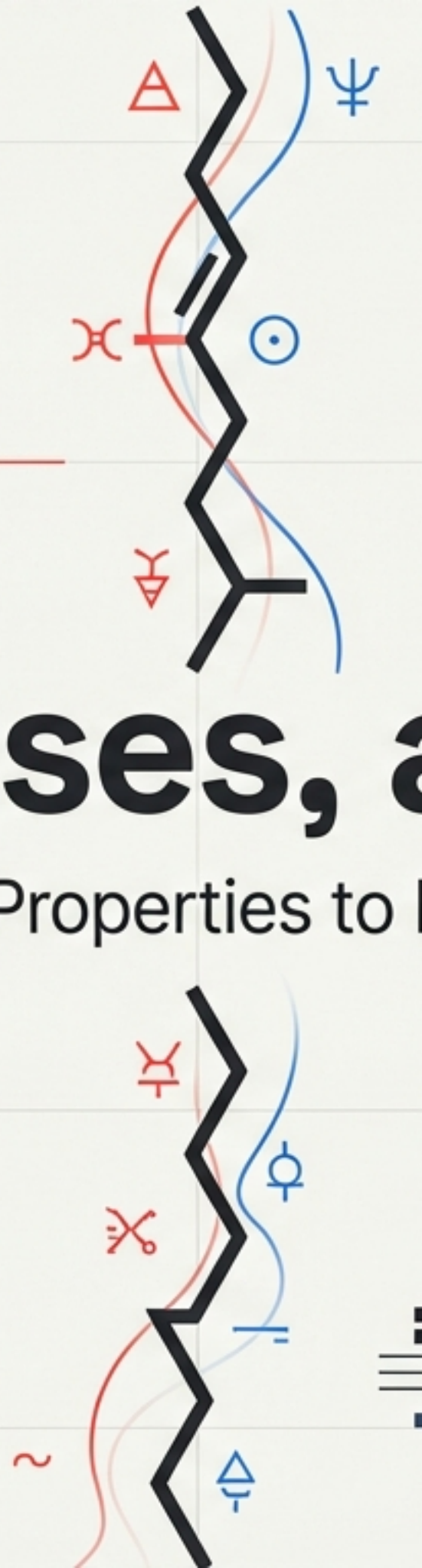


Acids, Bases, and Salts

From Chemical Properties to Everyday Utility



The Color of Chemistry: Indicators

Litmus Test



Blue > Red (Acid)
Red > Blue (Base)

Natural Indicators



Turmeric: Yellow > Reddish-Brown (Base)

Synthetic Indicators



Phenolphthalein: Colorless > Pink (Base)
Methyl Orange: Red (Acid) > Yellow (Base)

Indicator: A dye that changes color in acidic or basic media.

