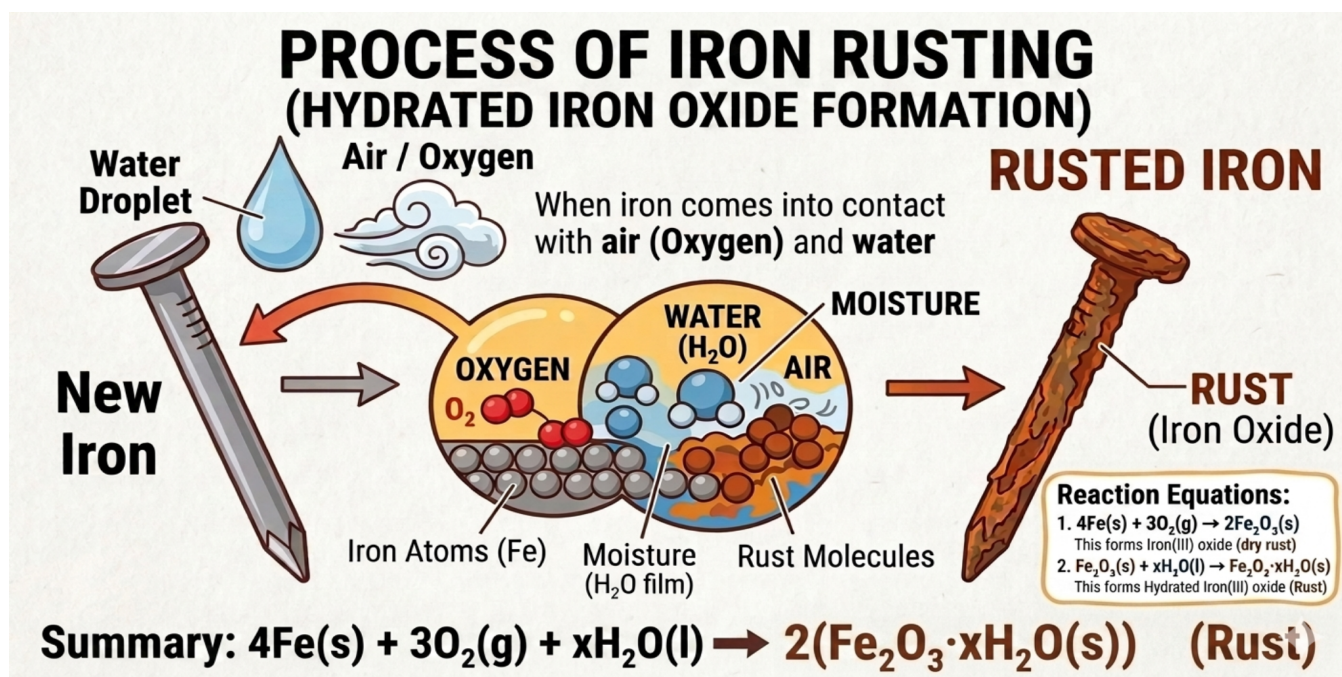


Corrosion

Corrosion is the gradual destruction of metals by chemical or electrochemical reaction with their environment.

Rusting of Iron



Rusting is specifically the corrosion of iron. When iron is exposed to moist air for a long time, it acquires a coating of a brown flaky substance called Rust.

Chemical Name of Rust: Hydrated Ferric Oxide.

