

A bright, glowing orb of light, possibly representing a chemical reaction or a celestial body, is centered in the upper half of the image. The orb is surrounded by a dark, textured, brownish-orange background that resembles a nebula or a starry sky. The text "Chapter 3: Types of Chemical Reactions" is overlaid on the lower half of the image in a white, sans-serif font with a subtle drop shadow.

Chapter 3: Types of Chemical Reactions

What We Know

- ▶ Chemical reactions can be simple or complex
- ▶ Chemical changes can be obvious or subtle
- ▶ They can be immediate or gradual



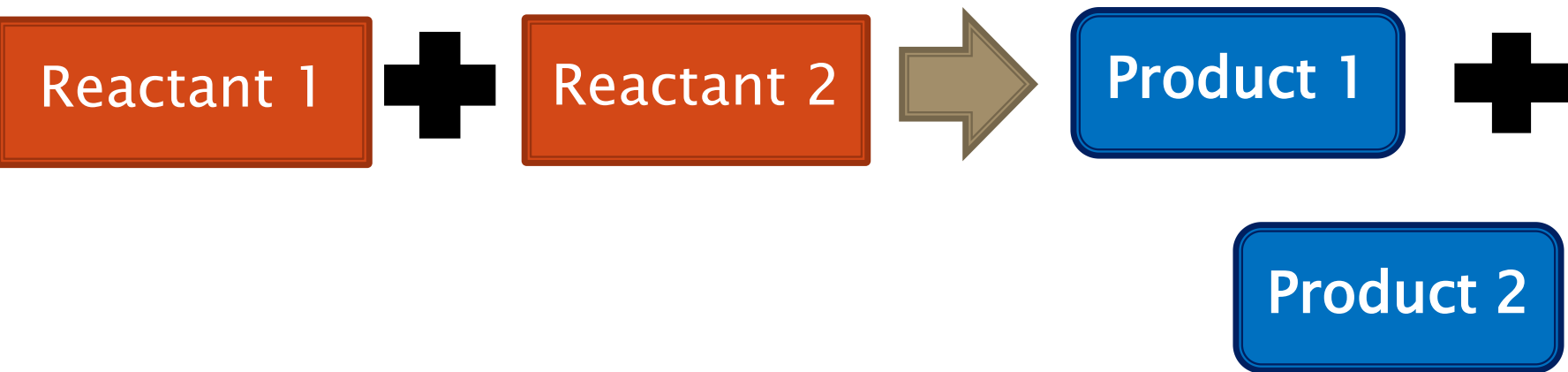
Word Equations

- ▶ Used to describe many different types of chemical reactions
- ▶ Indicates the change from reactants to products
- ▶ Some rules:
 - ▶ The left side lists all the reactants
 - ▶ The right side lists the products
 - ▶ An arrow is between the reactant and products. It shows that something is produced during the reaction



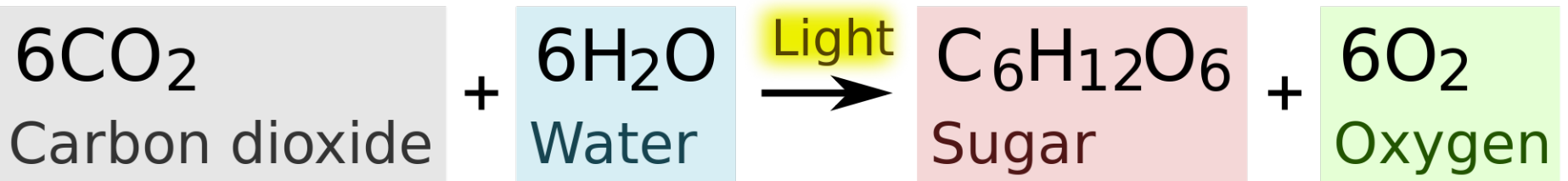
Word Equations

- ▶ All reactants → all products
- ▶ If there is multiple reactants or products they are separated by a plus sign (+)