Acid: Blue Litmus > Red **Base:** Red Litmus > Blue

Olfactory Indicators: Detecting via Scent

Acidic
Medium



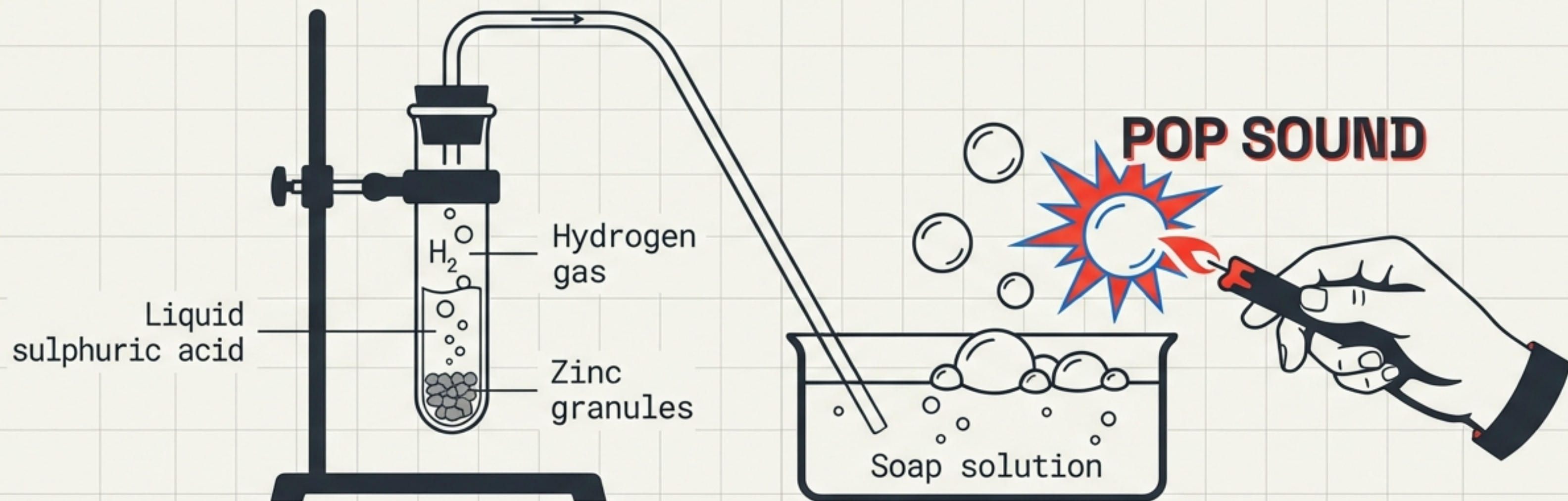
Substances whose odor changes in acidic or basic basic media are called **Olfactory Indicators**.

Examples:
Onion
Vanilla
Clove Oil

Basic
Medium
(NaOH)