Chemical Formula: $\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$

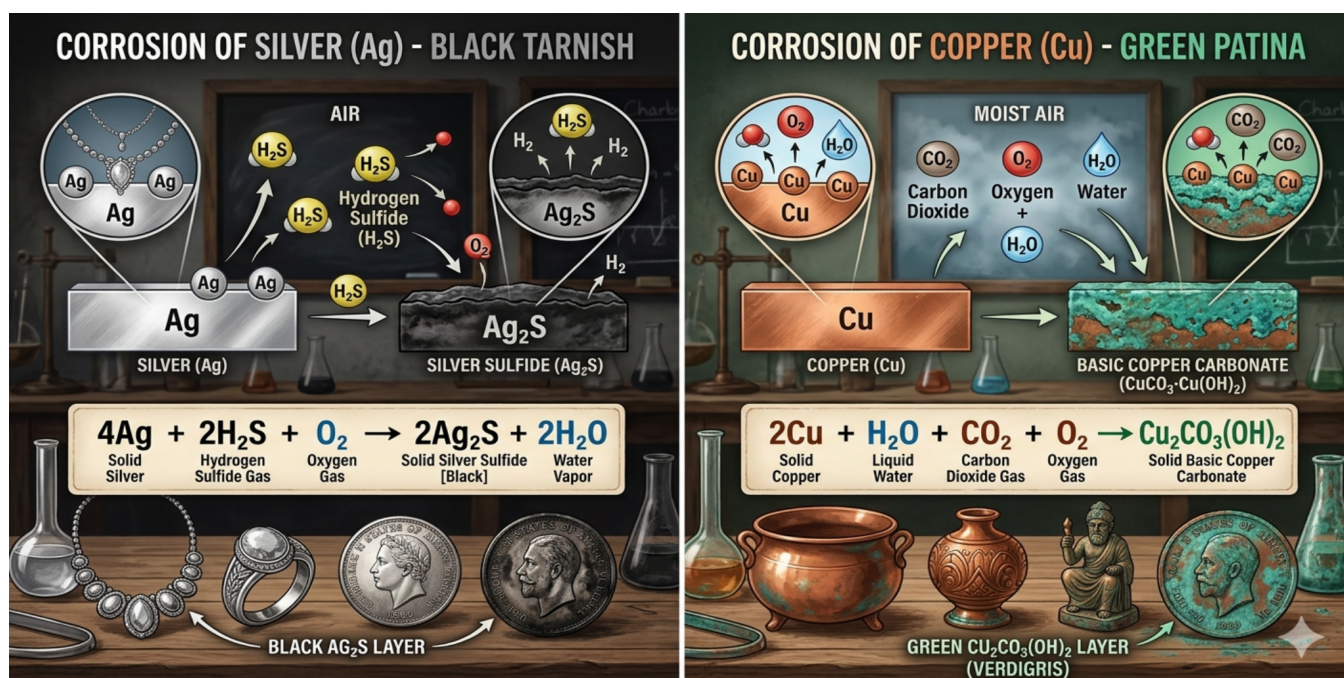
Reaction: $4\text{Fe(s)} + 3\text{O}_2\text{(g)} + 2x\text{H}_2\text{O(l)} \rightarrow 2\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O(s)}$

B. Conditions Necessary for Rusting

- Presence of Oxygen (Air)
- Presence of Water (Moisture)

