



WEEKLY HOME STUDY PACKAGE – WEEK 1 (05/07/21 – 09/07/21)

Subject	CHEMISTRY	YEAR/LEVEL	12
Strand	2 – INVESTIGATING MATTER		
Sub – Strand	CH 12.3.2 – OXIDATION AND REDUCTION		
Content Learning Outcome	Investigate redox reactions and its application in the production of some useful metals.		

OXIDATION NUMBER (OXIDATION STATE)

Objective: To calculate oxidation number of some common neutral atom and polyatomic ion.

An oxidation number is a number that is assigned to an element in a chemical reaction to show the total number of electrons which have been removed from an element (a positive oxidation state) or added to an element (a negative oxidation state) to get to its present state.

Oxidation state is commonly used to determine the changes in redox reactions and is mostly numerically similar to valence electrons.

Rules for Assigning Oxidation Number

1. The oxidation number of an atom is zero in a neutral substance that contains only one type of element.

Example: For O_2 and Mg , the oxidation number is 0.

2. The oxidation number of each oxygen atom in a compound is -2, except in peroxides (e.g. H_2O_2) where the oxidation number is -1.
3. The oxidation number of each hydrogen atom in a compound is +1 except in metallic hydrides (example in LiH , NaH , CaH_2 , and $LiAlH_4$) where it is -1.

4. The oxidation number of Group I metals is +1.

5. The oxidation number of Group II metals is +2.

6. The sum of the oxidation number in a neutral molecule is equal to zero (0).

Example: For $C_6H_{12}O_6$, the oxidation number is 0.

7. The oxidation number of an atom in a monoatomic ion is equal to the charge on the ion.

Example for: $Na^+ = +1$

$Cl^- = -1$

8. The sum of the oxidation numbers in a polyatomic ion is equal to the charge on the ion.

Example for H_3O^+ , the oxidation number is +1.

Note: Always include '+' or '-' sign before the number to indicate oxidation states.

Example : Calculate the oxidation number of sulphur in:

(i) Sulphur in SO_3

$$1(\text{S}) + 3(\text{O}) = 0$$

$$\text{S} + 3(-2) = 0$$

$$\text{S} - 6 = 0$$

$$\underline{\text{S} = +6}$$

(ii) Sulphur in SO_4^{2-}

$$1(\text{S}) + 4(\text{O}) = -2$$

$$\text{S} + 4(-2) = -2$$

$$\text{S} - 8 = -2$$

$$\underline{\text{S} = +6}$$

(iii) Sulphur in H_2SO_4

$$2(\text{H}) + 1(\text{S}) + 4(\text{O}) = 0$$

$$2(+1) + \text{S} + 4(-2) = 0$$

$$+2 + \text{S} - 8 = 0$$

$$\text{S} - 6 = 0$$

$$\underline{\text{S} = +6}$$

Exercise

Answer the following questions:

1. Find the oxidation number of chromium (Cr) in: **(3 marks)**

i. $\text{K}_2\text{Cr}_2\text{O}_7$	ii. CrO_4^{2-}	iii. $\text{Cr}_2\text{O}_7^{2-}$
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2. Find the oxidation number of carbon in: **(2 marks)**

i. CO_2	ii. CO_3^{2-}
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3. Find the oxidation number of hydrogen in: **(3 marks)**

i. H_2O	ii. NaH	iii. H_2O_2
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4. The oxidation state of chlorine in HClO_4 is: **(1 mark)**

- A. -1 B. +7 C. -5 D. -7

THE END