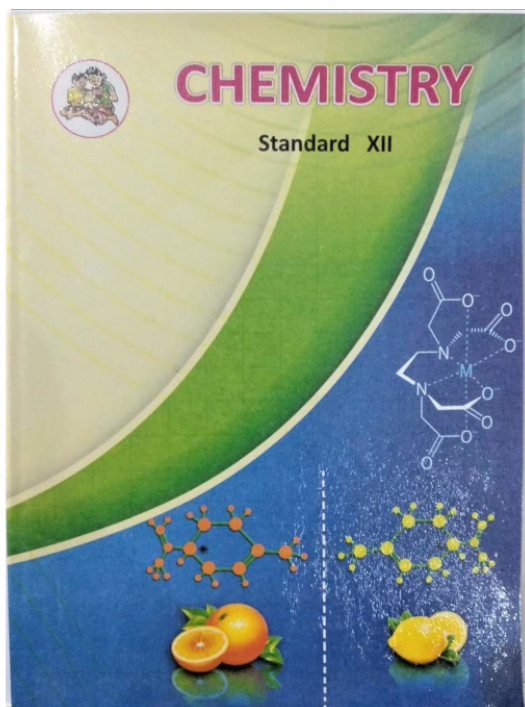


Maharashtra Board Solutions Class 12

Chemistry: Chapter 7- Elements of Groups 16, 17 and 18

Class 12 - Chapter 7 Elements of Groups 16, 17 and 18



For any clarifications or questions you can write to info@indcareer.com

Postal Address

IndCareer.com, 52, Shilpa Nagar, Somalwada Nagpur - 440015
Maharashtra, India

WhatsApp: +91 9561 204 888, Website: <https://www.indcareer.com>

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>



Maharashtra Board Solutions Class 12

Chemistry: Chapter 7- Elements of Groups 16, 17 and 18

Class 12: Chemistry Chapter 7 solutions. Complete Class 12 Chemistry Chapter 7 Notes.

Maharashtra Board Solutions Class 12 Chemistry: Chapter 7- Elements of Groups 16, 17 and 18

Maharashtra Board 12th Chemistry Chapter 7, Class 12 Chemistry Chapter 7 solutions

1. Select appropriate answers for the following.

Question i.

Which of the following has the highest electron gain enthalpy?

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

Answer:

- B. Chlorine

Question ii.

Hydrides of group 16 are weakly acidic. The correct order of acidity is

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

A. $\text{H}_2\text{O} > \text{H}_2\text{S} > \text{H}_2\text{Se} > \text{H}_2\text{Te}$

B. $\text{H}_2\text{Te} > \text{H}_2\text{O} > \text{H}_2\text{S} > \text{H}_2\text{Se}$

C. $\text{H}_2\text{Te} > \text{H}_2\text{Se} > \text{H}_2\text{S} > \text{H}_2\text{O}$

D. $\text{H}_2\text{Te} > \text{H}_2\text{Se} > \text{H}_2\text{O} > \text{H}_2\text{S}$

Answer:

C. $\text{H}_2\text{Te} > \text{H}_2\text{Se} > \text{H}_2\text{S} > \text{H}_2\text{O}$

Question iii.

Which of the following element does not show oxidation state of +4 ?

A. O

B. S

C. Se

D. Te

Answer:

A. O

Question iv.

HI acid when heated with conc. H_2SO_4 forms

A. HIO_3

B. KIO_3

C. I_2

D. KI

Answer:

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

C. I_2

Question v.

Ozone layer is depleted by

A. NO

B. NO_2

C. NO_3

D. N_2O_5

Answer:

A. NO

Question vi.

Which of the following occurs in liquid state at room temperature?

A. HIO_3

B. HBr

C. HCl

D. HF

Answer:

D. HF

Question vii.

In pyrosulfurous acid oxidation state of sulfur is

A. Only +2

B. Only +4

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

C. +2 and +6

D. Only +6

Answer:

B. Only + 4

Question viii.

Stability of interhalogen compounds follows the order

A. $\text{BrF} > \text{IBr} > \text{ICl} > \text{ClF} > \text{BrCl}$

B. $\text{IBr} > \text{BrF} > \text{ICl} > \text{ClF} > \text{BrCl}$

C. $\text{ClF} > \text{ICl} > \text{IBr} > \text{BrCl} > \text{BrF}$

D. $\text{ICl} > \text{ClF} > \text{BrCl} > \text{IBr} > \text{BrF}$

Answer:

C. $\text{ClF} > \text{ICl} > \text{IBr} > \text{BrCl} > \text{BrF}$

Question ix.

BrCl reacts with water to form

A. HBr

B. $\text{Br}_2 + \text{Cl}_2$

C. HOBr

D. $\text{HOBr} + \text{HCl}$

Answer:

D. $\text{HOBr} + \text{HCl}$

Question x.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Chlorine reacts with excess of fluorine to form.

- A. ClF
- B. ClF_3
- C. ClF_2
- D. Cl_2F_3

Answer:

- B. ClF_3

Question xi.

In interhalogen compounds, which of the following halogens is never the central atom.

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

Answer:

- D. F

Question xii.

Which of the following has one lone pair of electrons?

- A. IF_3
- B. ICl
- C. IF_5

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

D. ClF_3

Answer:

C. IF_5

Question xiii.

In which of the following pairs, molecules are paired with their correct shapes?

A. $[\text{I}_3]$: bent

B. BrF_5 : trigonal bipyramid

C. ClF_3 : trigonal planar

D. $[\text{BrF}_4]$: square planar

Answer:

A. $[\text{I}_3]$: bent

Question xiv.

Among the known interhalogen compounds, the maximum number of atoms is

A. 3

B. 6

C. 7

D. 8

Answer:

D. 8

2. Answer the following.

Question i.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Write the order of the thermal stability of the hydrides of group 16 elements.

Answer:

The thermal stability of the hydrides of group 16 elements decreases in the order of $\text{H}_2\text{O} > \text{H}_2\text{S} > \text{H}_2\text{Se} > \text{H}_2\text{Te}$.

Question ii.

What is the oxidation state of Te in TeO_2 ?

Answer:

The oxidation state of Te in TeO_2 is + 4.

Question iii.

Name two gases which deplete ozone layer.

Answer:

Nitrogen oxide (NO) released from exhaust systems of car or supersonic jet aeroplanes and chlorofluorocarbons (Freons) used in aerosol sprays and refrigerators deplete ozone layer.

Question iv.

Give two uses of ClO_2

Answer:

(i) ClO_2 is used as a bleaching agent for paper pulp and textiles.

(ii) It is also used in water treatment.

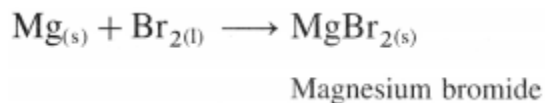
Question v.

What is the action of bromine on magnesium metal?

Answer:

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Bromine reacts instantly with magnesium metal to give magnesium bromide.



Question vi.

Write the names of allotropic forms of selenium.

Answer:

Selenium has two allotropic forms as follows :

(i) Red (non-metallic) form

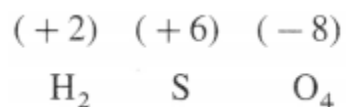
(ii) Grey (metallic) form

Question vii.

