

1. Find out the oxidation number of chlorine in the following compounds and arrange them in increasing order of oxidation number of chlorine.

NaClO₄, NaClO₃, NaClO, KClO₂, Cl₂O₇, ClO₃, Cl₂O, NaCl, Cl₂, ClO₂

Solution:

NaClO₄ x= +7

NaClO₃, x= +5

NaClO, x=+1

KClO₂, x= +3

Cl₂O₇, x= +7

ClO₃, x= +6

Cl₂O, x=+1

NaCl, x=-1

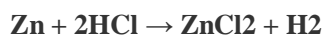
Cl₂, x=0

ClO₂, x= +4

Ascending order of compounds w.r.t their oxidation number is:

NaCl (-1), Cl₂(0), Cl₂O(+1), KClO₂(+3), ClO₂(+4), NaClO₃(+5), ClO₃(+6), Cl₂O₇=NaClO₄(+7).

2. identify the correct statement (s) with the following reaction:



- (i) Zinc is acting as an oxidant
- (ii) Chlorine is acting as a reductant
- (iii) Hydrogen ion is acting as an oxidant
- (iv) Zinc is acting as a reductant

Solution:

Option (iii) and (iv) are the answers.

3. The exhibition of various oxidation states by an element is also related to the outer orbital electronic configuration of its atom. Atom(s) having which of the following outermost electronic configurations will exhibit more than one oxidation state in its compounds.

- (i) 3s¹
- (ii) 3d¹ 4s²
- (iii) 3d² 4s²
- (iv) 3s² 3p³

Solution:

Option (iii) and (iv) are the answers.

4. Identify the correct statements with reference to the given reaction



- (i) Phosphorus is undergoing reduction only.

- (ii) Phosphorus is undergoing oxidation only.
- (iii) Phosphorus is undergoing oxidation as well as reduction.
- (iv) Hydrogen is undergoing neither oxidation nor reduction.

Solution:

Option (iii) and (iv) are the answers

5. The reaction

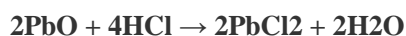


represents the process of bleaching. Identify and name the species that bleaches the substances due to its oxidising action.

Solution:

Hypochlorite ion is the species that bleaches the substance due to its oxidizing action.

6. PbO and PbO₂ react with HCl according to the following chemical equations:



Why do these compounds differ in their reactivity?

Solution:

In reaction (i), none of the atoms changes. Therefore, it is not a redox reaction. It is an acid-base reaction because PbO is a basic oxide which reacts with HCl acid.

The reaction (ii) is a redox reaction in which PbO₂ gets reduced and acts as an oxidizing agent

7. Nitric acid is an oxidising agent and reacts with PbO but it does not react with PbO₂. Explain why?

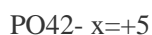
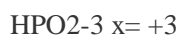
Solution:

Nitric acid is an oxidizing agent and reacts with PbO to give a simple acid-base reaction without any change in oxidation state. In PbO₂, Pb is in +4 oxidation state and cannot be oxidized further, hence no reaction takes place between PbO₂ and HNO₃.

8. Calculate the oxidation number of phosphorus in the following species.

- (a) HPO₂³⁻ and PO₄²⁻

Solution:



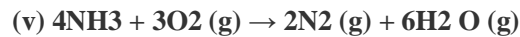
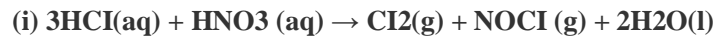
9. . Calculate the oxidation number of phosphorus in the following species.

- (a) Na₂S₂O₃
- (b) Na₂S₄O₆
- (c) Na₂SO₃
- (d) Na₂SO₄

Solution:



10. Identify the redox reactions out of the following reactions and identify the oxidising and reducing agents in them.



Solution:

(i) (iii) and (iv) are redox reactions

In (i) Reducing agent: HCl

Oxidizing agent: HNO₃

In (iii) Oxidising agent: Fe₂O₃

Reducing agent: CO

In (iv) Oxidising agent: O₂

Reducing agent: NH₃