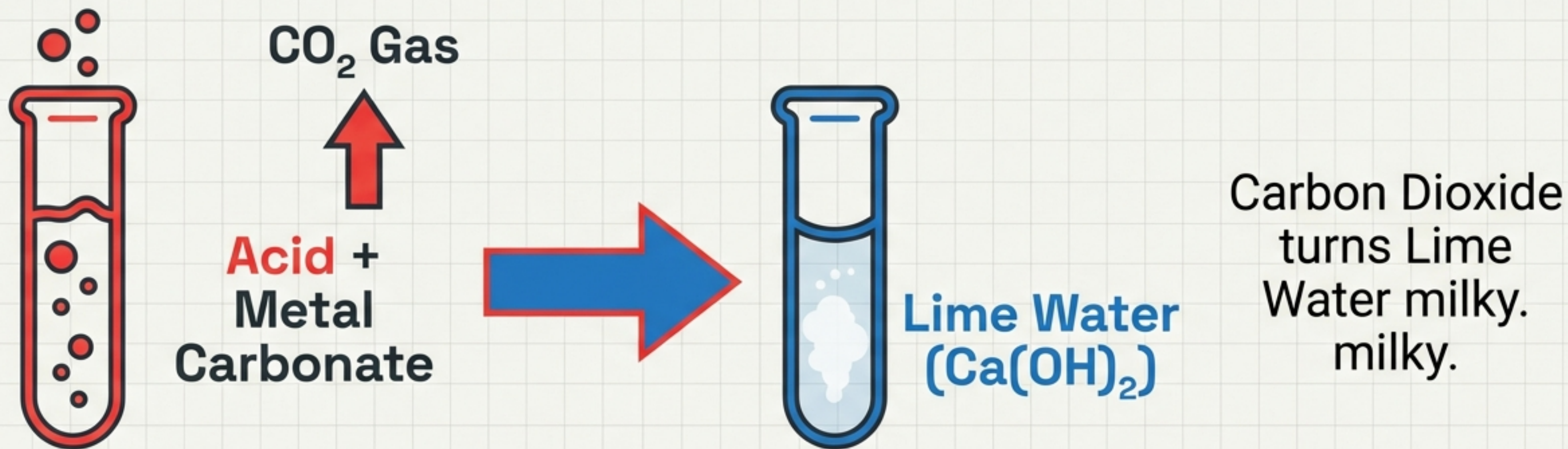
Chemical Warfare: Acids vs. Metals



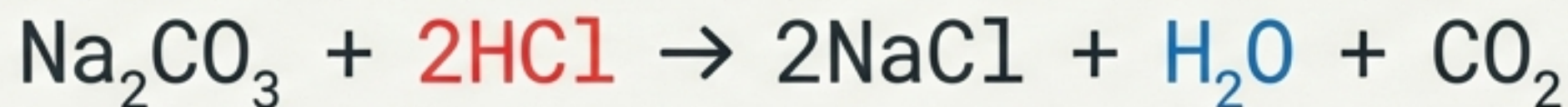
Acid + Metal \rightarrow Salt + Hydrogen Gas



The Fizz: Acids vs. Carbonates



Metal Carbonate + Acid \rightarrow Salt + CO_2 + Water



Limestone, Chalk, and Marble are all forms of CaCO_3 .

Neutralization: The Chemical Handshake

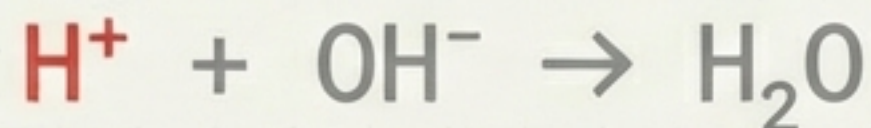
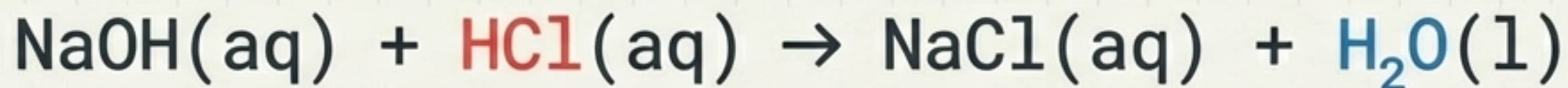
Acid
(H⁺)



Base
(OH⁻)

Real World Application:
Antacids neutralize
excess stomach acid
to relieve pain.

Base + Acid → Salt + Water



The Nature of Oxides

Metallic Oxides
= **BASIC**

Non-metallic Oxides
= **ACIDIC**

Reacts with
Acid to form
Salt + Water.

Reacts with
Base to form
Salt + Water.