What is the oxidation state of S in H_2SO_4 .

Answer:

The oxidation state of S in H_2SO_4 is + 6.



Question viii.

The pK_a values of HCl is -7.0 and that of HI is -10.0. Which is the stronger acid?

Answer:

For HCl, pK_a = -7.0, hence its dissociation constant is, K_a = 1 x 10⁻⁷.

For HI pK_a = - 10.0, hence its dissociation constant is K_a = 1 x 10⁻⁷. Hence HCl dissociates more than HI.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

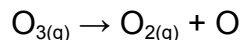
Therefore HCl is a stronger acid than HI.

Question ix.

Give one example showing reducing property of ozone.

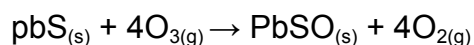
Answer:

Ozone decomposes to liberate nascent oxygen, hence it is a powerful oxidising agent.

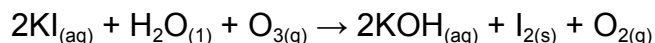


For example :

(i) It oxidises lead sulphide (PbS) to lead sulphate (PbSO₄).



(ii) Potassium iodide, KI is oxidised to iodine, I₂ in the solution.

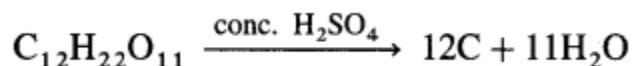


Question x.

Write the reaction of conc. H₂SO₄ with sugar.

Answer:

Concentrated sulphuric acid when added to sugar, it is dehydrated giving carbon.



The carbon that is left behind is called sugar charcoal and the process is called char.

Question xi.

Give two uses of chlorine.

Answer:

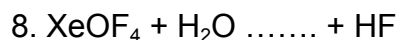
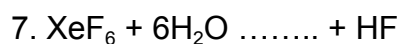
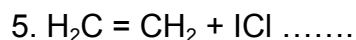
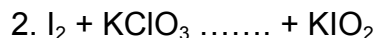
Chlorine is used for :

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

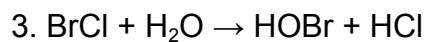
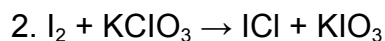
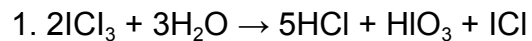
- for sterilization of drinking water.
- bleaching wood pulp required for the manufacture of paper and rayon, cotton and textiles are also bleached using chlorine.
- in the manufacture of organic compounds like CHCl_3 , CCl_4 , DDT, dyes and drugs.
- in the extraction of metals like gold and platinum.
- in the manufacture of refrigerant like Freon (i.e., CCl_2F_2).
- in the manufacture of several poisonous gases like mustard gas ($\text{Cl}-\text{C}_2\text{H}_4-\text{S}-\text{C}_2\text{H}_4-\text{Cl}$), phosgene (COCl_2) used in warfare.
- in the manufacture of tear gas (CCl_3NO_2).

Question xii.

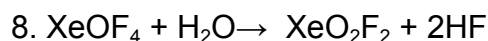
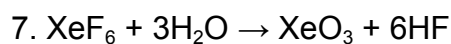
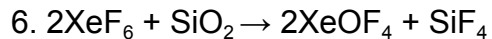
Complete the following.



Answer:



<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>



Question xiii.

Match the following

A – B

XeOF_2 – Xenon trioxydifluoride

XeO_2F_2 – Xenon monooxydifluoride

XeO_3F_2 – Xenon dioxytetrafluoride

XeO_2F_4 – Xenon dioxydifluoride

Answer:

XeOF_2 – Xenon monooxydifluoride

XeO_2F_2 – Xenon dioxydifluoride

XeO_3F_2 – Xenon trioxydifluoride

XeO_2F_4 – Xenon dioxytetrafluoride

Question xiv.

What is the oxidation state of xenon in the following compounds?

XeOF_4 , XeO_3 , XeF_5 , XeF_4 , XeF_2 .

Answer:

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Compound	Oxidation state of Xe
----------	-----------------------

XeOF ₄	+ 6
-------------------	-----

XeO ₃	+ 6
------------------	-----

XeF ₆	+ 6
------------------	-----

XeF ₄	+ 4
------------------	-----

XeF ₂	+ 2
------------------	-----

3. Answer the following.

Question i.

The first ionisation enthalpies of S, Cl and Ar are 1000, 1256 and 1520 kJ/mol⁻¹, respectively. Explain the observed trend.

Answer:

(i) The atomic number increases as, $_{16}\text{S} < _{17}\text{Cl} < _{18}\text{Ar}$.

(ii) Due to decrease in atomic size and increase in effective nuclear charge, Cl binds valence electrons strongly.

(iii) Hence ionisation enthalpy of Cl (1256 kJ mol⁻¹) is higher than that of S (1000 kJ mol⁻¹)

(iv) Ar has electronic configuration $3s^2 3p^6$. Since all electrons are paired and the octet is complete, it has the highest ionisation enthalpy, (1520 kJ mol⁻¹)

Question ii.

“Acidic character of hydrides of group 16 elements increases from H₂O to H₂Te” Explain.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Answer:

(i) The thermal stability of the hydrides of group 16 elements decreases from H_2O to H_2Te . This is because the bond dissociation enthalpy of the H-E bond decreases down the group.

(ii) Thus, the acidic character increases from H_2O to H_2Te .

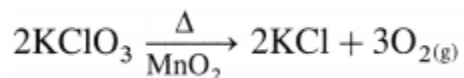
Question iii.

How is dioxygen prepared in laboratory from KClO_3 ?

Answer:

By heating chlorates, nitrates and permanganates.

Potassium chlorate in the presence of manganese dioxide on heating decomposes to form potassium chloride and oxygen.



Question iv.

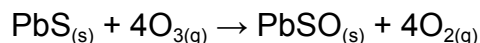
What happens when

a. Lead sulfide reacts with ozone (O_3).

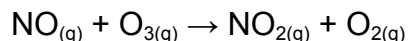
b. Nitric oxide reacts with ozone.

Answer:

(i) It oxidises lead sulphide (PbS) to lead sulphate (PbSO_4) changing the oxidation state of S from -2 to $+6$.



(ii) Ozone oxidises nitrogen oxide to nitrogen dioxide.



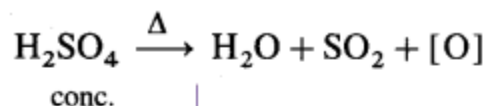
<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Question v.

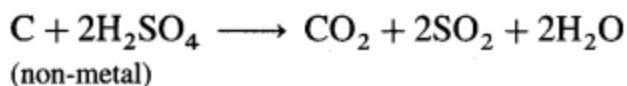
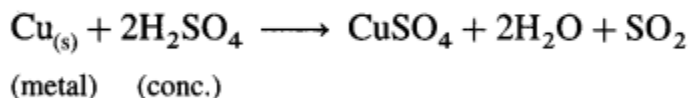
Give two chemical reactions to explain oxidizing property of concentrated H_2SO_4 .

Answer:

Hot and concentrated H_2SO_4 acts as an oxidising agent, since it gives nascent oxygen on heating.



It oxidises metals and non-metals. For example,

**Question vi.**

Discuss the structure of sulfur dioxide.

