

COMPARISON

GROUP I

Physical properties

Soft.

Low melting point. (decrease down the group).

Low density. (increase down the group).

All their compounds are soluble in water.

Chemical properties

Monovalent.

Lose one e⁻ & form a +ve ion.

Very reactive (increase down the group).

No catalytic properties.

Their compounds are white when solid & colorless when aqueous.

React with cold water forming an alkali (metal hydroxide + hydrogen).

React with Oxygen forming metal oxide (METAL₂OXYGEN).

Their compounds never undergo thermal decomposition except group 1 nitrate (2NaNO₃ --> 2NaNO₂ + O₂).

TRANSITION METALS

Physical properties

Hard.

High melting point.

High density.

Not all their compounds are soluble in water.

Chemical properties

Elements has more than one oxidation state.

Loses 1 electron or more & form colored, +ve ions.

Some are reactive (less reactive than groups 1, 2 and 3).

Their elements & compounds have catalytic properties (except zinc).

Most of their compounds are colored in both solid & liquid states.

Few can react with steam forming metal oxide (reaction takes a lot of time).

React with Oxygen forming metal oxide.

Their compounds undergo thermal decomposition to give the metal oxide.

GROUP II

GROUP VII

AKA Halogens.

PHYSICAL PROPERTIES

\$ Non-metals.

\$ Low melting and boiling points (increase down the group).

\$ Low density (increase down the group).

\$ Not shiny.

\$ Not malleable nor ductile.

\$ Poor conductor of electricity.

\$ All of their compounds are soluble in water except the ones with Silver & Lead.

\$ Color gets darker down the group.

CHEMICAL PROPERTIES

\$ Monovalent.

\$ Gain one e⁻ & form a -ve ion / share.

\$ Very reactive (decrease down the group).

\$ Exist as diatomic molecules.

\$ They react with metals forming salts.

\$ Their compounds with Hydrogen are usually strong acids.

\$ Each halogen can replace/oxidize the halogen below it in its compound.

GROUP VIII

AKA Noble gases.

They are all gases.

They are all inert.

Valency = 0 (*outermost energy level is filled with e⁻s*) (*no sharing, losing or gaining e⁻s*).

Mono-atomic.

\$ Helium is used in filling balloons.

\$ Argon is used in filling light bulbs.

\$ Krypton & Xenon used in commercial lights.

HALOGENS (part 2)

AKA Alkaline Earth metals.

PHYSICAL PROPERTIES

\$ Solid.

\$ Shiny.

\$ Silver.

\$ Malleable & ductile (layers of +ve ions can slide over each other).

\$ Good conductor of electricity (free moving e⁻s).

\$ Not all their compounds are soluble in water.

\$ All their compounds are white when solid & colorless when aqueous.

CHEMICAL PROPERTIES

\$ Divalent (one oxidation state).

\$ Lose 2 electrons & form a +ve ion (+2).

\$ Reactive bas less reactive than group 1 (increases down the group).

\$ No catalytic properties.

\$ React with oxygen forming metal oxide.

\$ Their compounds undergo thermal decomposition to give the metal oxide.

\$ React with water forming metal hydroxide or metal oxide.

Cold water (metal hydroxide and hydrogen)



Hot water (metal oxide and hydrogen)



"As we go down the group, the reaction with water is faster."

PROPERTIES COMMON IN ALL METALS

\$ Solid.

\$ Shiny (metallic luster).

\$ Silver.

\$ Malleable & ductile --> layers of +ve ions can slide over each other.

\$ Good conductor of electricity (free moving e⁻s).

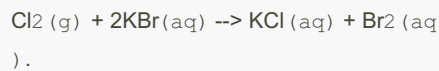
1- Fluorine is a yellow gas. When aqueous, it turns colorless.

2- Chlorine is greenish yellow gas. When aqueous, it turns colorless.

3- Bromine is a red brown liquid. When in gaseous state, it stays red brown. When aqueous, it turns orange.

4- Iodine is a dark grey solid. When in gaseous state, it turns purple. When aqueous, it turns red brown.

5- Astatine is a black solid.



Greenish yellow + colorless --> colorless + orange.



Greenish yellow + colorless --> colorless + red brown.



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