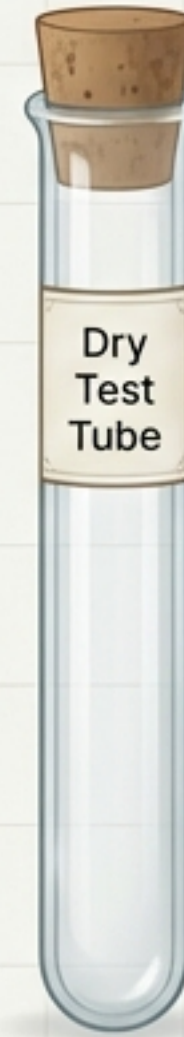
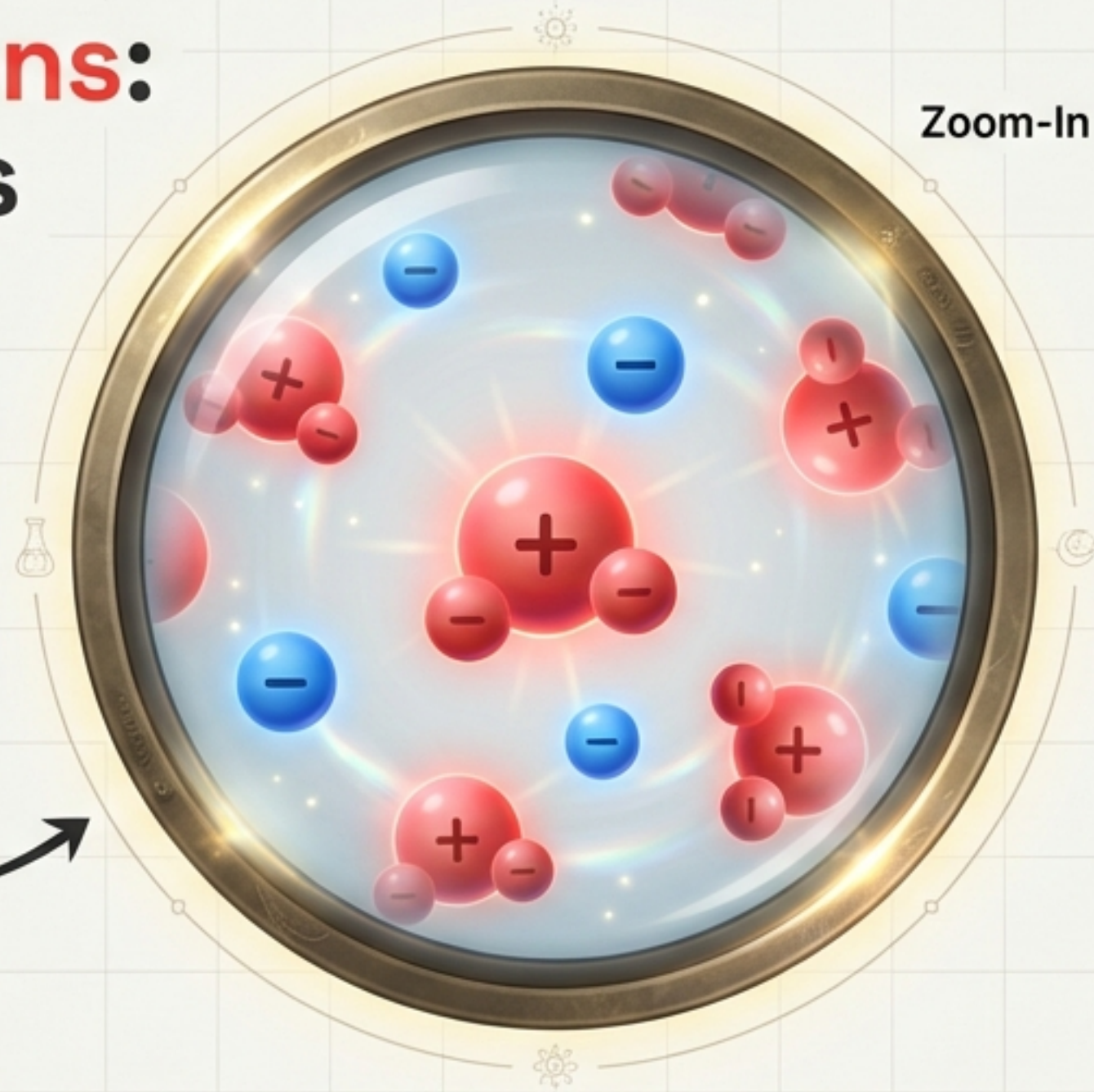
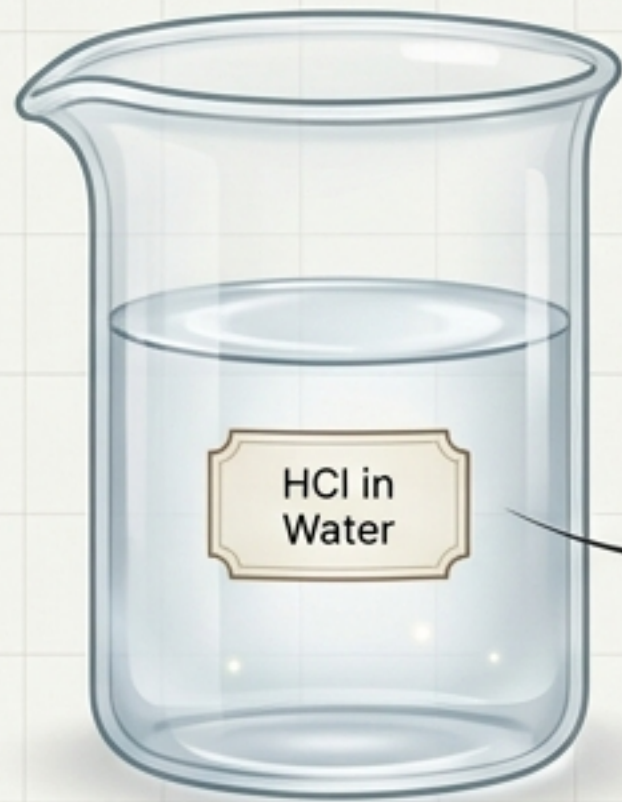
H																			He
Li	Be													B	C	N	O	F	Ne
Na	Mg													Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br			Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I			Xe
Cs	Ba		Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At			Rn
Fr	Ra		Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts			Og

