

❖ Reaction of Different Metals and Non-metals with Acids

Metal/Non-metal	Reaction with Dilute Hydrochloric Acid		Reaction with Dilute Sulphuric Acid	
	Room Temperature	Warm	Room Temperature	Warm
Magnesium (ribbon)	Magnesium (Mg) + Hydrochloric Acid (HCl) → Magnesium Chloride (MgCl ₂) + Hydrogen (H ₂) Mg + 2HCl → MgCl₂ + H₂	Magnesium (Mg) + Hydrochloric Acid (HCl) → Magnesium Chloride (MgCl ₂) + Hydrogen (H ₂) Mg + 2HCl → MgCl₂ + H₂	Magnesium (Mg) + Sulphuric Acid (H ₂ SO ₄) → Magnesium Sulphate (Mg ₂ SO ₄) + Hydrogen (H ₂) 2Mg + H₂SO₄ → MgSO₄ + H₂	Magnesium (Mg) + Sulphuric Acid (H ₂ SO ₄) → Magnesium Sulphate (Mg ₂ SO ₄) + Hydrogen (H ₂) 2Mg + H₂SO₄ → MgSO₄ + H₂
Aluminum (foil)	Aluminum (Al) + Hydrochloric Acid (HCl) → Aluminum Chloride (AlCl ₃) + Hydrogen (H ₂) 2Al + 6HCl → 2AlCl₃ + 3H₂	Aluminum (Al) + Hydrochloric Acid (HCl) → Aluminum Chloride (AlCl ₃) + Hydrogen (H ₂) 2Al + 6HCl → 2AlCl₃ + 3H₂	Aluminum (Al) + Sulphuric Acid (H ₂ SO ₄) + Water (H ₂ O) → Aluminum Sulphate (Al ₂ SO ₄) HexaHydrate (6H ₂ O) + Hydrogen (H ₂) 2Al + 3H₂SO₄ + 6H₂O → Al₂(SO₄)₃•6H₂O + 3H₂	Aluminum (Al) + Sulphuric Acid (H ₂ SO ₄) + Water (H ₂ O) → Aluminum Sulphate (Al ₂ SO ₄) HexaHydrate (6H ₂ O) + Hydrogen (H ₂) 2Al + 3H₂SO₄ + 6H₂O → Al₂(SO₄)₃•6H₂O + 3H₂
Iron (filings)	Iron does not react with hydrochloric acid at room temperature.	Iron (Fe) + Hydrochloric Acid (HCl) → Iron Chloride (FeCl ₂) + Hydrogen (H ₂) 2Fe + 2HCl → 2FeCl₂ + H₂	Iron does not react with diluted sulphuric acid at room temperature.	Iron (Fe) + Diluted Sulphuric Acid (H ₂ SO ₄) → Ferrous Sulphate (FeSO ₄) + Hydrogen (H ₂) Fe + H₂SO₄ → FeSO₄ + H₂
Copper (peeled flexible wire)	Copper does not react with hydrochloric acid at room temperature.	Copper does not react with hydrochloric acid (even when it is heated)	Copper does not react with diluted sulphuric acid at room temperature.	Copper (Cu) ^{+ conc.} Sulphuric Acid (H ₂ SO ₄) → Copper Sulphate (CuSO ₄) + Sulphur Dioxide (SO ₂) + Water (H ₂ O)

				$\text{Cu} + 2\text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{SO}_2 + 2\text{H}_2\text{O}$
Charcoal (powder)	Charcoal does not react with hydrochloric acid at room temperature.	Charcoal does not react with hydrochloric acid (even when it is heated).	Charcoal does not react with sulphuric acid at room temperature.	Charcoal (C) ^{+conc.} Sulphuric Acid (H ₂ SO ₄) → Carbon Dioxide (CO ₂) + Sulphur Dioxide (SO ₂) + Water (H ₂ O) $\text{C} + 2\text{H}_2\text{SO}_4 \rightarrow \text{CO}_2 + 2\text{SO}_2 + 2\text{H}_2\text{O}$
Sulphur (powder)	Sulphur does not react with hydrochloric acid at room temperature.	Sulphur does not react with hydrochloric acid (even when it is heated).	Sulphur does not react with sulphuric acid at room temperature.	Sulphur does not react with sulphuric acid (even when it is heated).

➤ Note:

- When metals react with acids, they produce hydrogen gas with produce a 'pop' sound when it burns.
- Iron reacts with hydrochloric acid and sulphuric acid on heating.
- Copper does not react with hydrochloric acid (even when it is heated) but reacts with sulphuric acid on heating.

Uses of Metals and Non-metals

As discussed above, metals are hard, malleable, ductile, and sonorous and are hence, can be used for:

- Making machinery
- Making automobiles, trains, and aeroplanes
- Making cooking utensils and water boilers
- Making industrial gadgets and satellites etc.

Non-metals also have several uses, such as:

- Essential for life (such as oxygen)
- Used as fertilizers (such as nitrogen and phosphorus)

- Used to purify water (such as chlorine)
- Applied on wounds as an antiseptic (such as purple-coloured iodine solution)
- Used in crackers (such as sulphur)

Thanks