Answer:

(i) SO_2 molecule has a bent V shaped structure with S-O-S bond angle 119.5° and bond dissociation enthalpy is 297 kJ mol^{-1} .

(ii) Sulphur in SO_2 is sp^2 hybridised forming three hybrid orbitals. Due to lone pair electrons, bond angle is reduced from 120° to 119.5° .

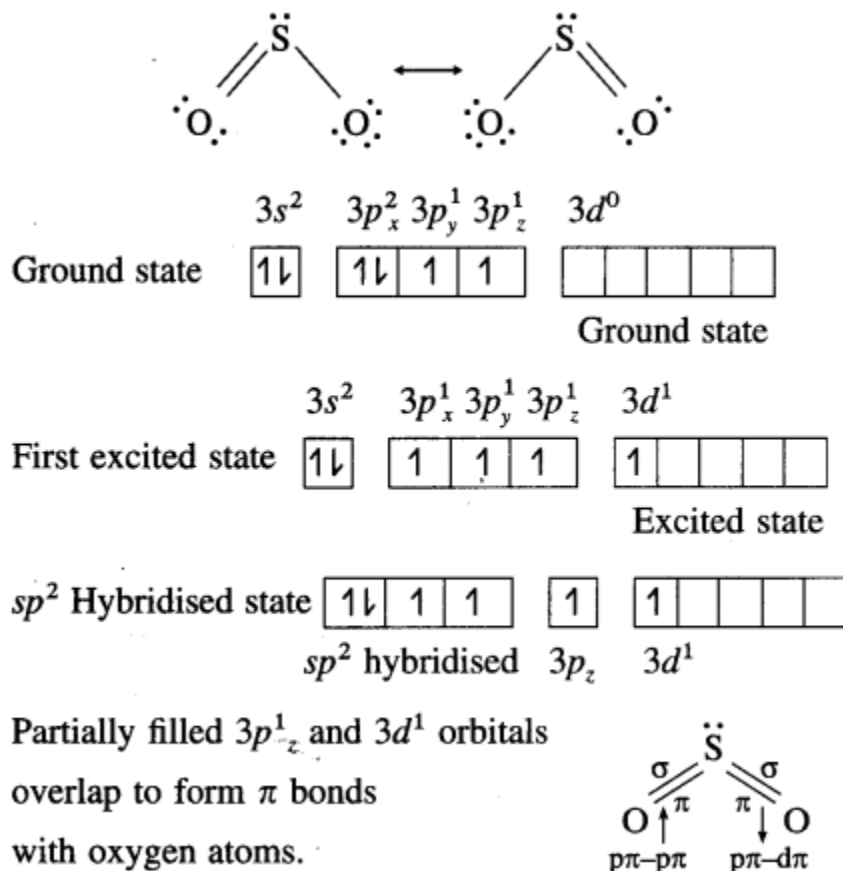
(iii) In SO_2 , each oxygen atom is bonded to sulphur by σ and a π bond.

(iv) a bond between S and O are formed by $\text{sp}^2\text{-p}$ overlapping.

(v) One of π bonds is formed by $\text{p}\pi - \text{p}\pi$ overlapping while other π bond is formed by $\text{p}\pi - \text{d}\pi$ overlap.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

(vi) Due to resonance both the bonds are identical having observed bond length 143 pm due to resonance,



Question vii.

Fluorine shows only -1 oxidation state while other halogens show -1, +1, +3, +5 and +7 oxidation states. Explain.

Answer:

- Halogens have outer electronic configuration $ns^2 np^5$.
- Halogens have tendency to gain or share one electron to attain the stable configuration of nearest inert element with configuration $ns^2 np^6$.
- Hence they are monovalent and show oxidation state – 1.
- Since fluorine does not have vacant d-orbital, it shows only one oxidation state of – 1 while all other halogens show variable oxidation states from – 1 to +7.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

- These oxidation states are, -1 , $+1$, $+3$, $+5$ and $+7$. Cl and Br also show oxidation states $+4$ and $+6$ in their oxides and oxyacids.

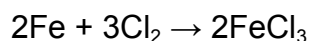
Question viii.

What is the action of chlorine on the following

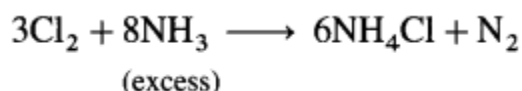
- Fe
- Excess of NH_3

Answer:

(a) Chlorine reacts with Fe to give ferric chloride.



(b) Chlorine reacts with the excess of ammonia to form ammonium chloride, NH_4Cl and nitrogen.

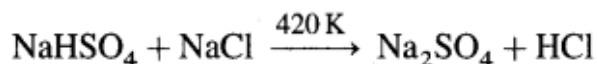
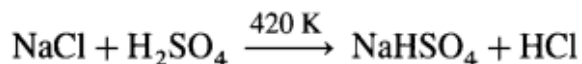


Question ix.

How is hydrogen chloride prepared from sodium chloride?

Answer:

1. In the laboratory, hydrogen chloride, HCl is prepared by heating a mixture of NaCl and concentrated H_2SO_4 .



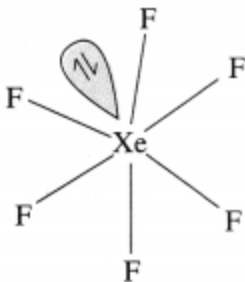
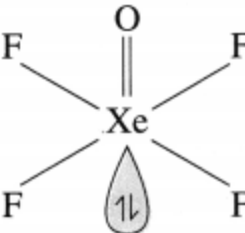
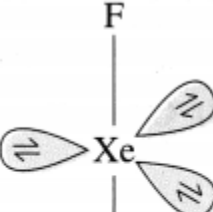
1. Hydrogen chloride gas, is dried by passing it through a dehydrating agent like concentrated H_2SO_4 and then collected by upward displacement of air.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Question x.

Draw structures of XeF_6 , XeO_3 , XeOF_4 , XeF_2 .

Answer:

Formula	Structure
XeF_6	 Distorted octahedral
XeO_3	 Trigonal pyramidal
XeOF_4	 Square pyramidal
XeF_2	 Linear

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Question xi.

What are interhalogen compounds? Give two examples.

Answer:

Interhalogen compounds : Compounds formed by the combination of atoms of two different halogens are called interhalogen compounds. In an interhalogen compound, of the two halogen atoms, one atom is more electropositive than the other. The interhalogen compound is regarded as the halide of the more electropositive halogen.

For example ClF, BrF₃, ICl

Question xii.

What is the action of hydrochloric acid on the following?

a. NH₃

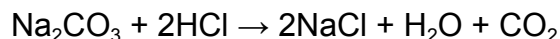
b. Na₂CO₃

Answer:

a. Hydrochloric acid reacts with ammonia to give white fumes of ammonium chloride.



b. Hydrochloric acid reacts with sodium carbonate to give sodium chloride, water with the liberation of carbon dioxide gas.



Question xiii.

Give two uses of HCl.