Le	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Basic: CuO (Copper Oxide)

Acidic: CO₂ (Carbon Dioxide)

The Power of Ions: It Only Happens in Water



Dry Litmus Paper:
NO color change.

Acids generate H^+ (which become H_3O^+) in water.

Bases generate OH^- in water.

Alkalis: Bases that are soluble in water.



Safety First: The Exothermic Rule



Water into Acid = **DANGER** (Splash/Heat).

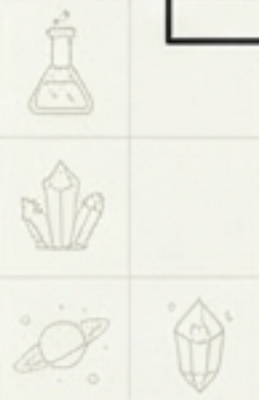
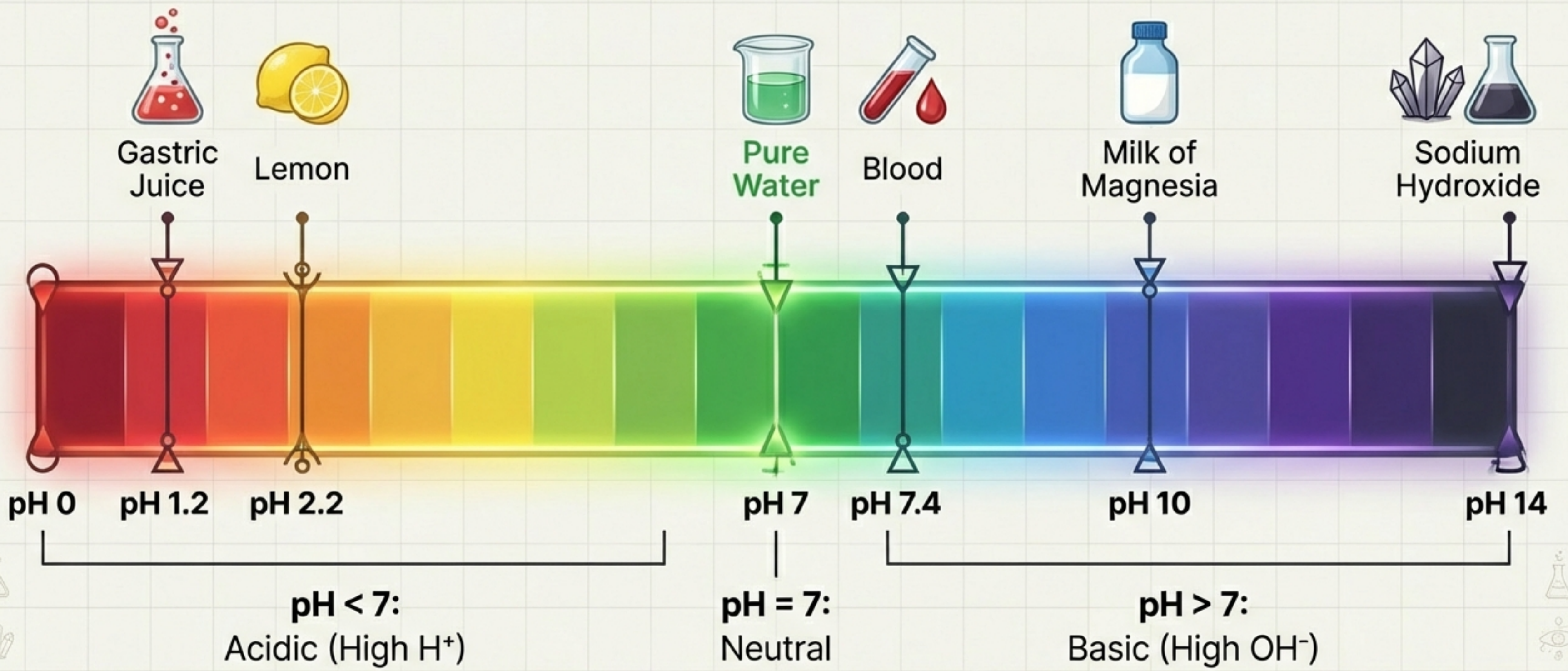
Acid into Water = **SAFE** (Dilution).

