negative as compared to chlorine, fluorine is a stronger oxidising agent than chlorine . Why?

Fluorine exhibits only -1 oxidation state, whereas other halogens exhibit +1, + 3, + 5, and + 7 oxidation states also. explain.



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2. (a) Write the balanced chemical equation for the reaction of  $Cl_2$  with hot and concentrated  $NaOH$ . Is this reaction a disproportionation reaction?

(b) When  $HCl$  reacts with finely powdered iron, it forms ferrous chloride and not ferric chloride. Why?

Deduce the molecular shape of  $BrF_3$  on the basis of  $VSEPR$  theory.

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3. Explain the following:

(a) In the preparation of  $HI$  from  $KI$ , phosphoric acid is preferred to sulphuric acid.

(b) Boiling point of  $HCl$  is lower than  $HF$ .

(c) Bleaching powder loses its bleaching property when kept in an open bottle for a long time.

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4. Explain the following:

(a) More metal fluorides are ionic in nature than metal chlorides.

(b) Perchloric acid is a stronger acid than sulphuric acid.

(c) Fluorine does not undergo disproportionation reactions but other halogens do.

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5. Fluorine does not form oxyacid, but other halogens do. Why?

(b) Both  $NO$  and  $ClO_2$  are odd electron species.  $NO$  dimerises but  $ClO_2$  does not. Why?

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6. (a) Fluorine cannot be prepared from fluorides by chemical oxidation. Why?

(b) Anhydrous  $HCl$  is bad conductor of electricity while aqueous  $HCl$

is a good conductor. Give reason.

(c) Fresh iodine stain can be removed by washing with hypo solution.

Explain.

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7. Explain the following:

(a) Dry chlorine does not bleach clothes.

(b) Fluorine does not form  $F_3^\ominus$  (polyhalide) ion.

(c)  $HF$  is least volatile and  $HCl$  is most volatile amongst hydrogen halides.

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8. Pure  $HI$  kept in a bottle acquires a brown colour after sometime.

Why?

(b) Ferric iodide is very unstable but ferric chloride is stable. Why?

(c)  $KHF_2$  is well known but  $KHCl_2$  and  $KHBr_2$  do not exist. Why?

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9. Iodine dissolves more in  $KI$  solution than in water. Why?

(b) Colour of  $KI$  solution containing starch turns deep blue when chlorine water is added. Explain.

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10. Mention the conditions in which the following statement are correct.

(a) Chlorine is a good bleaching agent

(b) A mixture of  $H_2$  and  $Cl_2$  explodes.

(c)  $Cl_2$  reacts with  $NaOH$  solution to produce sodium chloride and sodium hypochlorite (along with water).

(d)  $Cl_2$  reacts with  $NaOH$  solution to produce sodium chloride and sodium chlorate (along with water).

(e)  $Cl_2$  substitutes hydrogen atoms of a molecule of methane.

(f)  $Cl_2$  reacts with ammonia to form nitrogen and ammonium chloride.

(g)  $Cl_2$  reacts with lime to form bleaching powder.

(h) Iodine dissolves freely in water.

(i) Chlorine forms an addition product with  $SO_2$ .



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### Solved Example

1. What happens when  $Cl_2$  reacts with cold dilute solution of sodium hydroxide?

(b) Why does chlorine water lose its yellow colour on standing?



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2. (a) When a moist blue litmus paper is dipped in a solution of hypochlorous acid, it first turns red and then latter gets decolourised.

Explain.

(b) Iodine is liberated when  $KI$  is added to a solution of  $Cu^{2+}$  ions but

$Cl_2$  is not liberated when  $KCl$  is added to a solution of  $Cu^{2+}$  ions.

why?

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3.  $Na_2S_2O_3$  reacts with  $Cl_2$  and  $I_2$  to give different oxidation products.

Give the equations involved and a plausible explanation of their contrasting behaviour.

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4. A liquid 'A' is treated with  $Na_2CO_3$  solution. A mixture of two salts 'B' and 'C' is produced in the solution. The mixture on acidification with sulphuric acid and distillation produces in the solution. The mixture on acidification with sulphuric acid and distillation produces the liquid 'A' again. Identify 'A', 'B' and 'C' and write the equations involved.

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5. An inorganic compound ( $X$ ) gives a brick red flame on performing flame test. This compound gives the following tests also.

(a) Smells of chlorine when placed in moist air.

(b) If  $KI$  and  $CH_3COOH$  are added to the suspension in water, a brown colour is obtained.

Identify ( $X$ ) and down equations for reactions at steps (a) and (b) .

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6. Gradual addition of  $KI$  solution to  $Bi(NO_3)_3$  solution initially produces a dark brown precipitate which dissolves in excess of  $KI$  to give a clear yellow solution. Write chemical equation for the above reactions.

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7. Give reason: The brown colour of an acidified dilute solution of iodine in aqueous potassium iodide is intensified by addition of sulphite.

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### Exs 4 1 Subjective

1. Bond dissociation energy of  $F_2$  is less that of  $Cl_2$  give reason.

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2. Why fluorine does not exhibit any positive oxidation state?

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3. Bleaching of flowers by chlorine is permanet, while that by sulphur dioxide is tempory. Explain.



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4. Arrange  $\text{HOCl}$ ,  $\text{HClO}_2$ ,  $\text{HClO}_3$  and  $\text{HClO}_4$  in order of (i) acidic strength and (ii) oxidising power. Give reason.



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5. The negative value of electron gain enthalpy is less for fluorine than for chlorine . Why?



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6. Despite the fact than fluorine is more electronegative than iodine, yet  $\text{HF}$  is less acidic as compared to  $\text{HI}$  . Explain.



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7. What happens when  $Cl_2$  is passed through a hot concentrated solution of a base like  $Ba(OH)_2$ ?

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8. Why does fluorine never act as the central atom in polyatomic interhalogen compounds?

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9.  $ClF_2$  exists but  $ClCl_3$  does not. Why?

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10. Addition of  $Cl_2$  turns it colourless. Why?

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11. Given relevant chemical equations for the preparation of I<sub>2</sub>. (a) Chlorine from sodium chloride.
- (b) Iodine from Kelp.
- (c) Hydrobromic acid from potassium bromide.
- (d) Bleaching powder from slaked lime.
- (e)  $KClO_3$  from sodium chloride.

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12. A sodium salt (A) is heated with conc. Sulphuric acid. The evolved gas turns moist litmus paper red and produces white fumes in contact with a glass rod moistened with ammonia solution. It also gives white precipitate when passed through  $AgNO_3$  solution. When the salt is heated with  $MnO_2$  and conc.  $H_2SO_4$ , a gas with an irritating smell is evolved which turns starch-iodide paper blue. Identify the salt and the gaseous product evolved from it. Explain your answer with relevant chemical equations.

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13. A certain compound ( $X$ ) shows the following reactions.

(a) when  $Ki$  is added to an aqueous suspension of ( $X$ ) containing acetic acid, iodine is liberated.

(b) when  $CO_2$  is passed through an aqueous suspension of ( $X$ ) the turbidity transforms to a precipitate.

(c) When the past of ( $X$ ) in water is heated with ethyl alcohol, a product of anaesthetic use is obtained. Identify ( $X$ ) and write down chemical equations for reactions at steps (a), and (c).



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14. A colourless inorganic compound (A) imparts a green colour to flame. Its solution does not give white precipitate with  $H_2S$ . Its solution gives white precipitate with conc.  $H_2SO_4$  which is insoluble in dil.  $H_2SO_4$ . When it is heated with  $K_2Cr_2O_7$  and conc.  $H_2SO_4$ , a red

gas is evolved. The gas when passed through aqueous NaOH solution turns it Yellow. Identify the compound (A) and give chemical reactions.