Answer:

Hydrogen chloride (OR hydrochloric acid) is used :

- in the manufacture of chlorine and ammonium chloride,

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

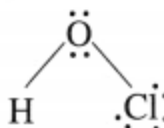
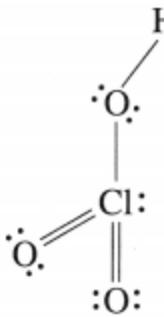
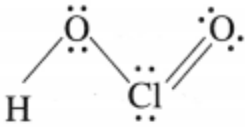
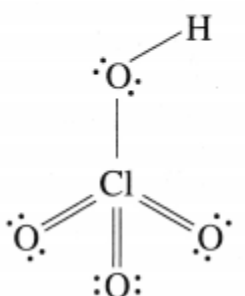
- to manufacture glucose from com, starch
- to manufacture dye
- in medicine and galvanising
- as an important reagent in the laboratory
- to extract glue from bones and for the purification of bone black.
- for dissolving metals, $\text{Fe} + 2\text{HCl}_{(\text{aq})} \rightarrow \text{FeCl}_2 + \text{H}_{2(\text{g})}$

Question xiv.

Write the names and structural formulae of oxoacids of chlorine.

Answer:

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Oxyacid of chlorine	Structure
(1) Hypochlorous acid, HOCl^{1+} :	
(3) Chloric acid, HClO_3^{5+} :	
(2) Chlorous acid, HClO_2^{3+} :	
(4) Perchloric acid, HClO_4^{7+} :	

Question xv.

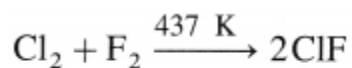
What happens when

- Cl_2 reacts with F_2 in equal volume at 437 K.
- Br_2 reacts with excess of F_2 .

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

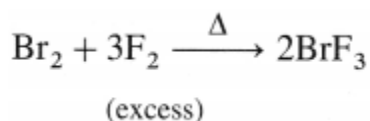
Answer:

(a) Cl_2 reacts with F_2 in equal volumes at 437 K to give chlorine monofluoride ClF.



(equal volumes)

(b) Br_2 reacts with excess of F_2 to give bromine trifluoride BF_3 .



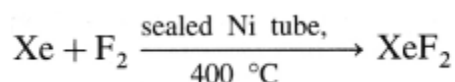
Question xvi.

How are xenon fluorides XeF_2 , XeF_4 and XeF_6 obtained ? Give suitable reactions.

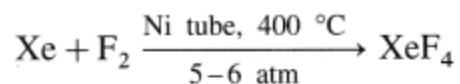
Answer:

Xenon fluorides are generally prepared by the direct reaction of xenon and fluorine in different ratios and under appropriate experimental conditions, such as temperature, in the presence of an electric discharge and by a photochemical reaction.

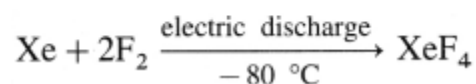
(i) Preparation of XeF_2 :



(ii) Preparation of XeF_4 :

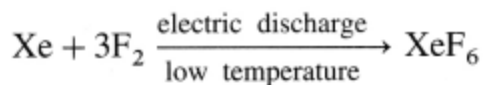


(1 : 5)



(iii) Preparation of XeF_6 :

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>



Question xvii.

How are XeO_3 and XeOF_4 prepared?

Answer:

Preparation of XeO_3 : Xenon trioxide (XeO_3) is prepared by the hydrolysis of XeF_4 or XeF_6 .

- **By hydrolysis of XeF_4 :**
 $3\text{XeF}_4 + 6\text{H}_2\text{O} \rightarrow 2\text{Xe} + \text{XeO}_3 + 12\text{HF} + 11\text{O}_2$
- **By hydrolysis of XeF_6 :**
 $\text{XeF}_6 + 3\text{H}_2\text{O} \rightarrow \text{XeO}_3 + 6\text{HF}$
- **Preparation of XeOF_4 :**
Xenon oxytetrafluoride (XeOF_4) is prepared by the partial hydrolysis of XeF_6 .
 $\text{XeF}_6 + \text{H}_2\text{O} \rightarrow \text{XeOF}_4 + 2\text{HF}$

Question xviii.

Give two uses of neon and argon.

Answer:

Uses of neon (Ne) :

- Neon is used in the production of neon discharge lamps and signs by filling Ne in glass discharge tubes.
- Neon signs are visible from a long distance and also have high penetrating power in mist or fog.
- A mixture of neon and helium is used in voltage stabilizers and current rectifiers.
- Neon is also used in the production of lasers and fluorescent tubes.

Uses of argon (Ar) :

- Argon is used to fill fluorescent tubes and radio valves.
- It is used to provide inert atmosphere for welding and production of steel.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

- It is used along with neon in neon sign lamps to obtain different colours.
- A mixture of 85% Ar and 15% N₂ is used in electric bulbs to enhance the life of the filament.

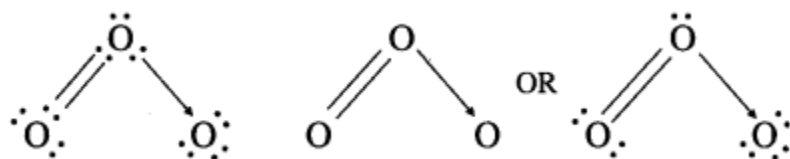
Question xix.

Describe the structure of Ozone. Give two uses of ozone.

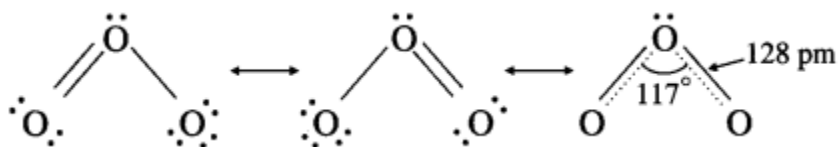
Answer:

(A)

- Ozone has molecular formula O₃.
- The lewis dot and dash structures for O₃ are :



- Infrared and electron diffraction spectra show that O₃ molecule is angular with O-O-O bond angle 117°.
- Both O-O bonds are identical having bond length 128 pm which is intermediate between single and double bonds.
- This is explained by considering resonating structures and resonance hybrid.



(B) Uses of Ozone :

- Ozone sterilises drinking water by oxidising germs and bacteria present in it.
- It is used as a bleaching agent for ivory, oils, starch, wax and delicate fabrics like silk.
- Ozone is used to purify the air in crowded places like Cinema halls, railways, tunnels, etc.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

- In industry, ozone is used in the manufacture of synthetic camphor, potassium permanganate, etc.

Question xx.

Explain the trend in following atomic properties of group 16 elements.

- i. Atomic radii
- ii. Ionisation enthalpy
- iii. Electronegativity.

Answer:

(1) Atomic and ionic radii :

1. As compared to group 15 elements, the atomic and ionic radii of group 16 elements are smaller due to higher nuclear charge.
2. The atomic and ionic radii increase down the group from oxygen to polonium. This is due to the addition of a new shell at each successive elements on moving down the group. The atomic radii increases in the order $O < S < Se < Te < Po$

(2) Ionisation enthalpy :

- The ionisation enthalpy of group 16 elements has quite high values.
- Ionisation enthalpy decreases down the group from oxygen to polonium. This is due to the increase in atomic volume down the group.
- The first ionisation enthalpy of the lighter elements of group 16 (O, S, Se) have lower values than those of group 15 elements in the corresponding periods. This is due to difference in their electronic configurations.