Dilution is highly exothermic.

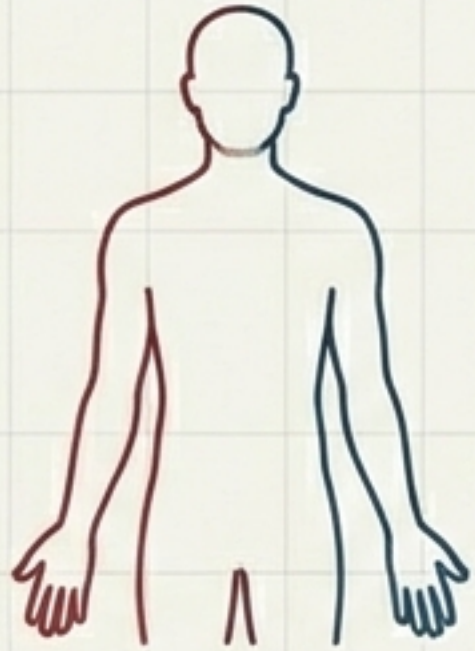
Dilution is highly exothermic. Always add Acid to Water slowly with constant stirring.



The pH Scale: Measuring Power



The Delicate Balance: pH in Everyday Life



Body works at
pH 7.0 – 7.8



Acid Rain (pH < 5.6)
endangers aquatic life



Tooth Decay
starts at pH < 5.5



Nettle Sting (Methanoic
Acid) - Treat with
Baking Soda

Living organisms are highly pH sensitive.



The Family of Salts

Strong Acid +
Strong Base



NEUTRAL SALT
(pH 7)

Example:
NaCl

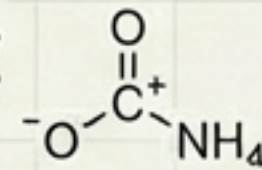


Strong Acid +
Weak Base

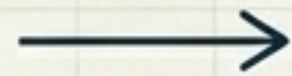


ACIDIC SALT
(pH < 7)