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15. Give balanced chemical reactions for the following:

- i. Sodium iodate is treated with sodium bisulphite solution.
- ii. Chlorine is passed through hot NaOH solution.
- iii. Chlorine is passed through aqueous potassium hydroxide.
- iv. Chlorine gas is bubbled through a solution of ferrous bromide.
- v. Iodine reacts with conc.  $HNO_3$ .
- vi. Chlorine is passed over slaked lime.
- vii. Sodium chloride is heated with  $K_2Cr_2O_7$  and conc.  $H_2SO_4$ .
- viii. Potassium iodide is heated with  $MnO_2$  and conc.  $H_2SO_4$ .
- ix. Chlorine reacts with  $Na_2SO_3$  solution.
- x. Iodine is added to stannous chloride solution.
- xi. Chlorine is passed through a suspension of iodine.
- xii.  $Cl_2$  is passed through a suspension of  $CaCO_3$ .

xiii. Chlorine gas is passed through dry and aqueous sulphur dioxide.

xiv. Bromine reacts with  $Na_2CO_3$  solution.

xv. Potassium reacts is added to bleaching powder containing dilute acetic acid.

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**16.** Pseudohalogens or halogenides are complex molecules which behaves like halogen s. Among the following list  $CN^\ominus$  (cyanide),  $OCN^\ominus$  (cyanate),  $SCN^\ominus$  (thio-cyanate),  $SeCN^\ominus$  (selenocyanate),  $TeCN^\ominus$  (tellurocyanate),  $ONC^\ominus$  (isocyanate),  $N_3^\ominus$  (azide), cyanogen  $(CN)_2$  oxycyanogen  $(OCN)_2$ , thiocyanogen  $(SCN)_2$ , telluroyanogen  $(TeCN)_2$ , azidecabon dislphide

$(SCNN_3, ClCN, BrCN, ICN, ICl, IF_7, IF_5, I_3^\ominus, ICl_2^\ominus, I^\ominus, I^\oplus, I_3^\oplus)$

a. Which are interpsedohalogents ?

b. Which are interhalogens or their anions ?

c. Which are polyhalides ?

d. Which are neither (a), (b), (c) or pseudohalogen or their anions ?

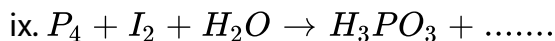
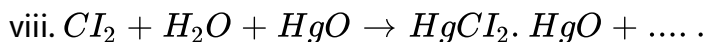
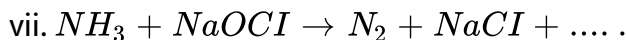
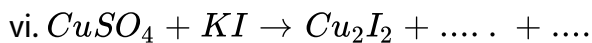
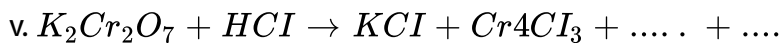
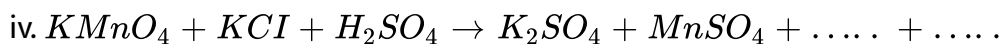
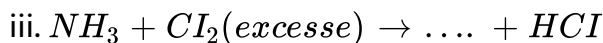
e. Which are pseudohalogens of their anions ?



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### Exs 4 1 Objective

1. Fill in the blanks.





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2. A gas X is passed through water to form a saturated solution. The aqueous solution on treatment with  $AgNO_3$  gives a white precipitate. The saturated aqueous solution also dissolves Mg ribbon with evolution of colourless gas Y, X and Y are respectively:

A.  $CO_2, Cl_2$

B.  $Cl_2, CO_2$

C.  $Cl_2, H_2$

D.  $H_2, Cl_2$

**Answer: C**

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3. A 500 g toothpaste sample has 0.2 g fluoride concentration. What is the concentration of  $F^\ominus$  in ppm ?

A. 250

B. 200

C. 400

D. 1000

**Answer: C**



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4. The interatomic distance in  $H_2$  and  $Cl_2$  molecules are 74 and 198 pm respectively. The bond length of HCl is

A. 272 pm

B. 136 pm

C. 124 pm

D. 248 pm

**Answer: B**



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5. In the halogen group, chlorine is a gas, bromine is a liquid and iodine exists as solid crystals. Then the next halogen astatine (At) would be

- A. Solid at room temperature
- B. Having higher electronegativity
- C. Liquid with higher ionisation enthalpy
- D. Least atomic size

**Answer: A**



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6. Iodine is placed between two liquids  $C_6H_6$  and water:

- A. It dissolves more in  $C_6H_6$

- B. It dissolves more in water
- C. It dissolves equally in both
- D. Does not dissolved in both

**Answer: A**

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7. Mixture of  $I_2$  and sand can be separated by:

- A. Dissolving in water and filtering
- B. Fractional crystallisation
- C. Sublimation
- D. None of the above

**Answer: C**

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1. Fluorine, the first member of group 17, differs from the other members of group in many respects due to:

- i. Very small size
- ii. Very high electronegativity
- iii. Absence of vacant d-orbitals in the valence shell
- iv. Dissociation energy in the molecular form ( $X_2$ ) is the least

Which member of the group 17 does not show positive oxidation state ?

- A. Iodine
- B. Bromine
- C. Chlorine
- D. Fluorine

**Answer: D**



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2. Fluorine, the first member of group 17, differs from the other members of group in many respects due to:

- i. Very small size
- ii. Very high electronegativity
- iii. Absence of vacant d-orbitals in the valence shell
- iv. Dissociation energy in the molecular form ( $X_2$ ) is the least

Which has the maximum molar enthalpy of vaporisation ?

- A. HF
- B. HCl
- C. HBr
- D. HI

**Answer: A**

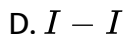
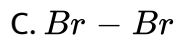
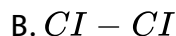
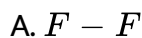


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3. Fluorine, the first member of group 17, differs from the other members of group in many respects due to:

- i. Very small size
- ii. Very high electronegativity
- iii. Absence of vacant d-orbitals in the valence shell
- iv. Dissociation energy in the molecular form ( $X_2$ ) is the least

Which of the following bonds is the stronger ?



**Answer: B**



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4. Fluorine, the first member of group 17, differs from the other members of group in many respects due to:

- i. Very small size
- ii. Very high electronegativity
- iii. Absence of vacant d-orbitals in the valence shell
- iv. Dissociation energy in the molecular form ( $X_2$ ) is the least

Which halogen does not form any oxyacid ?

- A. Iodine
- B. Bromine
- C. Chlorine
- D. Fluorine

**Answer: D**



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5. Fluorine, the first member of group 17, differs from the other members of group in many respects due to:

- i. Very small size
- ii. Very high electronegativity
- iii. Absence of vacant d-orbitals in the valence shell
- iv. Dissociation energy in the molecular form ( $X_2$ ) is the least

The most basic among the following is:



**Answer: C**



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6. Fluorine, the first member of group 17, differs from the other members of group in many respects due to:

- i. Very small size
- ii. Very high electronegativity
- iii. Absence of vacant d-orbitals in the valence shell
- iv. Dissociation energy in the molecular form ( $X_2$ ) is the least

Which of the following do not exist ?



**Answer: B**



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7. Halogens react with each other to form a number of compounds called interhalogen compounds. Their general formula is  $AX_n$ , where A is less electronegative halogen while X is a more electronegative halogen and n is its number. The interhalogen compounds are essentially covalent and more reactive than the halogens since the bond A-X is weaker than A-A or X-X bond. The reaction of interhalogens are similar to those of halogens.

Which of the following interhalogen compound is not possible ?



**Answer: D**



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8. Halogens react with each other to form a number of compounds called interhalogen compounds. Their general formula is  $AX_n$ , where A is less electronegative halogen while X is a more electronegative halogen and n is its number. The interhalogen compounds are essentially covalent and more reactive than the halogens since the bond A-X is weaker than A-A or X-X bond. The reactions of interhalogens are similar to those of halogens.