Photosynthesis

▶ Molecular Equation



▶ Word Equation

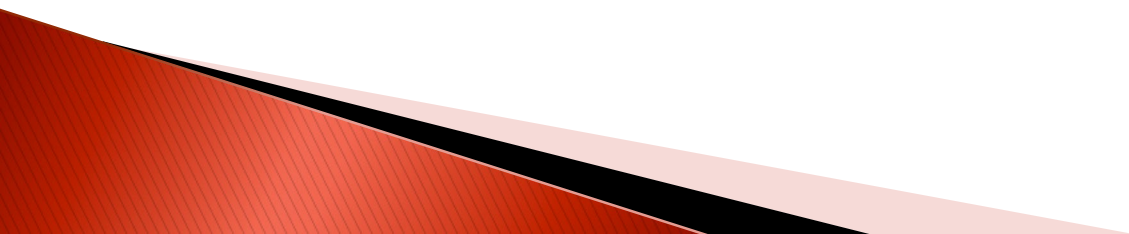
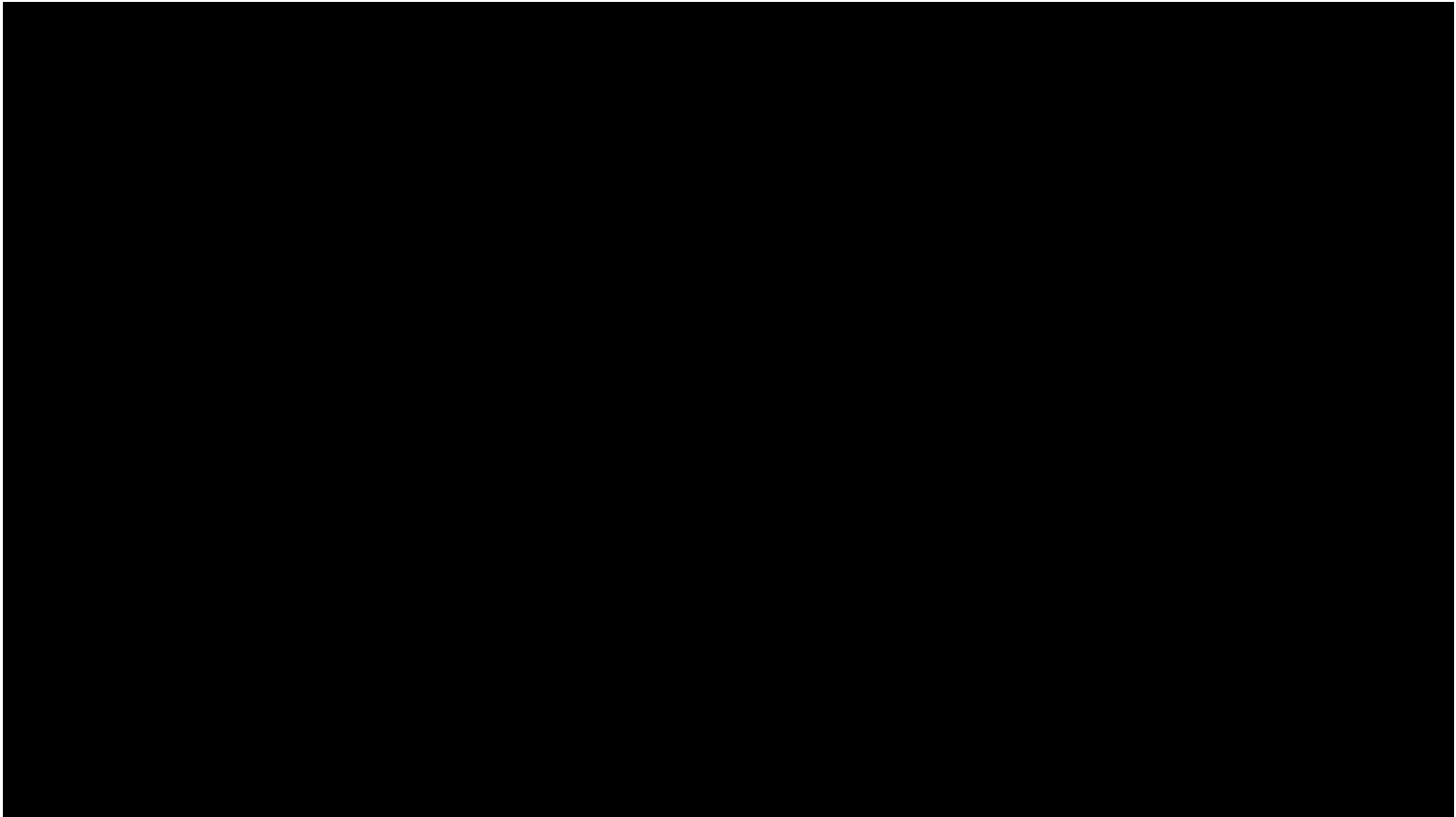
- ▶ Carbon dioxide and water use sunlight to produce sugar/glucose and oxygen gas
- ▶ The reaction is **endothermic**