Example:
NH₄Cl



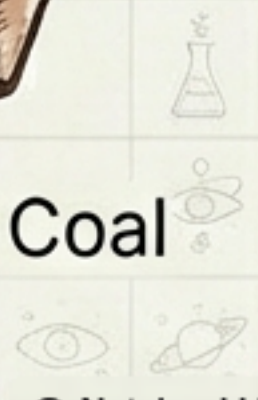
Weak Acid +
Strong Base



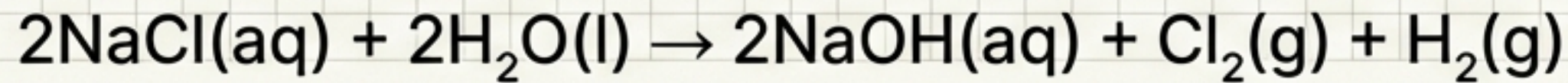
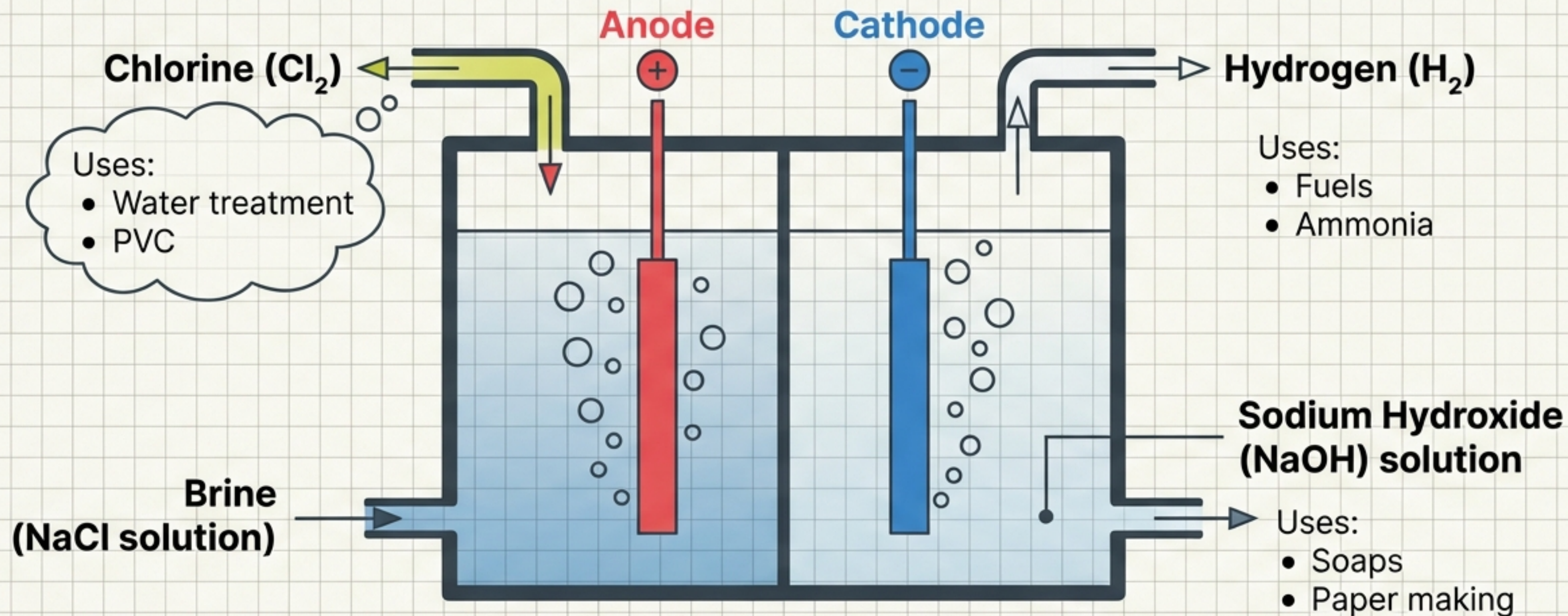
BASIC SALT
(pH > 7)

Example:
Na₂CO₃

Mined like Coal



Common Salt: The Industrial Raw Material



Industrial Derivatives

Bleaching Powder (CaOCl_2)



Produced from **Chlorine + Dry Slaked Lime.**

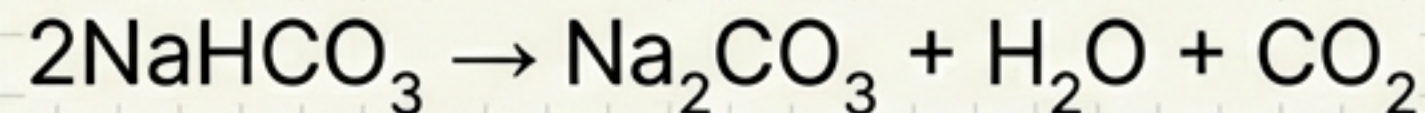
- Uses: Bleaching cotton, disinfecting water.

Baking Soda (NaHCO_3)



Mild non-corrosive base.

- Reaction: Releases CO_2 when heated (causes rising).