Which halogen shows maximum oxidation state in forming interhalogen compound ?

A. *I*

B. *Br*

C. *Cl*

D. *F*

**Answer: A**



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9. Halogens react with each other to form a number of compounds called interhalogen compounds. Their general formula is  $AX_n$ , where A is less electronegative halogen while X is a more electronegative halogen and n is its number. The interhalogen compounds are essentially covalent and more reactive than the halogens since the bond A-X is weaker than A-A or X-X bond. The reactions of interhalogens are similar to those of halogens.

How many lone pairs of electrons are present on chlorine in  $ClF_3$  molecule?

- A. 0
- B. 1
- C. 2
- D. 3

**Answer: C**



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10. Halogens react with each other to form a number of compounds called interhalogen compounds. Their general formula is  $AX_n$ , where A is less electronegative halogen while X is a more electronegative halogen and n is its number. The interhalogen compounds are essentially covalent and more reactive than the halogens since the bond A-X is weaker than A-A or X-X bond. The reaction of interhalogens are similar to those of halogens.

Which of the following statement is wrong for interhalogen ?

- A. The value of n in  $AX_n$  (interhalogen) can be 1,3,5 or 7
- B. The value of n in  $AX_n$  (interhalogen) can be 2,4, or 6
- C. A can never be fluorine as it is most electronegative halogen.
- D. X can never be iodine as it is least electronegative halogen.

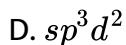
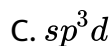
**Answer: B**



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11.  $I_2$  has less solubility in water and its solubility increase on adding KI solution. When KI and  $I_2$  react then a species 'X' is formed by which solubility of  $I_2$  increases.

Hybridisation of anionic part of 'X' is



**Answer: C**



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12.  $I_2$  has less solubility in water and its solubility increase on adding KI solution. When KI and  $I_2$  react then a species 'X' is formed by which

solubility of  $I_2$  increases.

Shape of anionic part of 'X' is

- A. Linear
- B. T shape
- C. Pyramidal
- D. See-saw

**Answer: A**



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13.  $I_2$  has less solubility in water and its solubility increase on adding KI solution. When KI and  $I_2$  react then a species 'X' is formed by which solubility of  $I_2$  increases.

Which of the following of the is the correct characteristic of anionic part of 'X' ?

[Polar and non-polar nature to be considered on the basis of dipole



moment]

(I) Planar (II) non-planar (III) polar (IV) non-polar

A. I and II

B. I and IV

C. II and III

D. II and IV

**Answer: B**



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14.  $I_2$  has less solubility in water and its solubility increase on adding KI solution. When KI and  $I_2$  react then a species 'X' is formed by which solubility of  $I_2$  increases.

Geometry of anionic part of X is

A. Trigonal bipyramidal

B. Square pyramidal

C. Pentagon

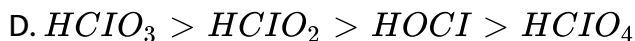
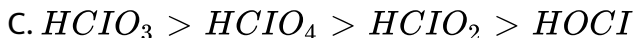
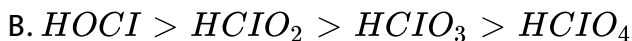
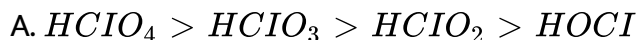
D. Linear

**Answer: A**

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15. Oxygen is more electronegative than chloride. In the series of oxyacids  $\text{HOCl}$ ,  $\text{HClO}_2$ ,  $\text{HClO}_3$  and  $\text{HClO}_4$ , an increasing number of oxygen atom is bonded to the chlorine atom. Chlorine forms a number of oxyacids which differ in their stability order.

The order if acid strength og  $\text{HOCl}$ ,  $\text{HClO}_2$ ,  $\text{HClO}_3$  and  $\text{HClO}_4$  are

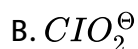


Answer: A

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16. Oxygen is more electronegative than chloride. In the series of oxyacids  $\text{HOCl}$ ,  $\text{HClO}_2$ ,  $\text{HClO}_3$  and  $\text{HClO}_4$ , an increasing number of oxygen atom is bonded to the chlorine atom. Chlorine forms a number of oxyacids which differ in their stability order.

Which of the following is the strongest conjugate base ?



Answer: D

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17. Oxygen is more electronegative than chloride. In the series of oxyacids  $\text{HOCl}$ ,  $\text{HClO}_2$ ,  $\text{HClO}_3$  and  $\text{HClO}_4$ , an increasing number of oxygen atom is bonded to the chlorine atom. Chlorine forms a number of oxyacids which differ in their stability order.

The hybridisation of Cl in  $\text{ClO}_2$  and its shape are

- A.  $sp^3$ , pyramidal
- B.  $sp^2$ , angular
- C.  $sp^3$ , angular
- D.  $sp^2$ , trigonal planar

**Answer: C**



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18. Oxygen is more electronegative than chloride. In the series of oxyacids  $\text{HOCl}$ ,  $\text{HClO}_2$ ,  $\text{HClO}_3$  and  $\text{HClO}_4$ , an increasing number of

oxygen atom is bonded to the chlorine atom. Chlorine forms a number of oxyacids which differ in their stability order.

The least stable oxo-anion among the following is



**Answer: A**



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**19.** Among the halogens, fluorine differs considerably from the other members. The hydrides of halogens also differ in their properties.

Fluorine differs from the other halogens due to:

A. Small size

- B. Very high electronegativity
- C. Non-availability of d-orbitals
- D. All of these

**Answer: D**

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20. Among the halogens, fluorine differs considerably from the other members. The hydrides of halogens also differ in their properties.

Which of the following bond has the highest bond energy ?

- A.  $F - F$
- B.  $Cl - Cl$
- C.  $Br - Br$
- D.  $I - I$

**Answer: B**



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21. Among the halogens, fluorine differs considerably from the other members. The hydrides of halogens also differ in their properties.

Which of the following halogens do not form polyhalide ?

A. F

B. Cl

C. Br

D. I

**Answer: A**



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22. Bleaching powder is a mixed salt of hydrochloric acid and hypochlorous acid. It has the formula,  $CaOCl_2 \cdot H_2O$ . It is

manufactured by the action of chlorine on dry slaked lime at  $40^{\circ}C$ .

There is also a view that bleaching power is a mixture  $[Ca(OCl)_2 + CaCl_2 \cdot Ca(OH)_2 \cdot H_2O]$ . The amount of chlorine obtained from a sample of bleaching power by the treatment with excess of dilute acids or  $CO_2$  is called available chlorine. A good sample of bleaching power contains 35 – 38 % of available chlorine. On long standing, it undergoes auto-oxidation and the amount of available chlorine decreases. The estimation of available chlorine is done volumetrically by (a) iodometric method or by (b) arsenite method. In textile industry, the cotton cloth is mainly bleached with the help of bleaching power.

Maximum percentage of available chlorine on the basis of  $CaOCl_2 \cdot H_2O$  formula is

A. 35

B. 40

C. 45

D. 49



Answer: D

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On long standing, the bleaching power undergoes auto-oxidation. The products formed are

- A. Calcium chloride only
- B. Calcium chlorate only
- C. Calcium chloride and calcium chlorate
- D. Calcium chloride and calcium chlorite

**Answer: C**



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24. Bleaching power is a mixed salt of hydrochloric acid and hypochlorous acid. It has the formula,  $CaOCl_2 \cdot H_2O$ . It is manufactured by the action of chlorine on dry slaked lime at  $40^\circ C$ .