Other Example

- ▶ Zinc + hydrochloric acid → zinc chloride + hydrogen gas + energy
- ▶ **Word Equation**
- ▶ Zinc and hydrochloric acid produce zinc chloride, hydrogen gas, and energy
- ▶ **Exothermic!**

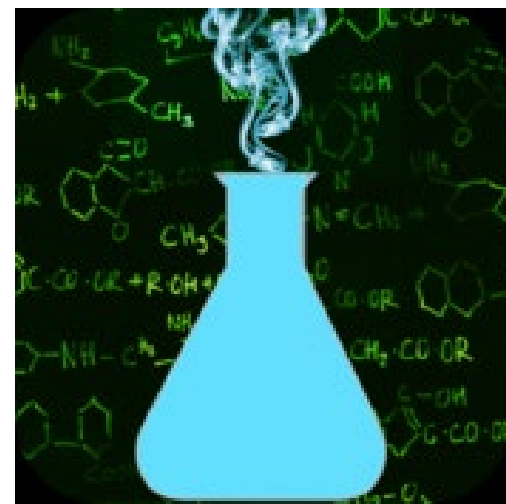


Zinc and Hydrochloric Acid



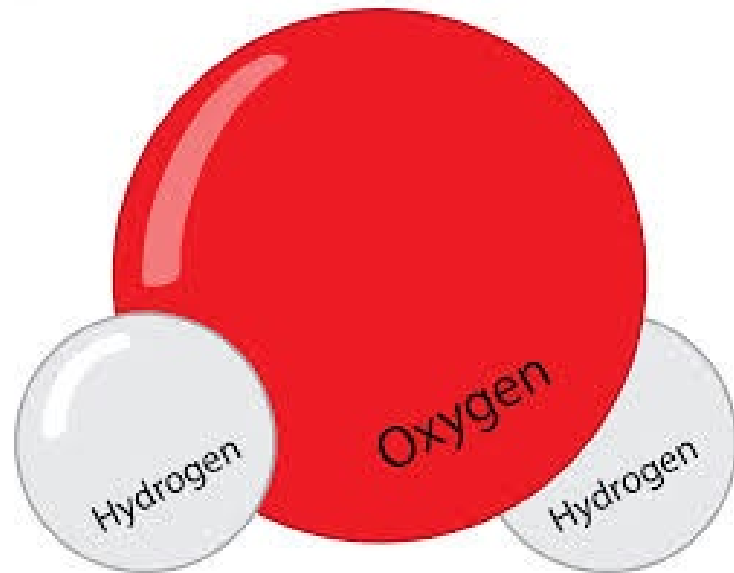
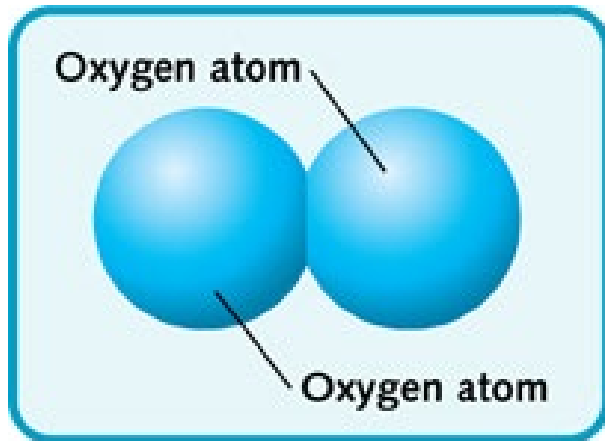
Types of Reactions