Group 15 : (valence shell) $ns^2 np_x^1 np_y^1 np_z^1$

Group 16 : (valence shell) $ns^2 np_x^2 np_y^1 np_z^1$

Group 15 elements have extra stability of half-filled and more symmetrical orbitals, while group 16 elements acquire extra stability by losing one of paired electrons from np_x -orbital forming half-filled p-orbitals.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Hence group 16 elements have lower first ionisation enthalpy than group 15 elements.

(3) Electronegativity :

- The electronegativity values of group 16 elements have higher values than corresponding group 15 elements in the same periods.
- Oxygen is the second most electronegative elements after fluorine. (O = 3.5, F = 4)
- On moving down the group electronegativity decreases from oxygen to polonium.
- On moving down the group atomic size increases, hence nuclear attraction decreases, therefore electro-negativity decreases.

Elements	O	S	Se	Te	Po
Electronegativity	3.5	2.4	2.4	2.0	1.7

4. Answer the following.

Question i.

Distinguish between rhombic sulfur and monoclinic sulfur.

Answer:

Rhombic sulphur	Monoclinic sulphur
1. It is pale yellow.	1. It is bright yellow.
2. Orthorhombic crystals	2. Needle-shaped monoclinic crystals
3. Melting point, 385.8 K	3. Melting point, 393 K
4. Density, 2.069 g/cm ³	4. Density: 1.989 g/cm ³

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

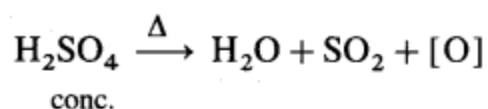
- | | |
|---|---|
| 5. Insoluble in water, but soluble in CS ₂ | 5. Soluble in CS ₂ |
| 6. It is stable below 369 K and transforms to α-sulphur above this temperature. | 6. It is stable above 369 K and transforms into β-sulphur below this temperature. |
| 7. It exists as S ₈ molecules with a structure of a puckered ring. | 7. It exists as S ₈ molecules with a structure of a puckered ring. |
| 8. It is obtained by the evaporation of roll sulphur in CS ₂ | 8. It is prepared by melting rhombic sulphur and cooling it till a crust is formed. Two holes are pierced in the crust and the remaining liquid is poured to obtain needle-shaped crystals of monoclinic sulphur (β-sulphur). |

Question ii.

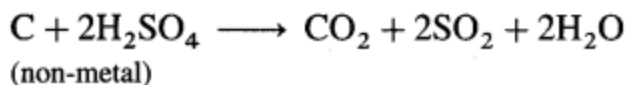
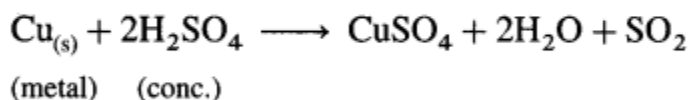
Give two reactions showing oxidizing property of concentrated H₂SO₄.

Answer:

Hot and concentrated H₂SO₄ acts as an oxidising agent, since it gives nascent oxygen on heating.



It oxidises metals and non-metals. For example,



<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Question iii.

How is SO_2 prepared in the laboratory from sodium sulfite? Give two physical properties of SO_2 .

Answer:

(A) Laboratory method (From sulphite) :

- Sodium sulphite on treating with dilute H_2SO_4 forms SO_2 .
$$\text{Na}_2\text{SO}_3 + \text{H}_2\text{SO}_{4(\text{aq})} \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{O}_{(1)} + \text{SO}_{2(\text{g})}$$
- Sodium sulphite, Na_2SO_3 on reaction with dilute hydrochloric acid solution forms SO_2 .
$$\text{Na}_2\text{SO}_{3(\text{aq})} + 2\text{HCl}_{(\text{aq})} \rightarrow 2\text{NaCl}_{\text{aq}} + \text{H}_2\text{O}_{(1)} + \text{SO}_{2(\text{g})}$$

(B) Physical properties of SO_2

- It is a colourless gas with a pungent smell.
- It is highly soluble in water and forms sulphurous acid, H_2SO_3
$$\text{SO}_{2(\text{g})} + \text{H}_2\text{O}_{(1)} \rightarrow \text{H}_2\text{SO}_{3(\text{aq})}$$
- It is poisonous in nature.
- At room temperature, it liquefies at 2 atmospheres. It has boiling point 263K.

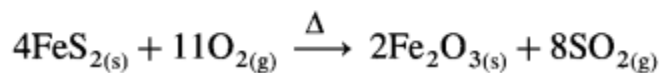
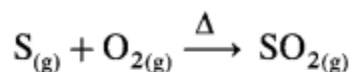
Question iv.

Describe the manufacturing of H_2SO_4 by contact process.

Answer:

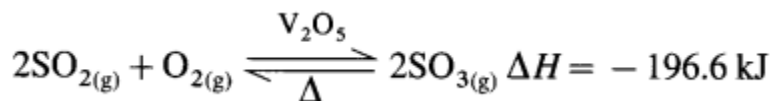
Contact process of the manufacture of sulphuric acid involves following steps :

(1) Preparation of SO_2 : Sulphur or pyrite ores like iron pyrites, FeS_2 on burning in excess of air, form SO_2 .



<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

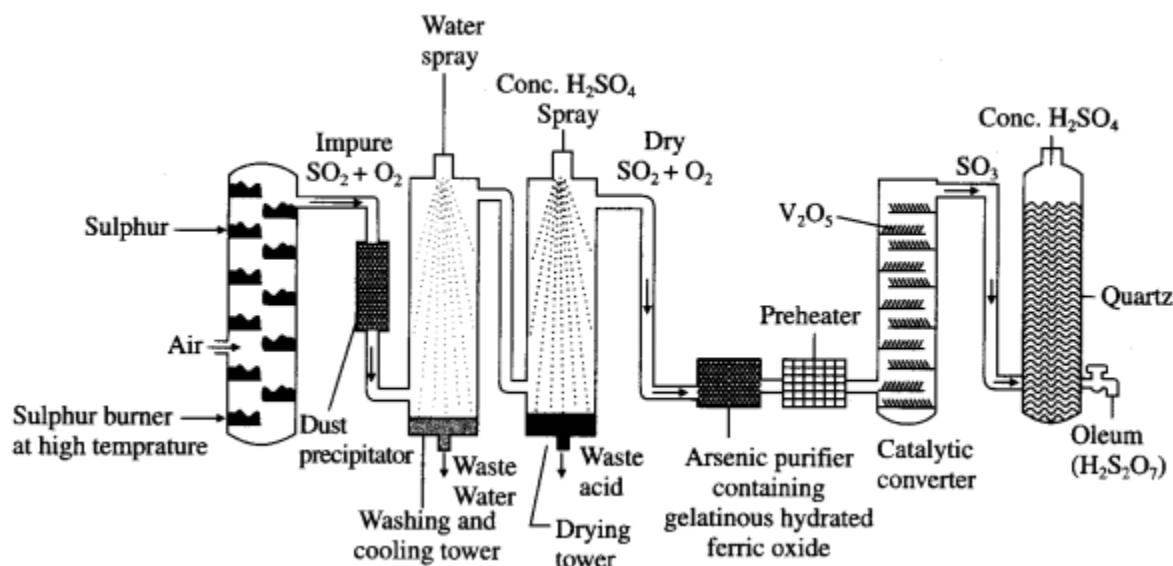
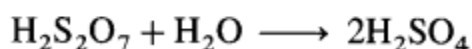
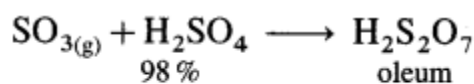
(2) Oxidation of SO_2 to SO_3 : SO_2 is oxidised to SO_3 in the presence of a heterogeneous catalyst V_2O_5 and atmospheric oxygen. This oxidation reaction is reversible.