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The chemical name of bleaching powder is

- A. Calcium hypochlorite
- B. Calcium chlorohypochlorite
- C. Calcium chlorate
- D. calcium perchlorate

**Answer: B**



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25. Bleaching power is a mixed salt of hydrochloric acid and hypochlorous acid. It has the formula,  $CaOCl_2 \cdot H_2O$ . It is manufactured by the action of chlorine on dry slaked lime at  $40^\circ C$ . There is also a view that bleaching power is a mixture  $[Ca(OCl)_2 + CaCl_2 \cdot Ca(OH)_2 \cdot H_2O]$ . The amount of chlorine obtained from a sample of bleaching power by the treatment with excess of dilute acids or  $CO_2$  is called available chlorine. A good sample of bleaching power contains 35 – 38 % of available chlorine. On long standing, it undergoes auto-oxidation and the amount of available chlorine decreases. The estimation of available chlorine is done volumetrically by (a) iodometric method or by (b) arsenite method. In textile industry, the cotton cloth is mainly bleached with the help of bleaching power.

The percentage of available chlorine in commercial samples of bleaching powder is usually between 35 % and 38 % . The low value is due to

- A. Incomplete reaction between slaked lime and  $Cl_2$  during its formation.
- B. Impurities present in the original slaked lime.
- C. Decomposition of bleaching power when kept in air.
- D. All of the above.

**Answer: D**



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26. Bleaching power is a mixed salt of hydrochloric acid and hypochlorous acid. It has the formula,  $CaOCl_2 \cdot H_2O$ . It is manufactured by the action of chlorine on dry slaked lime at  $40^\circ C$ . There is also a view that bleaching power is a mixture  $[Ca(OCl)_2 + CaCl_2 \cdot Ca(OH)_2 \cdot H_2O]$ . The amount of chlorine obtained from a sample of bleaching power by the treatment with excess of dilute acids or  $CO_2$  is called available chlorine. A good

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On long standing, it undergoes auto-oxidation and the amount of available chlorine decreases. The estimation of available chlorine is done volumetrically by (a) iodometric method or by (b) arsenite method. In textile industry, the cotton cloth is mainly bleached with the help of bleaching power.

3.55 g of bleaching power when treated with acetic acid and excess of KI liberated iodine which required 60 mL of 0.5 N sodium thiosulphate solution. The percentage of available chlorine in the sample is

A. 30.0

B. 25.0

C. 20.0

D. 35.0

**Answer: A**



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1. Species which are isoelectronic with  $OF_2$  are

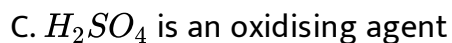
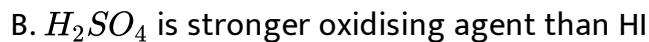
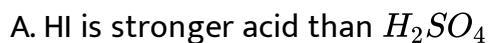


Answer: A::B



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2. HI cannot be prepared by the action of conc.  $H_2SO_4$  on KI because



D. HI is strong reducing agent

Answer: A::B::C

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3. Which one of the following arrangements does not give the correct picture of the trends indicated against it ?

A.  $F_2 > Cl_2 > Br_2 > I_2$  : Bond dissociation energy

B.  $F_2 > Cl_2 > Br_2 > I_2$  : Oxidising power

C.  $F > Cl > Br > I$  : Electron gain enthalpy

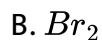
D.  $F_2 > Cl_2 > Br_2 > I_2$  : Electronegativity

Answer: A::C

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4. Which one of the following halogens turn (s) starch iodide paper blue ?

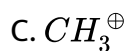
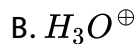


Answer: A::B



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5. Select triangular planar species among the following:

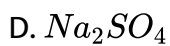
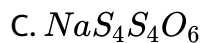
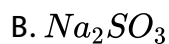




**Answer:**

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**6.** Iodine reacts with hypo to give



**Answer: A::C**

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7. which one of the following salts will evolve halogen on treatment with conc.  $H_2SO_4$  ?

A.  $NaCl$

B.  $CaCl_2$

C.  $NaBr$

D.  $KI$

**Answer: C::D**



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8. Electrolysis of aqueous solution of Brine ( $NaCl$ ) gives

A.  $Cl_2$

B.  $H_2$

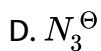
C.  $NaOH$

D. All of these

**Answer: D**

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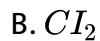
9. Which one of the following are pseudohalide ions ?



**Answer: A::B**

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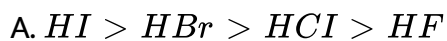
10. The halogens, which are not attacked by conc.  $HNO_3$ , are



Answer: A::B::C

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11. Select the correct order:



D. None of these

Answer: A::B

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12.  $Cl_2$  reacts with hot aqueous NaOH to give

A.  $NaCl$

B.  $NaClO_3$

C.  $NaClO_2$

D.  $NaClO_4$

Answer: A::B



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13. Aqueous solution of  $Na_2S_2O_3$  on reaction with  $Cl_2$ , gives

A.  $Na_2S_4O_6$

B.  $NaHSO_4$

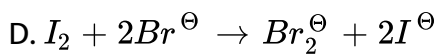
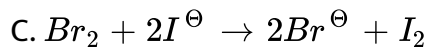
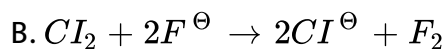
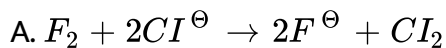
C.  $HCl$

D.  $NaOH$

Answer: B::C

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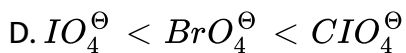
14. Which one of the following reactions does not occur ?



Answer: B::D

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1. The oxidising ability of perhalates are in the order:



Answer: B



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2. Acid strength is in the order:



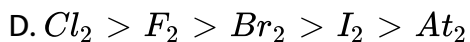
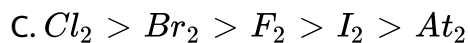
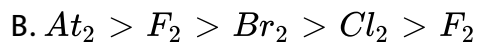
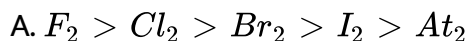
D. None



**Answer: B**

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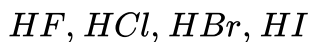
**3. Oxidising power of halogens are**

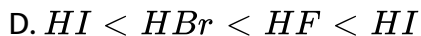
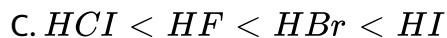
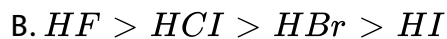
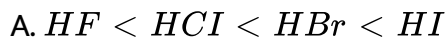


**Answer: A**

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**4. Arrange the following acids in the decreasing order of their acid strength:**

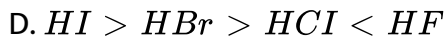
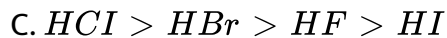
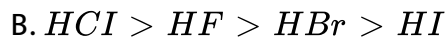
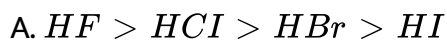




Answer: A

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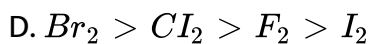
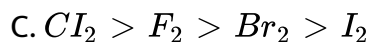
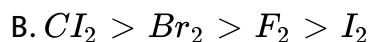
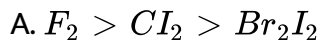
5. Bond strength of halogen acids are



Answer: A

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6. Bond energy of halogens are

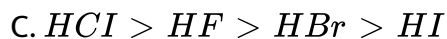
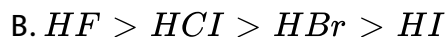
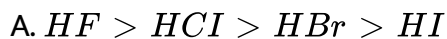


Answer: B



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7. Reducing properties of halogen acid are



D.  $HCl > HBr > HF < HI$

**Answer: B**



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8. Which of the following halogen acid is a liquid ?

A. HF

B. HCl

C. HBr

D. HI

**Answer: A**



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9. Which of the following exists as an associated molecule even in the vapour state ?