- ▶ There are patterns that certain elements and compounds will follow and many chemists will see this as bakers do with recipes
- ▶ These groupings allow chemists to predict the product of an unknown reaction.
- ▶ It also helps them understand the behaviors of substances in a chemical reaction.



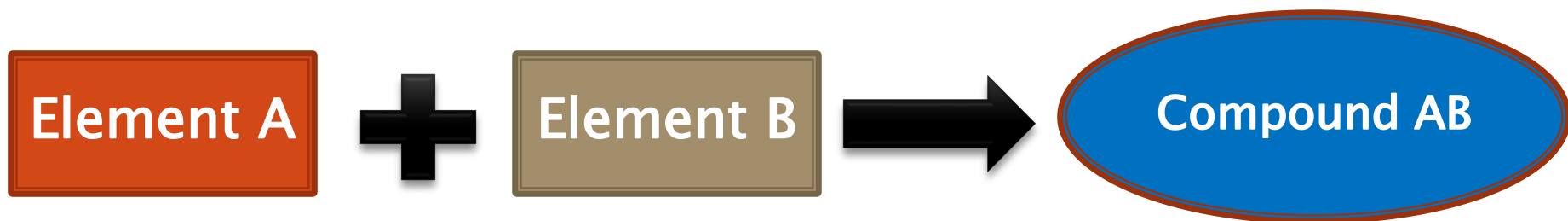
Terminology

- ▶ **Element** – individual entity from periodic table
– Hydrogen (H_2), Iron (Fe), Oxygen (O_2)
- ▶ **Compound** – group of elements together –
Water (H_2O), Carbon dioxide (CO_2)



Simple Composition Reactions

- ▶ 2 or more elements react to form a new compound
- ▶ Most are exothermic



- ▶ Product is always a compound

Simple Decomposition Reactions

- ▶ Breaks a compound into separate elements
- ▶ Reactant is always a compound



- ▶ Most are **endothermic** – absorb energy

Combustion

- ▶ A fuel is burned in the presence of oxygen to produce carbon dioxide, water, and energy



(**octane + oxygen** → **water + carbon dioxide + energy**)

- ▶ Used largely in the petroleum industry

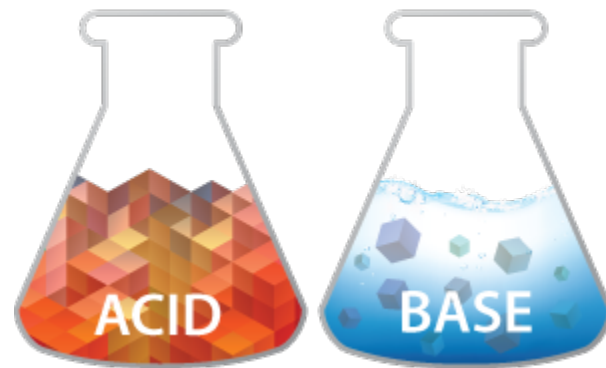


Uses for Petroleum



SmartStat.net
The power of numbers.

Neutralization



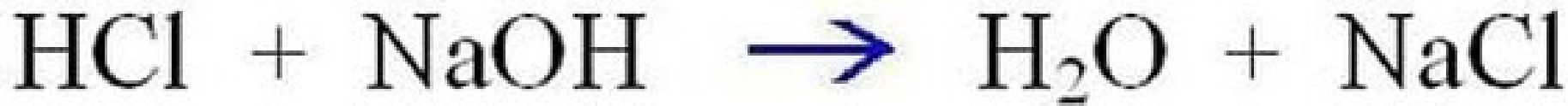
- ▶ Looked at yesterday
- ▶ Taking an antacid to neutralize stomach acid
- ▶ Acid reacts with a base

Acid

Base

Water

Salt



To be continued...