To avoid the poisoning of a costly catalyst, it is necessary to make SO_2 free from the impurities like dust, moisture, As_2O_3 poison, etc.

The forward reaction is exothermic and favoured by increase in pressure. The reaction is carried out at high pressure (2 bar) and 720 K temperature. The reacting gases, SO_2 and O_2 are taken in the ratio 2:3.

(3) Dissolution of SO_3 : SO_3 obtained from catalytic converter is absorbed in 98% H_2SO_4 to obtain $\text{H}_2\text{S}_2\text{O}_7$, oleum or fuming sulphuric acid.



Flow diagram for the manufacture of sulphuric acid

Question 7.1 (Textbook Page No 141)

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Question 1.

Elements of group 16 generally show lower values of first ionisation enthalpy compared to the elements of corresponding period of group 15. Why?

Answer:

Group 15 elements have extra stable, half filled p-orbitals with electronic configuration (ns^2np^3). Therefore more amount of energy is required to remove an electron compared to that of the partially filled orbitals (ns^2np^4) of group 16 elements of the corresponding period.

Question 7.2 (Textbook Page No 141)**Question 1.**

The values of first ionisation enthalpy of S and Cl are 1000 and 1256 kJ mol⁻¹, respectively. Explain the observed trend.

Answer :

The elements S and Cl belong to second period of the periodic table.

Across a period effective nuclear charge increases and atomic size decreases with increase in atomic number. Therefore the energy required for the removal of electron from the valence shell (I.E.) increases in the order $S < Cl$.

Question 7.4 (Textbook Page No 141)**Question 1.**

Fluorine has less negative electron gain affinity than chlorine. Why?

Answer :

The size of fluorine atom is smaller than chlorine atom. As a result, there are strong inter electronic repulsions in the relatively small 2p orbitals of fluorine and therefore, the incoming electron does not experience much attraction. Thus fluorine has less negative electron gain affinity than chlorine.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Try this... (Textbook Page No 140)

Question 1.

Explain the trend in the following properties of group 17 elements.

- (1) Atomic size,
- (2) Ionisation enthalpy,
- (3) Electronegativity,
- (4) Electron gain enthalpy.

Answer:

(1) Atomic size :

- Atomic and ionic radii increase down the group as atomic number increases due to the addition of new electronic valence shell to each succeeding element.
- The atomic radii increase in the order $F < Cl < Br < I$
- Halogens possess the smallest atomic and ionic radii in their respective periods since the effective nuclear charge experienced by valence electrons in halogen atoms is the highest.

(2) Ionisation enthalpy :

- The ionisation enthalpies of halogens are very high due to their small size and large nuclear attraction.
- The ionisation enthalpies decrease down the group since the atomic size increases.
- The ionisation enthalpy decreases in the order $F > Cl > Br > I$.
- Among halogens fluorine has the highest ionisation enthalpy due to its smallest size.

Element	F	Cl	Br	I
Ionisation enthalpy	168	125	114	100

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

kJ/mol 0 6 2 8

(3) Electronegativity :

- Halogens have the highest values for electronegativity due to their small atomic radii and high effective nuclear charge.
- Each halogen is the most electronegative element of its period.
- Fluorine has the highest electronegativity as compared to any element in the periodic table.
- The electronegativity decreases as,
 $F > Cl > Br > I$
4.0 3.2 3.0 2.7 (electronegativity)

(4) Electron gain enthalpy ($\Delta_{eg}H$) :

- The halogens have the highest negative values for electron gain enthalpy.
- Electron gain enthalpies of halogens are negative indicating release of energy.
- Halogens liberate maximum heat by gain of electron as compared to other elements.
- Since halogens have outer valence electronic configuration, $ns^2 np^5$, they have strong tendency to accept an electron to complete an octet and acquire electronic configuration of the nearest inert elements.
- In case of fluorine due to small size of 2 p-orbitals and high electron density, F has less negative electron gain enthalpy than Cl.
 $F_{(g)} + e^- \rightarrow F^-_{(g)} \Delta_{eg}H = - 333 \text{ kJ mol}^{-1}$
 $Cl_{(g)} + e^- \rightarrow Cl^-_{(g)} \Delta_{eg}H = - 349 \text{ kJ mol}^{-1}$
- The variation in electron gain enthalpy is in the order of, $Cl > F > Br > I$.

Question 2.

Oxygen has less negative electron gain enthalpy than sulphur. Why?

Answer:

- Oxygen has a smaller atomic size than sulphur.
- It is more electronegative than sulphur.
- It has a larger electron density.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

- Due to high electron density, oxygen does not accept the incoming electron easily and therefore has less electron gain enthalpy than sulphur.

Question 7.3 (Textbook Page No 141)**Question 1.**

Why is there a large difference between the melting and boiling points of oxygen and sulphur?

Answer :

Oxygen exists as diatomic molecule (O_2) whereas sulphur exists as polyatomic molecule (S_8). The van der Waals forces of attraction between O_2 molecules are relatively weak owing to their much smaller size. The large van der Waals attractive forces in the S_8 molecules are due to large molecular size. Therefore oxygen has low m.p. and b.p. as compared to sulphur.

Question 7.5 (Textbook Page No 141)**Question 1.**

Bond dissoClation enthalpy of F_2 ($158.8 \text{ kJ mol}^{-1}$) is lower than that of Cl_2 ($242.6 \text{ kJ mol}^{-1}$) Why?

Answer :

Fluorine has small atomic size than chlorine. The lone pairs on each F atom in F_2 molecule are so close together that they strongly repel each other, and make the F – F bond weak. Thus, it requires less amount of energy to break the F – F bond. In Cl_2 molecule the lone pairs on each Cl atom are at a larger distance and the repulsion is less.

Thus Cl – Cl bond is comparatively stronger. Therefore bond dissoClation enthalpy of F_2 is lower than that of Cl_2 .

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>



lone pair – lone pair repulsion

Fig. 7.1

Question 7.6 (Textbook Page No 142)

Question 1.

Noble gases have very low melting and boiling points. Why?

Answer :

Noble gases are monoatomic, the only type of interatomic interactions which exist between them are weak van der Waals forces. Therefore, they can be liquefied at very low temperatures and have very low melting or boiling points.

Can you tell? (Textbook Page No 142)

Question 1.

The first member of the a group usually differs in properties from the rest of the members of the group. Why?

Answer:

The first member of a group usually differs in properties from the rest of the members of the group for the following reasons :

- Its small size
- High electronegativity
- Absence of vacant d-orbitals in its valence shell.

Use your brain power! (Textbook Page No 142)

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Question 1.

Oxygen forms only OF_2 with fluorine while sulphur forms SF_6 . Explain. Why?

Answer:

- Oxygen combines with the most electronegative element fluorine to form OF_2 and exhibits positive oxidation state (+ 2). Since, oxygen does not have vacant J-orbitals it cannot exhibit higher oxidation states.
- Sulphur has vacant d-orbitals and hence can exhibit + 6 oxidation state to form SF_6 .