A. HCl

B. HBr

C. HF

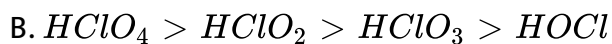
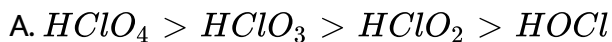
D. HI

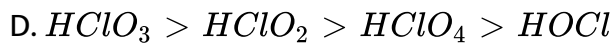
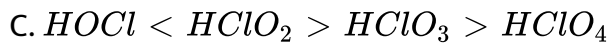
Answer: C



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10. The relative acidic strength, stability and oxidising agent of oxyacids of chlorine are

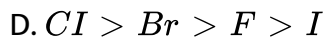
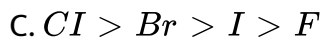
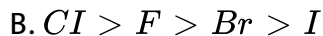
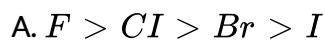




**Answer: A**

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**11. IE of halogens are**



**Answer: A**

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12. In gaseous state, ionic character is greatest in

A. HBr

B. HF

C. HCl

D. HI

**Answer: B**

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13. Which of the following does not liberate  $Br_2$  from KBr ?

A.  $I_2$

B.  $Cl_2$

C. conc.  $H_2SO_4$

D.  $F_2$

**Answer: A**



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**14.** Which has the highest degree of hydrogen bonding ?

A. HCl

B.  $H_2O$

C. HF

D. HBr

**Answer: C**



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**15.** In case of halogens strong oxidising character is favoured by their

A. Low dissociation energy



B. Low E.A.

C. Low IE

D. Low hydration energy of  $X^{\ominus}$  ion.

**Answer: A**

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16.  $Cl_2$  is

A. More reactive than  $F_2$

B. Less reactive than  $Br_2$

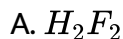
C. More reactive than  $Br_2$  and  $I_2$

D. Less reactive than  $I_2$

**Answer: C**

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17. Mark the strongest reducing agent.

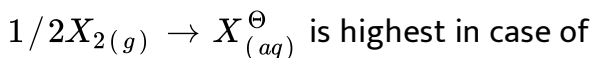


Answer: D



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18. The sum of energy term involved in the reaction:



A. Fluorine

B. Chlorine

C. Bromine

D. Iodine

**Answer: A**



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**19.** Which one of the following oxidises water to oxygen with large evolution of heat ?

A. Chlorine

B. Bromine

C. Iodine

D. Fluorine

**Answer: D**



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20. Which one of the following halogen acids has the lowest melting point ?

A. HF

B. HCl

C. HBr

D. HI

**Answer: B**



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21. Which of the following halogen acids has the highest boiling point ?

A. HF

B. HCl

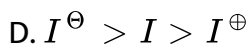
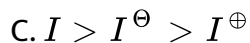
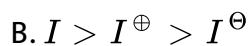
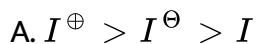
C. HBr

D. HI

**Answer: A**

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**22.** Size of the iodine species following the order:



**Answer: D**

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**23.** volatile nature of halogens is because

- A. The halogen molecules are more reactive
- B. The force existing between the molecules are only weak van der Waal forces
- C. Halogen molecules are bounded by strong force
- D. Halogen molecules are bounded by electrostatic forces.

**Answer: B**

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24. Which of the following will displace the halogen from the solution of the halide ?

- A.  $Br_2$  added to NaCl solution
- B.  $Cl_2$  added to KCl solution
- C.  $Cl_2$  added to NaF solution
- D.  $Br_2$  added to KI solution

**Answer: D**

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**25.** Which one of the followign is the most basic ?

A. I

B. Br

C. Cl

D. F

**Answer: A**

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**26.** Euchlorine is a mixture of

A.  $Cl_2$  and  $SO_2$

B.  $Cl_2$  and  $ClO_2$

C.  $Cl_2$  and  $CO$

D. None

**Answer: B**

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27. On heating  $NaX$  with  $H_2SO_4$  and  $MnO_2$  the halogens that cannot be prepared is .....

A.  $I_2$

B.  $Cl_2$

C.  $Br_2$

D.  $F_2$

**Answer: D**

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28. In the reaction:  $3Br_2 + 6OH^{\ominus} \rightarrow 5Br^{\ominus} + BrO_3^{\ominus} + 3H_2O$ ,  $Br_2$

is

- A. Oxidised
- B. Reduced
- C. Disintegrated
- D. Disproportionated

**Answer: D**



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29. Ticture of iodine contains

- A.  $I_2$ ,  $KI$  and  $C_2H_5OH$
- B.  $I_2$  and  $C_2H_5OH$

C.  $KI$  and  $C_2H_5OH$

D.  $I_2$  and  $H_2O$

**Answer: A**

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30. In the reaction  $I_2 + 2OH^\ominus \rightarrow I^\ominus + IO^\ominus + H_2OI_2$  is

A. Oxidised

B. Reduced

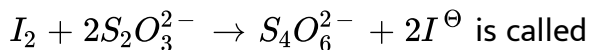
C. Oxidised and reduced

D. Forms complex

**Answer: C**

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31. Estimation of reducing substances by the use of standard  $I_2$ ,



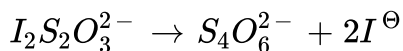
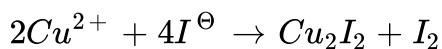
- A. Iodimetry
- B. Iodometry
- C. Oxidising
- D. Reducing

**Answer: A**



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32. Estimation of oxidising substance involving the liberation of  $I_2$  and subsequent volumetric estimation of  $I_2$  are referred to as



- A. Iodimetry

B. Iodometry

C. Oxidising

D. Reducing

**Answer: B**



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33. HCl and HF are prepared by heating their salt ( $NaCl$  and  $CaF_2$ ) with conc.  $H_2SO_4$  but HI and HBr cannot be prepared by similar reaction because HBr and HI have

A. Reducing properties

B. Oxidising property

C. Complex forming ability

D. None of these

**Answer: A**



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34. HBr and HI may be obtained by heating bromide and iodine with syrupy phosphoric acid not with  $H_2SO_4$  because  $H_2SO_4$  is

- A. A weaker acid
- B. Less stable
- C. An oxidising agent
- D. A reducing agent

Answer: C



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35. On passing  $Cl_2$  water in a mixture of KBr and KI solution in contact with  $CCl_4$  continuously with occasional shaking, we observe

- A. Orange  $CCl_4$  layer changing to violet

B. Persisting violet  $CCl_4$  layer

C. Persisting brown layer

D. Violet layer changing into brown and finally colourless

**Answer: D**

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**36.** Which of the following is soluble in water ?

A. AgF

B. AgBr

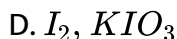
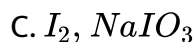
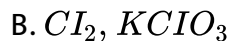
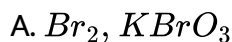
C. AgCl

D. AgI

**Answer: A**

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37. A greenish yellow gas reacts with an alkali metal hydroxide to form a halate which can be used in fireworks and safety matches. The gas and the halate are



**Answer: B**

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38. When chlorine water is added to an aqueous solution of sodium iodide in the presence of chloroform, a violet colouration is obtained. On adding more of chlorine water and vigorous shaking, the violet colour disappears. This shows the conversion of ..... into .....

A.  $I_2, HIO_3$

B.  $I_2, HI$

C.  $HI, HIO_3$

D.  $I_2, HOI$

**Answer: A**

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39. For  $(A) + K_2CrO_3 + air \xrightarrow{Heat} (B)$

$(B) + Cl_2 \rightarrow (C)$  pink

Which of the following is correct ?