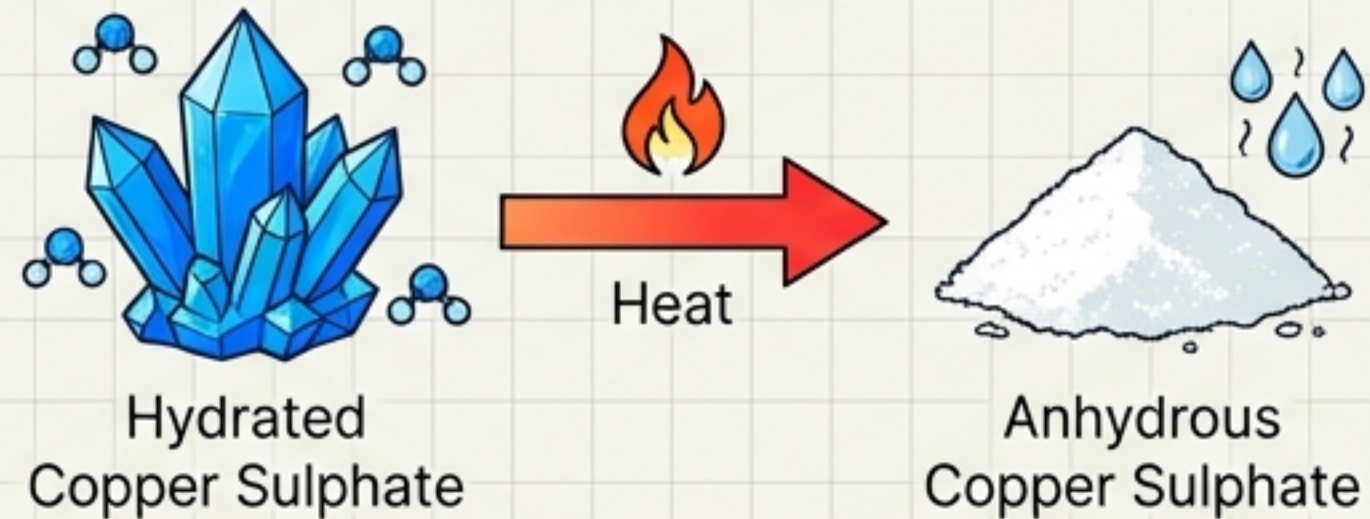


Washing Soda & Plaster of Paris

Washing Soda ($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$)

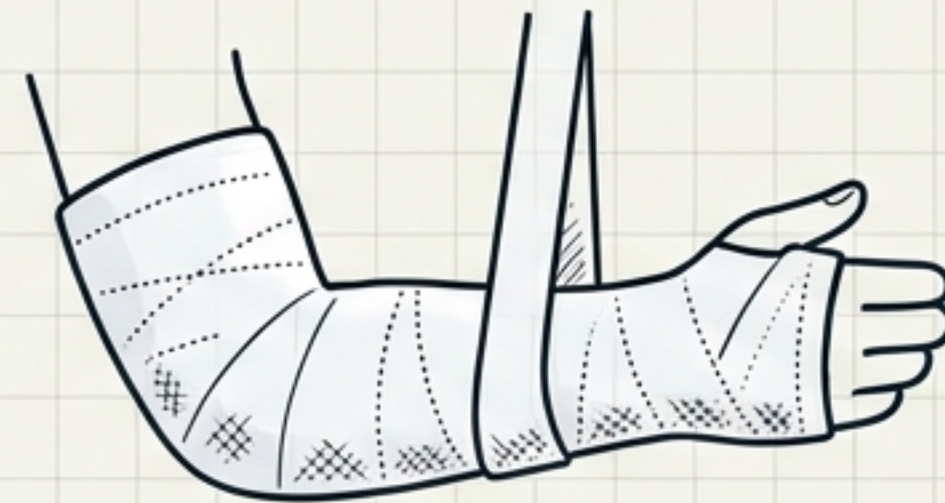
Used in glass, soap, and paper industries.

Water of Crystallization



Plaster of Paris ($\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$)

Made by heating Gypsum.
Used for setting fractured bones.



Powder (Plaster of Paris) + Water \rightarrow Hard Solid (Gypsum)