Question 2.

Which of the following possesses hydrogen bonding? H_2S , H_2O , H_2Se , H_2Te

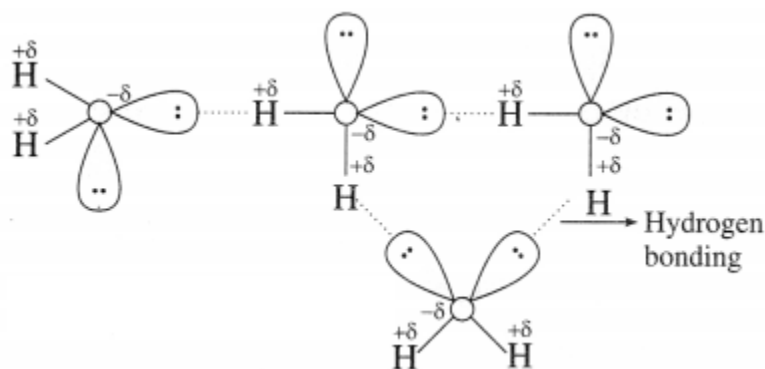
Answer:

- Oxygen being more electronegative, is capable of forming hydrogen bonding in the compound H_2O .
- The other elements S, Se and Te of Group 16, being less electronegative do not form hydrogen bonds.
- Thus, hydrogen bonding is not present in the other hydrides H_2S , H_2Se and H_2Te .

Question 3.

Show hydrogen bonding in the above molecule with the help of a diagram.

Answer:



<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Try this..... (Textbook Page No 143)

Question 1.

Complete the following tables :

Element	O	O	S	F
Compound	H₂O	OF₂	H₂S	HF
Oxidation state	- 2	.....	.....	.....
Element	Se	Se	Te	Cl
Compound	SeO₂	SeO₃	TeF₆	HOCl
Oxidation state	.....	+ 6	.....	.....

Answer:

Element	O	O	S	F
Compound	H ₂ O	OF ₂	H ₂ S	HF
Oxidation state	- 2	+ 2	- 2	- 1
Element	Se	Se	Te	Cl
Compound	SeO ₂	SeO ₃	TeF ₆	HOCl
Oxidation state	+ 4	+ 6	+ 6	+ 1

Can you tell? (Textbook Page No 146)

Question 1.

What is allotropy?

Answer:

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

The property of some elements to exist in two or more different forms in the same physical state is called allotropy.

Question 2.

What is the difference between allotropy and polymorphism?

Answer:

- Allotropy is the existence of an element in more than one physical form. It means that under different conditions of temperature and pressure an element can exist in more than one physical forms.
- Coal, graphite and diamond etc., are different allotropic forms of carbon.
- Polymorphism is the existence of a substance in more than one crystalline form.
- It means that under different conditions of temperature and pressure, a substance can form more than one type of crystal. For example, mercuric iodide exists in the orthorhombic and trigonal form.

Question 7.7 (Textbook Page No 146)

Which form of sulphur shows paramagnetic behaviour?

Answer :

In the vapour state, sulphur partly exists as S_2 molecule, which has two unpaired electrons in the antibonding π^* orbitals like O_2 . Hence it exhibits paramagnetism.

Try this..... (Textbook Page No 149)

Question 1.

Why water in a fish pot needs to be changed from time to time?

Answer:

A fish pot is an artificial ecosystem and the fish in it are selective and maintained in a restricted environment.

In a fish pot, the unwanted food and waste generated by the fish mix with the water and remain untreated due to lack of decomposers.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Accumulation of waste material will decrease the levels of dissolved oxygen in the water pot.

Hence, it is necessary to change the water from time to time.

Question 7.8 (Textbook Page No 149)

Dioxygen is paramagnetic in spite of having an even number of electrons. Explain.

Answer :

Dioxygen is a covalently bonded molecule.

The paramagnetic behaviour of O_2 can be explained with the help of molecular orbital theory.

Electronic configuration O_2

KK $\sigma(2s)^2 \sigma^*(2s)^2 \sigma(2p_z)^2 \pi(2p_x)^2 \pi(2p_y)^2 \pi^*(2p_x)^1 \pi^*(2p_y)^1$. Presence of two unpaired electrons in antibonding orbitals explains paramagnetic nature of dioxygen.

Question 7.9 (Textbook Page No 150)

High concentration of ozone can be dangerously explosive. Explain.

Answer :

Thermal stability : Ozone is thermodynamically unstable than oxygen and decomposes into O_2 . The decomposition is exothermic and results in the liberation of heat (ΔH is –ve) and an increase in entropy (ΔS is positive). This results in large negative Gibbs energy change (ΔG). Therefore high concentration of ozone can be dangerously explosive. Eq $O_3 \rightarrow O_2 + O$

Try this..... (Textbook Page No 151)

(a) Ozone is used as a bleaching agent. Explain.

Answer:

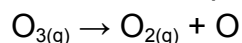
<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

- Ozone due to its oxidising property can act as a bleaching agent. $O_{3(g)} \rightarrow O_{2(g)} + O$
- It bleaches coloured matter. $\text{coloured matter} + O \rightarrow \text{colourless matter}$
- Ozone bleaches in the absence of moisture, so it is also known as dry bleach.
- Ozone can bleach ivory and delicate fabrics like silk.

(b) Why does ozone act as a powerful oxidising agent?

Answer:

Ozone decomposes to liberate nascent oxygen, hence it is a powerful oxidising agent.



For example :

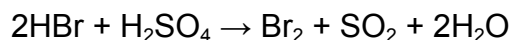
- It oxidises lead sulphide (PbS) to lead sulphate (PbSO₄).
 $PbS_{(s)} + 4O_{3(g)} \rightarrow PbSO_{4(s)} + 4O_{2(g)}$
- Potassium iodide, KI is oxidised to iodine, I₂ in the solution.
 $2KI_{(aq)} + H_2O_{(l)} + O_{3(g)} \rightarrow 2KOH_{(aq)} + I_{2(s)} + O_{2(g)}$

Question 7.10 : (Textbook Page No 154)

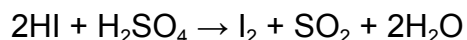
What is the action of concentrated H₂SO₄ on (a) HBr (b) HI

Answer :

Concentrated sulphuric acid oxidises hydrobromic acid to bromine.



It oxidises hydroiodic acid to iodine.



Try this..... (Textbook Page No 156)

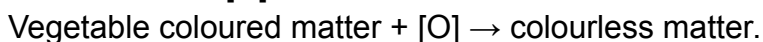
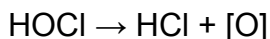
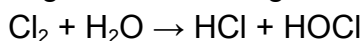
Question 1.

Give the reasons for the bleaching action of chlorine.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Answer:

- Chlorine acts as a powerful bleaching agent due to its oxidising nature.
- In moist conditions or in the presence of water it forms unstable hypochlorous acid, HOCl which decomposes giving nascent oxygen which oxidises the vegetable colouring matter of green leaves, flowers, litmus, indigo, etc.



Question 2.

Name two gases used in war.