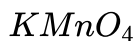
A. (A) is black,  $MnO_2$ , (B) is blue,  $K_2MnO_4$  and (C) is pink,  $KMnO_4$

B. (A) is green,  $Cr_2O_3$ , (B) is yellow,  $K_2CrO_4$  and (C) is pink,

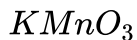
$K_2Cr_2O_7$



C. (A) is black,  $MnO_2$ , (B) is green,  $K_2MnO_4$  and (C) is pink,



D. (A) is black,  $Bi_2O_3$ , (B) is colourless,  $KBiO_2$  and (C) is pink,



**Answer: C**

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**40.** Educhlorine is

A. Obtained by heating perchlorate with conc.  $HCl$

B. A chloride of europium

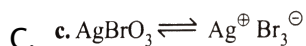
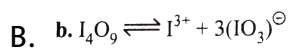
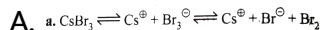
C. A mixture of  $ClI_2$  and  $ClI_2O_7$

D. A mixture of  $ClI_2$  and  $ClO_2$

**Answer: D**

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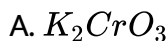
41. Which is incorrectly matched ?



Answer: D

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42. A certain compound ( $X$ ) when treated with copper sulphate solution yields a brown precipitate. On adding hypo solution the precipitate turns white. The compound is



B.  $KI$

C.  $KBr$

D.  $K_3PO_4$

**Answer: B**

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43. The products of the chemical reaction between  $Na_2S_2O_3$ ,  $Cl_2$  and  $H_2O$  are

A.  $S, HCl, Na_2SO_4$

B.  $S, HCl, Na_2S$

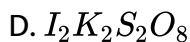
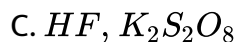
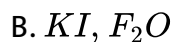
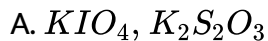
C.  $S, HCl, Na_2SO_4$

D.  $S, NaClO_3$

**Answer: A**

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44. Fluorine on reaction with  $KIO_3(aq)$  gives (A) and on reaction with  $KHCO_4$  gives (B). (A) and (B) are

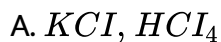


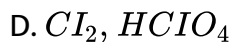
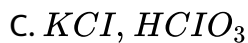
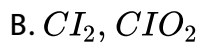
**Answer: C**



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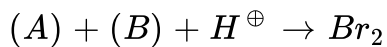
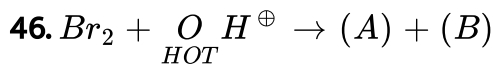
45.  $KClO_3$  on reaction with  $SO_2$  gives (A) and on reaction with conc.  $H_2SO_4$  gives (B). (A) and (B) are



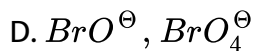
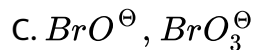
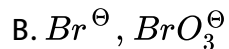
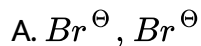


**Answer: A**

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(A) gives yellow precipitate with  $AgNO_3$ . (A) and (B) are



**Answer: B**



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47. 10 g of bleaching power on reaction with KI required 50 mL of 2N hypo solution. Thus, % of bleaching powder is

A. 100

B. 80

C. 63.5

D. 35.5

Answer: C

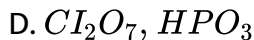
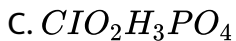
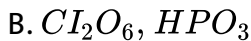


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48.  $\text{HClO}_4 + \text{P}_2\text{O}_5 \rightarrow (\text{A}) + (\text{B})$

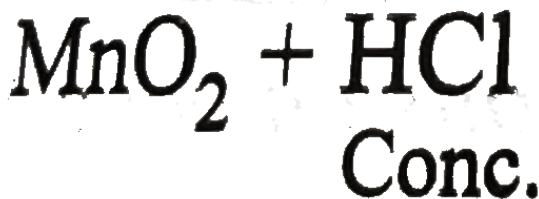
(A) and (B) are

A.  $\text{HClO}_3, \text{H}_3\text{PO}_4$

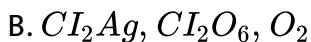


Answer: D

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The substances (A), (B), (C) and (D) are



C.  $H_2$ ,  $AgCl$ ,  $H_2O$ ,  $O_2$

D.  $HClO$ ,  $AgCl$ ,  $ClO_2$ ,  $O_2$

**Answer: A**

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**50.** Select the correct statement(s):

A.  $Cl_2O$  and  $ClO_2$  are used as bleaching agents and as germicides.

B.  $ClO_2$  is the anhydride of  $HClO_2$  and  $HClO_3$ .

C.  $I_2O_5$  is used in the quantitative estimation of CO.

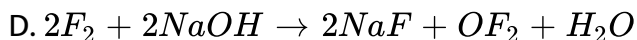
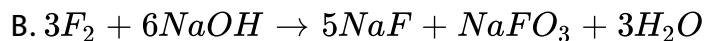
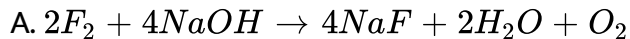
D. All of the above are correct.

**Answer: D**

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51. Which one of the following represents the reaction between fluorine and cold NaOH (dil) ?

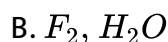


Answer: D



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52. Which one of the following pairs of reactants does not form oxygen when they react with each other ?



C.  $Cl_2$ ,  $NaOH$  solution (cold, dilute)

D.  $CaOCl_2$ ,  $H_2SO_4$  (dilute, small amount)

**Answer: C**

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53. One atom of ..... combines with one atom of bromine.

A. Ar

B. Rb

C. Mg

D. HCl

**Answer: B**

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54. Which bond has the greatest polarity ?

A.  $H - Cl$

B.  $H - Br$

C.  $H - I$

D.  $H - F$

**Answer: D**



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55. Bleaching properties of bleaching powder are due to its

A. Oxidising properties

B. Reducing properties

C. Basic properties

D. Disinfecting properties

**Answer: A**

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**56.** Bleaching powder is a mixture of

- A. Calcium hypochlorite and calcium chloride
- B. Calcium chlorate and calcium chloride
- C. Calcium hypochlorite and basic calcium chloride
- D. Calcium chlorate and calcium hydroxide

**Answer: C**

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**57.** One can draw the map of a building on a glass plate by

- A. HI

B. HF

C. HBr

D. HCl

**Answer: B**

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**58.** The colour of  $I_2$  is violet because it

A. Absorbs violet light

B. Does not absorb light

C. Absorbs yellow and green light

D. None of the above

**Answer: C**

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59. The boiling points of halogens increase with increase in molecular weight, it is because

- A. As the size increases molecules undergo association leading to higher stability
- B. Bond strength increases due to increase in electronegativity
- C. van der Waals force increase with increase in number of electrons per mole
- D. None of the above

**Answer: C**



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60. The tetrahedral nature of the three bonds in a chlorate ion ( $ClO_3^-$ ) is due to

- A. The presence of a lone of electrons
- B.  $sp^3$ -hybridisation
- C.  $sp^2$ -hybridisation
- D. Trigonal bipyramidal shape of ion

**Answer: B**



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**61.** The catalyst used in the Deacon's process for the manufacture of chlorine is

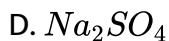
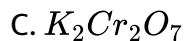
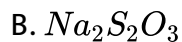
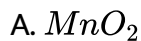
- A. Cu
- B. An alloy of copper
- C.  $CuCl_2$
- D. CuS

**Answer: C**



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62. Which one of the following acts as an antichlor ?

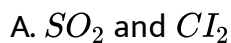


Answer: B



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63. One gas bleaches the colour of flowers by reduction and other by oxidation. These gases are





B. CO and  $Cl_2$

C.  $NH_3$  and  $SO_2$

D.  $H_2$  and  $Br_2$

**Answer: A**

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**64.** Bromine occurs as a bromide in a mineral called

A. Nitre

B. Tincal

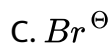
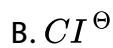
C. Common salt

D. Carnallite

**Answer: D**

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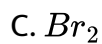
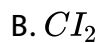
65. The halide which does not give a precipitate with  $AgNO_3$  is



**Answer: B**

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66. Which halogen can be purified by sublimation ?



Answer: D

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67. The halogen having the smallest covalent radius is

A. I

B. Cl

C. Br

D. F

Answer: D

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68. The following acid have arrange in the order of decreasing strength.

