| **Name:** |
|---|

| **Atomic Structure** | **Objectives** |
|---|---|
| 5. Oxidation and Reduction | -define oxidation and reduction in terms of electron transfer<br>-use simple examples , e.g. Na with $Cl_2$, Mg with $O_2$, Zn with $Cu^{2+}$ to describe oxidation and reduction in terms of electron transfer<br>-apply knowledge of oxidation and reduction to explain the rusting of iron<br>-define oxidising agent and reducing agent<br>-carry out an experiment to show that halogens act as oxidising agents(reactions with bromides, iodides, $Fe^{2+}$ and sulfites; half equations only required)<br>-carry out an experiment to demonstrate the displacement reactions of metals (Zn with $Cu^{2+}$, Mg with $Cu^{2+}$) |

Oxidation and reduction can be described in four ways:

In terms of:

1. Addition/removal of oxygen.
2. Addition/removal of hydrogen.
3. Electron transfer.

**1. <u>Addition/Removal of Oxygen:</u>**

*Def$^n$:* Oxidation is the addition of oxygen.

E.g. $C + O_2 \rightarrow CO_2$ The carbon gains oxygen, therefore the carbon is oxidised.

*Def$^n$:* Reduction is the removal of oxygen.

E.g. $CuO + H_2 \rightarrow Cu + H_2O$ The copper loses oxygen, therefore the copper is reduced.

**2. <u>Addition/Removal of Hydrogen:</u>**

*Def$^n$:* Oxidation is the removal of hydrogen.

E.g. $H_2S + Cl_2 \rightarrow S + 2HCl$ The sulphur loses hydrogen, therefore the S is oxidised.

*Def$^n$:* Reduction is the addition of hydrogen.

E.g. $CO + 2H_2 \rightarrow CH_3OH$ The carbon monoxide gains hydrogen, therefore the CO is reduced.

**3. <u>Electron Transfer:</u>**

*Def$^n$:* Oxidation is the loss of electrons.

E.g. $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$ The zinc loses $2e^-$, therefore the zinc is oxidised.

*Def$^n$:* Reduction is the gain of electrons.

E.g. $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$ The copper gains $2e^-$, therefore the copper is reduced.

Remember, for electron transfer: **O**xidation **I**s **L**oss **R**eduction **I**s **G**ain.



G. Galvin

**Oxidising/Reducing Agents:**

*Def$^{n}$:* An **Oxidising Agent** is a substance that brings about oxidation in other substances by being reduced.

*Def$^{n}$:* A **Reducing Agent** is a substance that brings about reduction in other substances by being oxidised.

E.g. $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$