

CHAPTER 10

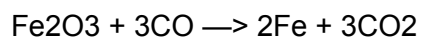
OXIDATION DEFINITIONS:

- Gain of oxygen
 - Loss of hydrogen
 - Loss of electrons
 - Increase in oxidation state
-

REDUCTION DEFINITIONS:

- Loss of oxygen
 - Gain of hydrogen
 - Gain of electrons
 - Decrease in oxidation state
-

E.G:



- Fe is reduced but CO is oxidised.
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OXIDATION STATES

RULE 0:

Atoms of the same element, such as:

- Single atoms;
- Molecules of an element; and
- Metallic elements

OXIDATION STATE: 0

RULE 1: (ALL ELEMENTS)

- a) Group 1 elements in their compounds (Na, K, etc.)

OXIDATION STATE: +1

- b) Group 2 elements in their compounds (Mg, Ca, etc.)

OXIDATION STATE: +2

RULE 2: (SPECIAL NON-METALS)

- a) Fluorine in its compounds

OXIDATION STATE: -1

- b) Hydrogen in its compounds

OXIDATION STATE: +1

- c) Oxygen in its compounds

OXIDATION STATE: -2

RULE 3: (GROUPS 13 TO 17)

— Elements from Groups 13 to 17 in their compounds
 > often based on the most common valency

- a) Metallic elements
- b) Non-metallic elements and metalloids

RULE 4: (GROUPS 3 TO 12)

- Elements from Groups 3 to 12 in their compounds, and elements with their proton numbers 57 to 71 or 89 to 103
 OXIDATION STATE: ALWAYS POSITIVE!
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OXIDISING AND REDUCING AGENTS

OXIDISING AGENTS can:

- Oxidise another substance
- Increase the oxidation state of an element in another substance
- Gain electrons from the other substance

Thus, an oxidising agent causes oxidation while being reduced itself.

E.G: oxygen, chlorine, *potassium manganate (VII)*.

REDUCING AGENTS can:

- Reduce another substance
- Decrease the oxidation state of an element in another substance
- Lose electrons from the other substance

Thus, a reducing agent causes reduction while being oxidised itself.

E.G: hydrogen, reactive metals (K, Na, etc.), *carbon and potassium iodide*.