Identify the correct order.  $ClOH(I)BrOH(II)IOH(III)$

A.  $I > II > III$

B.  $II > I > III$

C.  $III > II > I$

D.  $I > III > II$

**Answer: A**

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**69.** Which has maximum pH in aqueous solution ?

A.  $NaClO$

B.  $NaClO_2$

C.  $NaClO_3$

D.  $NaClO_4$

**Answer: A**

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70. The strongest oxidising agent among the following is

- A. Ozone
- B. Oxygen
- C. Fluorine
- D. Chlorine

**Answer: C**

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### Exercises Assertion Reasoning

1. Assertion (A):  $ClF$  is more reactive than  $F_2$ .

Reason (R ): The F-F bond is weaker than ClF bond.

- A. If both (A) and (R) are correct and (R) is the correct explanation of (A).
- B. If both (A) and (R) are correct and (R) is the correct explanation of (A).
- C. If (A) is correct, but (R) is incorrect.
- D. If (A) is incorrect, but (R) is correct.

**Answer: C**

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2. Assertion (A): Salts of  $ClO_3^\ominus$  and  $ClO_4^\ominus$  are well known but those of  $FO_3^\ominus$  are unknown.

Reason (R): F is more electronegative than O, while Cl is less electronegative than O.

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3. Assertion (A): ICl on hydrolysis gives HI and HOCl.

Reason (R): Water can attack iodine more readily.

A. If both (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct and (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. Both (A) and (R) are incorrect.

**Answer: D**

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4. Assertion (A):  $F_2$  does not show disproportion reactions.

Reason (R):  $F_2$  is the stronger oxidising agent and is always reduced.

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5. Assertion (A): HBr is weaker acid than HI.

Reason (R ): HBr is more polar than HI.

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6. Assertion (A): Iodine forms  $IF_7$ .

Reason (R ): In iodine 5d-subshell is available in the valence shell to expand its octet.

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7. Assertion (A): HOCl is a stronger acid than HOBr.

Reason (R ): More the electronegativity of the halogen stronger is the acid.



A. If both (A) and (R) are correct, and (R) is the correct explanation of (A)

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

**Answer: A**

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**8. Assertion (A):** Bond energy of Cl-Cl bond is more than F-F bond.

**Reason (R):** Shorter the bond length, stronger the bond, more is the bond energy.

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9. Assertion (A):  $I_2$  and displace  $Cl_2$  from  $NaClO_3$ .

Reason (R ): I is more electronegative than Cl.

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10. Assertion (A): F-F bond in  $F_2$  molecule is weak.

F atom is small in size.

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11. Assertion (A): The fluorine has lower reactivity.

Reason (R ): F-F bond has low bond dissociation energy.

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12. Assertion (A): The halogens absorb visible light.

Reason (R ): All halogens are coloured.



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13. Assertion (A): HOCl is a stronger acid than  $HClO_3$ .

Reason (R ): Oxidation state of Cl in  $HClO_4$  is +7 and in  $HClO_3$  is +5



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## Exercises Integer

1. Sodium iodate is treated with calculated amount of sodium bisulphite to prepare one mole of iodine. How many moles of sodium disulphite are required to prepare one mole of iodine from sodium iodate ?



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2. In the molecule  $ICl_3$ , how many lone pairs of electrons are associated with iodine ?

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3. In the interhalogen compound  $AB_n$ , what is the maximum value of  $n$  ?

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4. In a given sample of bleaching powder, the percentage of available chlorine is 49. The volume in litres of chlorine obtained if 20 g of the sample is treated with HCl at NTP is.

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5. What is the oxidation state of iodine in  $H_5IO_6$  ?



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6. How many orbitals are involved in the hybridisation of iodine in  $IF_7$  ?



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7. Chlorine water on cooling deposits greenish yellow crystals of formula  $Cl_2 \cdot XH_2O$ . What is the value of X ?



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8. How many lone pairs are associated with in  $IF_7$  ?



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9. What is the oxidation state of Cl in  $HClO_4$  ?



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10. What is the oxidation state of Cl in  $HClO_4$  ?

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### Exercises Fill In The Blanks

1. Chlorine was discovered by .....

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2. The element having 9 protons and 10 neutrons is .....

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3. Fluorine absorbs ..... portion of light and appears yellow.

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4.  $ClO_2O$  is an anhydride of .....

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5. Iodine deficiency in diet cause .....

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6.  $CN^\ominus$ ,  $SCN^\ominus$  and  $N_3^\ominus$  are called .....

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7. The halogen which normally does not form oxoacid is .....

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8. The stronger reducing agent among all the halide ions is .....

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9. The increase in the solubility of iodine in an aqueous solution of potassium iodide is due to the formation of \_\_\_\_\_ .

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10. Halogen acid used in the preparation of aqua regia is .....

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11. Most electropositive halogen atom is .....

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12. The anhydride of hypochlorous acid is .....

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13. Outermost electronic configuration of the highest electronegative atom is .....

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14. Chlorine acts as bleaching agent only in the presence of .....

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15. Freons are used as .....

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1.  $Cl_2O_6$  is a mixed anhydride of  $HClO_3$  and  $HClO_4$ .

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2. Sea weeds are important source of bromine.

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3. Antichlor is a compound which removes chlorine form a material.

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4. HIF can be stronger in glass bottles.

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5.  $I_2$  cannot liberate  $Cl_2$  from aqueous KCl but it can liberate  $Cl_2$  from  $KClO_3$ .

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6. Conc.  $H_2SO_4$  cannot be used to prepared HBr from NaBr.

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7. HBr is stronger acid than HI because of hydrogen bonding.

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8.  $I_4O_9$  is a covalent compound.

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9. Halogen that is most easily reduced is fluorine.

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10. Solid  $Cl_2O_6$  is a covalent compound.

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11.  $ICl_3$  is an example of a pseudohalogen.

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12. Iodine is used as an antiseptic.

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13. Tear gas is  $CCl_3$ ,  $SO_2$ .

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14. Chlorine is known as superhalogen.

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### Exercises Archives Linked Comprehension

1. Bleaching powder and bleach solution are produced on a large scale and used in several household products. The effectiveness of bleach solution is often measured by iodometry.

$25\text{mL}$  of household bleach solution was mixed with  $30\text{mL}$  of  $0.50\text{MKI}$  and  $10\text{mL}$  of  $4\text{N}$  acetic acid. In the titration of the liberated iodine,  $48\text{mL}$  of  $0.25\text{NNa}_2\text{S}_2\text{O}_3$  was used to reach the end point. The molarity of the household bleach solution is :

A.  $0.48\text{M}$

B.  $0.96\text{M}$

C. 0.24M

D. 0.02M

**Answer: C**

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2. Bleaching powder and bleach solution are produced on a large scale and used in several house hold production. The effectiveness of bleach solution is often measured by iodometry.

Bleaching powder contains s salt of an oxoacid as one of its components. The anhyride of that oxoacid is

A.  $Cl_2O$

B.  $Cl_2O_7$

C.  $ClO_2$

D.  $ClO_2O_8$

**Answer: A**

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3. The reactions of  $Cl_2$  gas with cold-dilute and hot-concentrated NaOH in water give sodium salts of 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 reacts with white phosphorus to give a compound S. On hydrolysis, S gives an oxoacid of phosphorus.

P and Q, respectively, are the sodium salts of

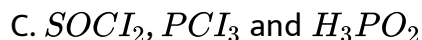
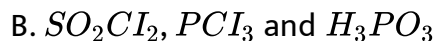
- A. Hypochlorous and chloric acids
- B. Hypochlorous and chlorous acids
- C. Chloric and perchloric acids
- D. Chloric and hypochlorous acids.

**Answer: A**

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4. The reactions of  $Cl_2$  gas with cold-dilute and hot-concentrated NaOH in water give sodium salts of 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 reacts with white phosphorus to give a compound S. On hydrolysis, S gives an oxoacid of phosphorus.