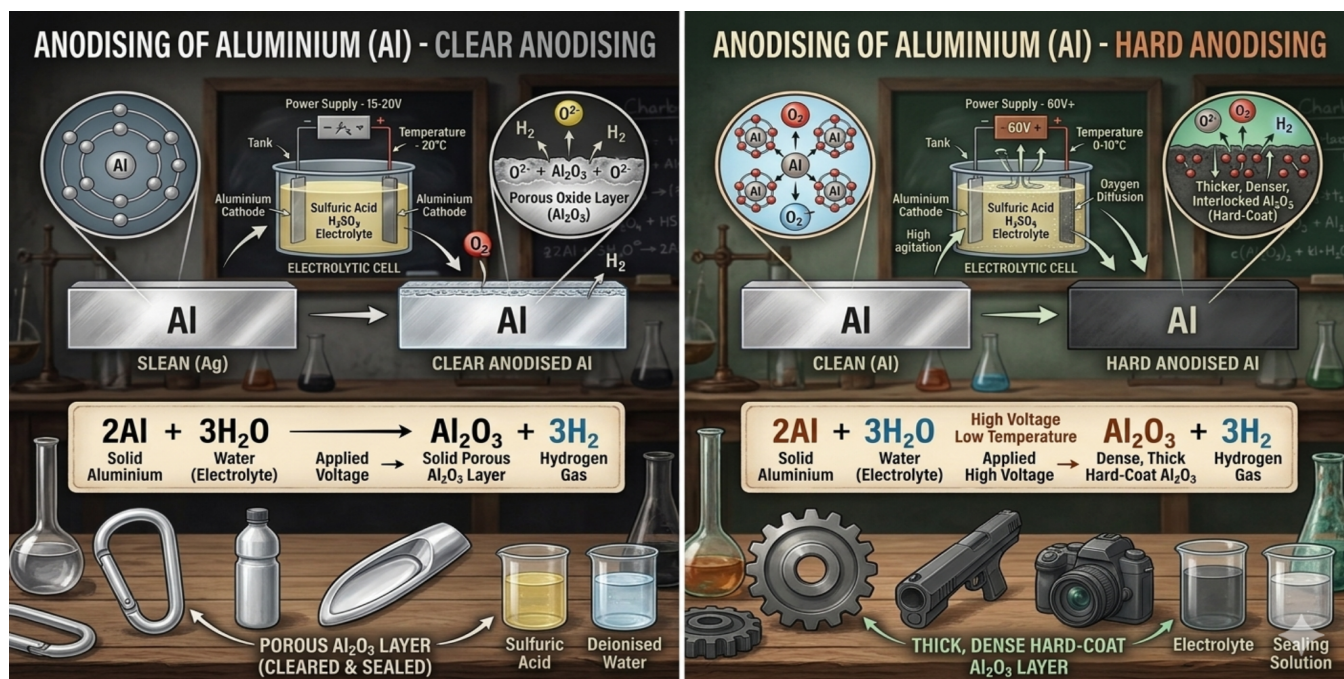
If you remove either one (e.g., using boiled distilled water with an oil layer), the iron will not rust.

C. Corrosion in Other Metals



- **Copper:** Reacts with moist CO_2 in the air to gain a green coating of Basic Copper Carbonate [$\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$].
- **Silver:** Reacts with Sulphur (usually H_2S gas) in the air to form a black coating of Silver Sulphide (Ag_2S).





- **Aluminium:** Forms a protective layer of Aluminium Oxide (Al₂O₃) which, unlike rust, actually prevents further corrosion.

Methods of Prevention Preventing Corrosion

- **Painting:** Coating the surface to block air and moisture.
- **Oiling/Greasing:** Creating a water-repellent layer (used in tools and machinery).
- **Galvanization:** Coating iron with a thin layer of Zinc. Even if the zinc coating is scratched, the iron is protected because Zinc is more reactive.
- **Alloying:** Mixing metals to create a corrosion-resistant substance (e.g., Iron + Carbon + Chromium/Nickel = Stainless Steel, which does not rust).
- **Anodizing:** Increasing the thickness of the natural oxide layer on metals like Aluminium.

Rancidity

Definition

When fats and oils present in food are oxidized, they become rancid. Their smell and taste change, making the food unpleasant and unsafe to eat.

Reasons for Rancidity

- **Oxidation:** Exposure to Oxygen in the air.
- **Light:** Accelerates the oxidation process.
- **Temperature:** High temperatures speed up the chemical reaction of oxidation.

Preventing Rancidity

- **Adding Antioxidants:** Substances that prevent oxidation (e.g., BHA or BHT).
- **Nitrogen Flushing:** Replacing the oxygen in food packets (like chips) with Nitrogen, which is an unreactive gas.
- **Airtight Containers:** Slows down the contact with oxygen.
- **Refrigeration:** Low temperature slows down the rate of the oxidation reaction.
- **Storing away from Light:** Using dark containers or cool, dark places.

Summary Table

Phenomenon	Material Affected	Result	Key Factor
Rusting	Iron (Fe)	Reddish-brown flakes	O ₂ + Moisture
Corrosion (Ag)	Silver (Ag)	Black coating	Sulphur (H ₂ S)
Corrosion (Cu)	Copper (Cu)	Green coating	Moist CO ₂
Rancidity	Fats and Oils	Unpleasant smell & taste	Oxidation (Oxygen)