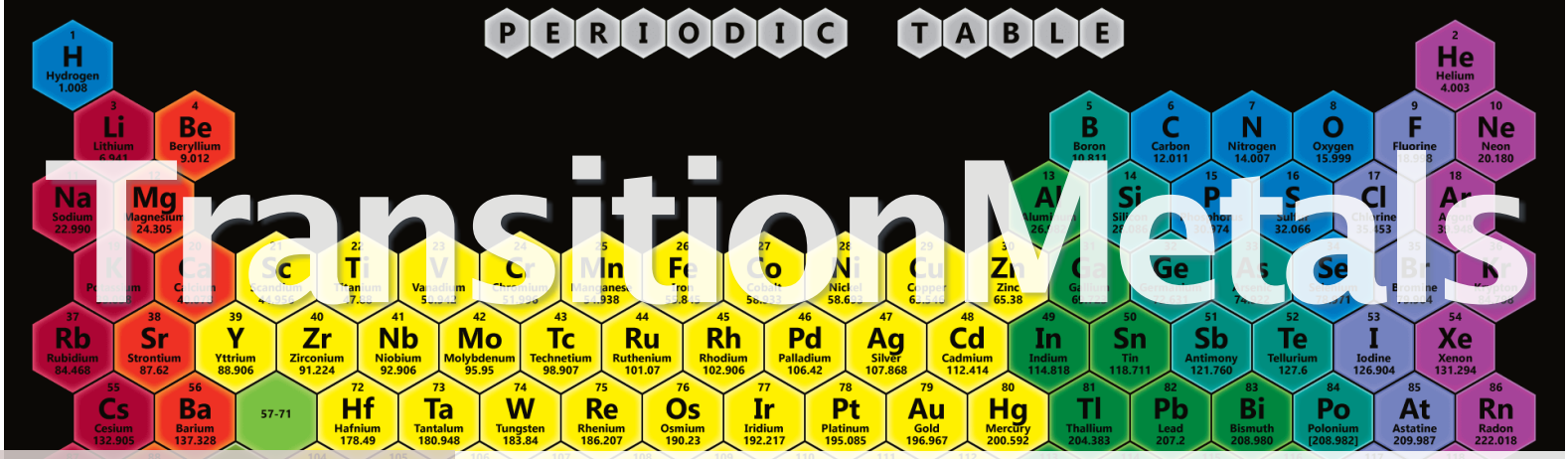

Key Objectives:

You should be able to:

- List the general physical properties of metals
- Describe the general chemical properties of metals
e.g. reaction with dilute acids and reaction with oxygen
- Explain in terms of their properties why alloys are used instead of pure metals
- Identify representations of alloys from diagrams of structure
- Deduce an order of reactivity from a given set of experimental results
- Describe the reactivity series as related to the tendency of a metal to form its positive ion, illustrated by its reaction, if any, with:
– the aqueous ions
– the oxides
of the other listed metals
- Describe and explain the action of heat on the hydroxides, carbonates and nitrates of the listed metals
- Account for the apparent unreactivity of aluminium in terms of the oxide layer which adheres to the metal
- Name the uses of copper related to its properties (electrical wiring and in cooking utensils)
- Name the uses of mild steel (car bodies and machinery) and stainless steel (chemical plant and cutlery)
- Explain the uses of zinc for galvanising and for making brass
- Describe the idea of changing the properties of iron by the controlled use of additives to form steel alloys

Periodic Table: Transition elements

Transition elements are all metals that are found in the elongated section of the Periodic Table between Groups II and III. Common examples of transition elements are copper, iron and nickel.

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Physical Properties:

- are harder and stronger than the elements in Group I

- have higher densities than the elements in Group I

- have higher melting points than the elements in Group I

Property	Metallic property
Physical state at room temperature	Solid (except mercury)
Malleability	Good
Ductility	Good
Appearance	Shiny (lustrous)
Melting point and boiling point	Usually high
Density	Usually high
Conductivity (thermal and electrical)	Good

Chemical Properties:

- form coloured compounds, e.g. copper(II) sulphate crystals are blue, and potassium(VII) manganate purple

- the elements and their compounds show catalytic activity, e.g. iron in the Haber process and vanadium(V) oxide in the Contact process

- have variable oxidation states, e.g. iron can form Fe2+ and Fe3+ ions.

Although metallic bonds are strong, they are not rigid, which means that the rows of ions in metals can slide over each other when a force is applied. This is because the ions in a metallic element are all the same size.

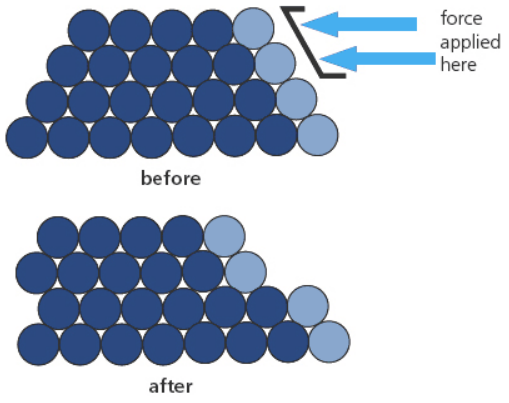

Figure 10.1 The positions of the positive ions in a metal before and after a force has been applied