R, S and T, respectively, are



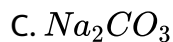
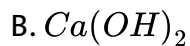
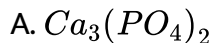
**Answer: A**



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1. The reagent(s) used for softening the temporary hardness of water is (are):

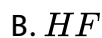


Answer: A::C::D



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2. Which of the following halides react(s) with  $AgNO_3(aq)$  to give a precipitate that dissolves in  $Na_2S_2O_3(aq)$



C.  $HBr$

D.  $HI$

Answer: A::C::D

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3. For the reaction :  $I^- + ClO_3^- + H_2SO_4 \rightarrow Cl^- + HSO_4^- + I_2$

The correct statement(s) in the balanced equation is/are:

A. a. Stoichiometric coefficient of  $HSO_4^\ominus$  is 6.

B. b. Iodide is oxidised.

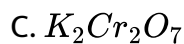
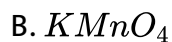
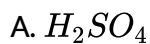
C. c. Sulphur is reduced.

D. d.  $H_2O$  is one of the products.

Answer: A::B::D

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1. HBr and HI can reduce sulphuric acid, HCl can reduced  $KMnO_4$  and HF can reduce.....



D. None of these

**Answer: D**



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2. Chlorine acts as a bleaching agent only in the presence of

A. Dry air

B. Moisture

C. Sunlight

D. Pure oxygen

**Answer: B**

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3. Bromine can be liberated from potassium bromide solution by the action of

A. Iodine solution

B. Chlorine water

C. Sodium chloride

D. Potassium iodide

**Answer: B**

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4. The following acids have arranged in the order of decreasing strength.

Identify the correct order.  $\text{ClOH(I)} \text{BrOH(II)} \text{IOH(III)}$

A. IgtIIgtIII

B. IIgtIgtIII

C. IIIgtIIgtI

D. IgtIIIgtII

**Answer: A**



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5. Which of the following species is not a pseudo halide ?

A.  $\text{CNO}^\ominus$

B.  $\text{RCOO}^\ominus$

C.  $\text{OCN}^\ominus$

D.  $NNN^{\ominus}$

**Answer: B**

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6. In compounds of type  $ECl_3$  where  $E = B, P, As, Bi$ . The angles  $Cl - E - Cl$  for different  $E$  are in the order :

A.  $B > P = As = Bi$

B.  $B > P > As > Bi$

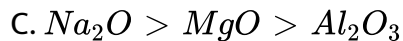
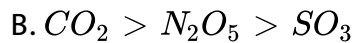
C.  $B < P = As = Bi$

D.  $B < P < As < Bi$

**Answer: B**

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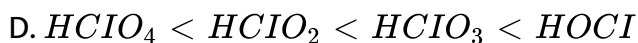
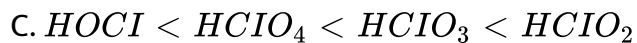
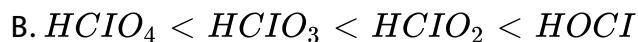
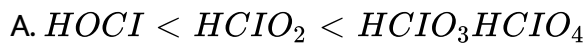
7. The correct order of acid strength is



**Answer: A**

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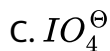
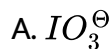
8. The set with the correct order of acidity is



**Answer: A**

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9. When  $I^\ominus$  is oxidised by  $MnO_4^\ominus$  in an alkaline medium,  $I^\ominus$  converts into



**Answer: A**

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10. The correct statement for the molecule  $CSI_3$  is



A. It contains  $CS^{\oplus}$  and  $I^{\ominus}$  ions

B. It contains  $CS^{\oplus}$  and  $I^{\ominus}$  and lattice  $I_2$  molecule

C. It is a covalent molecule

D. It contains  $CS^{\oplus}$  and  $I_3^{\ominus}$  ions

**Answer: D**

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**11.** Among the following oxoacids, the correct decreasing order of acid strength is

A.  $HClO_4 > HClO_3 > HClO_2 > HOCl$

B.  $HClO_2 > HClO_4 > HClO_3 > HOCl$

C.  $HOCl > HClO_2 > HClO_3 > HClO_4$

D.  $HClO_4 > HOCl > HClO_2 > HClO_3$

**Answer: A**



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12. Hydrogen peroxide in its reaction with  $KIO_4$  and  $NH_2OH$  respectively, is acting as a

- A. Reducing agent, oxidising agent
- B. Reducing agent, reducing agent
- C. Oxidising agent, oxidising agent
- D. Oxidising agent, reducing agent

**Answer: A**



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Exercises Archives Integer

1. Based on *VSEPR* theory, the number of  $90^\circ F = Br - F$  angles in  $BrF_5$  is :

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2. Reaction of  $Br_2$  with  $Na_2CO_3$  in aqueous solution gives NaBr and sodium bormate with evolution of  $CO_2$  gas. The number of NaBr molecue involved in the balanced chemical equation is .....

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3. Consider the following list of reagents: Acidified  $K_2Cr_2O_7$ , alkaline  $KMnO_4$ ,  $CuSO_4$ ,  $H_2O_2$ ,  $Cl_2$ ,  $O_3$ ,  $HNO_3$ , and  $Na_2S_2O_3$ . The total number of reagents that can oxidis aqueous  $I^\ominus$  ion  $I_2$  is

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## Exercises Archives Fill In The Blanks

1. Iodine reacts with hot NaOH solution. The products are NaI and .....

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## Exercises Archives True False

1. Dilute HCl oxidises melting Fe to  $Fe^{2+}$ .

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2. In aqueous solution, chlorine is a stronger oxidising agent than fluorine.

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3. HBr is a stronger acid than HI because of hydrogen bonding.

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### True False Subjective

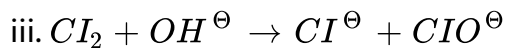
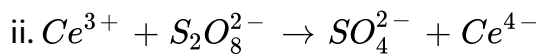
1. Give reason for the following within two sentences:

- i. Hydrogen bromide cannot be prepared by the action of concentrated sulphuric acid on sodium bromide.
- ii. When a blue litmus paper is dipped in a solution of hypochlorous acid, it first turns red then gets decolourised.

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2. Complete and balance the following reactions:





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3. Show with balanced equations what happens when the following are mixed: Aqueous solution of ferric sulphate and potassium iodide.

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4. Give reasons in one or two sentence for each of the following:  
Fluorine can be prepared from fluoride by chemical oxidation.

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5. Write the balanced equations for the reactions when a mixture of potassium chlorate, oxalic acid and sulphuric acid is heated.

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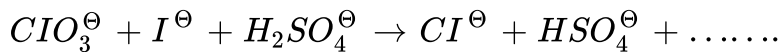
6. Arrange the following in the order of:

i. Increase bond strength:  $HCl$ ,  $HBr$ ,  $HF$ ,  $HI$

ii. Increasing oxidation number of iodine:  $I_2$ ,  $HI$ ,  $HIO_4$ ,  $ICI$

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7. Complete and balance the following reactions:



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8. Mention the products formed in the following: "Chlorine gas is bubbled through a solution of ferrous bromide."

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9. Give balanced equations for the following: Iodate ion reacts with bisulphite ion to liberate iodine.

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10. Arrange the following:  $\text{HOCl}$ ,  $\text{HOClO}_2$  and  $\text{HOClO}$  in increasing order of thermal stability.

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11. Write the balanced chemical equations for the following:

- i. Sodium bromate reacts with fluorine in the presence of an alkali.
- ii. Sodium chlorate reacts with sulphur dioxide in dilute sulphuric acid medium.

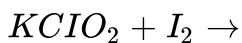
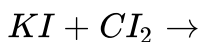
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12. Bond dissociation energy of  $F_2$  is less than that of  $Cl_2$  give reason.

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13. Complete the following chemical equations:



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

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