Answer:

Phosgene : COCl_2

Mustard gas: $\text{Cl} - \text{CH}_2 - \text{CH}_2 - \text{S} - \text{CH}_2 - \text{CH}_2 - \text{Cl}$

Use your brain power! (Textbook Page No 157)

Question 1.

Chlorine and fluorine combine to form interhalogen compounds. The halide ion will be of chlorine or fluorine?

Answer:

Among the- two halogens, chlorine is more electropositive than fluorine
(Electronegativity values: F = 4.0, Cl = 3.2)

The interhalogen compound is regarded as the halide of the more electropositive halogen. Hence, the interhalogen compound is the fluoride of chlorine, i.e. chlorine monofluoride, ClF .

Question 2.

Why does fluorine combine with other halogens to form maximum number of fluorides?

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Answer:

Since fluorine is the most electronegative element and has the smallest atomic radius compared to other halogen fluorine forms maximum number of fluorides.

Use your brain power! (Textbook Page No 158)

Question 1.

What will be the names of the following compounds: ICl, BrF?

Answer:

ICl : Iodine monochloride

BrF : Bromine monofluoride

Question 2.

Which halogen (X) will have maximum number of other halogen (X) attached?

Answer:

The halogen Iodine (I) will have the maximum number of other halogens attached.

Question 3.

Which halogen has tendency to form more interhalogen compounds?

Answer:

The halogen fluorine (F) has the maximum tendency to form more interhalogen compounds as it has a small size and more electronegativity.

Question 4.

Which will be more reactive?

(a) ClF_3 or ClF,

(b) BrF_5 or BrF

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

Answer:

ClF_3 is more reactive than ClF , while BrF_5 is more reactive than BrF . Both ClF_3 and BrF_5 are unstable compared to ClF and BrF respectively due to steric hindrance hence are more reactive.

Question 5.

Complete the table :

Formula	Name
ClF	Chlorine monofluoride
ClF_3	.....
.....	Chlorine pentachloride
BrF}	.....
.....	Bromine pentafluoride
ICl}	.....
ICl_3	.....

Answer:

Formula	Name
ClF	Chlorine monofluoride
ClF_3	Chlorine trifluoride
ClF_5	Chlorine

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

	pentafluoride
BrF	Bromine monofluoride
BrF ₅	Bromine pentafluoride
ICl	Iodine monochloride
ICl ₃	Iodine trichloride

Use your brain power! (Textbook Page No 159)

Question 1.

In the special reaction for ICl, identify the oxidant and the reductant? Denote oxidation states of the species.

Answer:



Potassium chlorate, KClO₃ is the oxidising agent or oxidant and iodine is the reducing agent or reductant.

Use your brain power! (Textbook Page No 162)

Question 1.

What are missing entries?

	Name
Formula	

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

XeOF_2	Xenon monooxyfluoride
.....	Xenon dioxydifluoride
XeO_3F_2	.....
XeO_2F_4	.....

Answer:

Formula	Name
XeOF_2	Xenon monooxydifluoride
XeO_2F_2	Xenon dioxydifluoride
XeO_3F_2	Xenon trioxydifluoride
XeO_2F_4	Xenon dioxytetrafluoride



Maharashtra Board Solutions

Class 12 Chemistry

- Chapter 1- Solid State
- Chapter 2- Solutions
- Chapter 3- Ionic Equilibria
- Chapter 4- Chemical Thermodynamics
- Chapter 5- Electrochemistry
- Chapter 6- Chemical Kinetics
- Chapter 7- Elements of Groups 16, 17 and 18
- Chapter 8- Transition and Inner Transition Elements
- Chapter 9- Coordination Compounds
- Chapter 10- Halogen Derivatives
- Chapter 11- Alcohols, Phenols and Ethers
- Chapter 12- Aldehydes, Ketones and Carboxylic Acids
- Chapter 13- Amines
- Chapter 14- Biomolecules
- Chapter 15- Introduction to Polymer Chemistry
- Chapter 16- Green Chemistry and Nanochemistry

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

About About Maharashtra State Board (MSBSHSE)

The Maharashtra State Board of Secondary and Higher Secondary Education or MSBSHSE (Marathi: महाराष्ट्र राज्य माध्यमिक आणि उच्च माध्यमिक शिक्षण मंडळ), is an **autonomous and statutory body established in 1965**. The board was amended in the year 1977 under the provisions of the Maharashtra Act No. 41 of 1965.

The Maharashtra State Board of Secondary & Higher Secondary Education (MSBSHSE), Pune is an independent body of the Maharashtra Government. There are more than 1.4 million students that appear in the examination every year. The Maha State Board conducts the board examination twice a year. This board conducts the examination for SSC and HSC.

The Maharashtra government established the Maharashtra State Bureau of Textbook Production and Curriculum Research, also commonly referred to as Ebalbharati, in 1967 to take up the responsibility of providing quality textbooks to students from all classes studying under the Maharashtra State Board. MSBHSE prepares and updates the curriculum to provide holistic development for students. It is designed to tackle the difficulty in understanding the concepts with simple language with simple illustrations. Every year around 10 lakh students are enrolled in schools that are affiliated with the Maharashtra State Board.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

FAQs

Where do I get the Maharashtra State Board Books PDF For free download?

You can download the Maharashtra State Board Books from the eBalbharti official website, i.e. cart.ebalbharati.in or from this article.

Add image

How to Download Maharashtra State Board Books?

Students can get the Maharashtra Books for primary, secondary, and senior secondary classes from here. You can view or download the Maharashtra State Board Books from this page or from the official website for free of cost. Students can follow the detailed steps below to visit the official website and download the e-books for all subjects or a specific subject in different mediums.

Step 1: Visit the official website ebalbharati.in

Step 2: On the top of the screen, select "Download PDF textbooks"

Step 3: From the "Classes" section, select your class.

Step 4: From "Medium", select the medium suitable to you.

Step 5: All Maharashtra board books for class 11th will now be displayed on the right side.

Step 6: Click on the "Download" option to download the PDF book.

Who developed the Maharashtra State board books?

As of now, the MSCERT and Balbharti are responsible for the syllabus and textbooks of Classes 1 to 8, while Classes 9 and 10 are under the Maharashtra State Board of Secondary and Higher Secondary Education (MSBSHSE).

How many state boards are there in Maharashtra?

The Maharashtra State Board of Secondary & Higher Secondary Education, conducts the HSC and SSC Examinations in the state of Maharashtra through its nine Divisional Boards located at Pune, Mumbai, Aurangabad, Nasik, Kolhapur, Amravati, Latur, Nagpur and Ratnagiri.

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>

About IndCareer

IndCareer.com is a leading developer of online career guidance resources for the Indian marketplace. Established in 2007, IndCareer.com is currently used by over thousands of institutions across India, including schools, employment agencies, libraries, colleges and universities.

IndCareer.com is designed to assist you in making the right career decision - a decision that meets your unique interests and personality.

For any clarifications or questions you can write to **info@indcareer.com**

Postal Address

IndCareer.com
52, Shilpa Nagar,
Somalwada
Nagpur - 440015
Maharashtra, India

WhatsApp: +91 9561 204 888

Website: <https://www.indcareer.com>

<https://www.indcareer.com/schools/maharashtra-board-solutions-class-12-chemistry-chapter-7-elements-of-groups-16-17-and-18/>