Chapter 3: Types of Reactions continued



Formulas for Common Compounds

- ▶ Created so scientists of different languages could know what each other were talking about
- ▶ Zinc + Sulfur → Zinc Sulfide
- ▶ When they form a compound the non-metal has the latter part of its name to “-ide”
- ▶ Using the **chemical name** for the products and reactant

Periodic Table

- ▶ Shows chemical names of each element along with their chemical symbol

Periodic Table

16 **8**

O

Oxygen

16.00 **(6)**

Chemical Symbol

Chemical Name

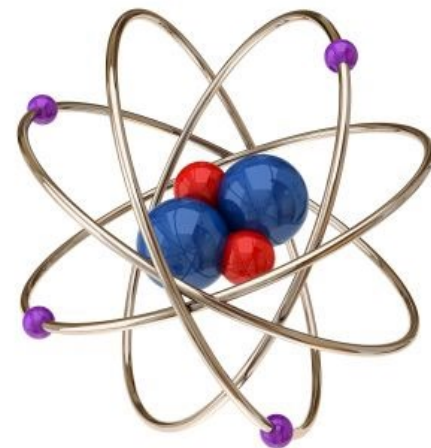
1A	2A	3A	4A	5A	6A	7A	8	9	10
1 H	2 He								
3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne		
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar		
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd
55 Cs	56 Ba	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd
87 Fr	88 Ra	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm

11A	12A	13A	14A	15A	16A	17A	18A
49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe		
81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn		
113							
113							

68	69	70	71
Er	Tm	Yb	Lu
108	109	110	111
Fm	Md	No	Lr

* Lan Ser
+ Acti Ser

Chemical Formula



- ▶ Zinc + Sulfur \rightarrow Zinc Sulfide
- ▶ $\text{Zn} + \text{S} \rightarrow \text{ZnS}$
- ▶ Name: 1.Metal 2.Non-Metal
- ▶ Periodic Table in back of textbook
- ▶ Name of non-metal adds “-ide” to name
- ▶ Oxygen \rightarrow Oxide, Chlorine \rightarrow Chloride
- ▶ Formula will also have the element’s state
- ▶ (s) = solid, (l) = liquid, (g) = gas, (aq) = aqueous (means dissolved in water)



Common Names

- ▶ Not everyone is a scientist so certain compounds have been given **common names**
- ▶ You may already know some of these names!
- ▶ H_2O ?
- ▶ $NaCl$?
- ▶ $C_6H_{12}O_6$?
- ▶ $NaHCO_3$?



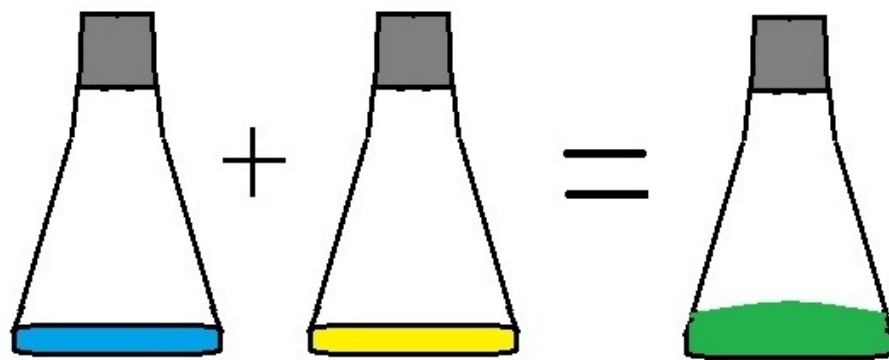
Chemical Equation

- ▶ We've talked about different signs of chemical actions – bubbling, formation of a precipitate, colour change, etc.
- ▶ In some reactions substances or matter may seem to be destroyed but it actually doesn't change

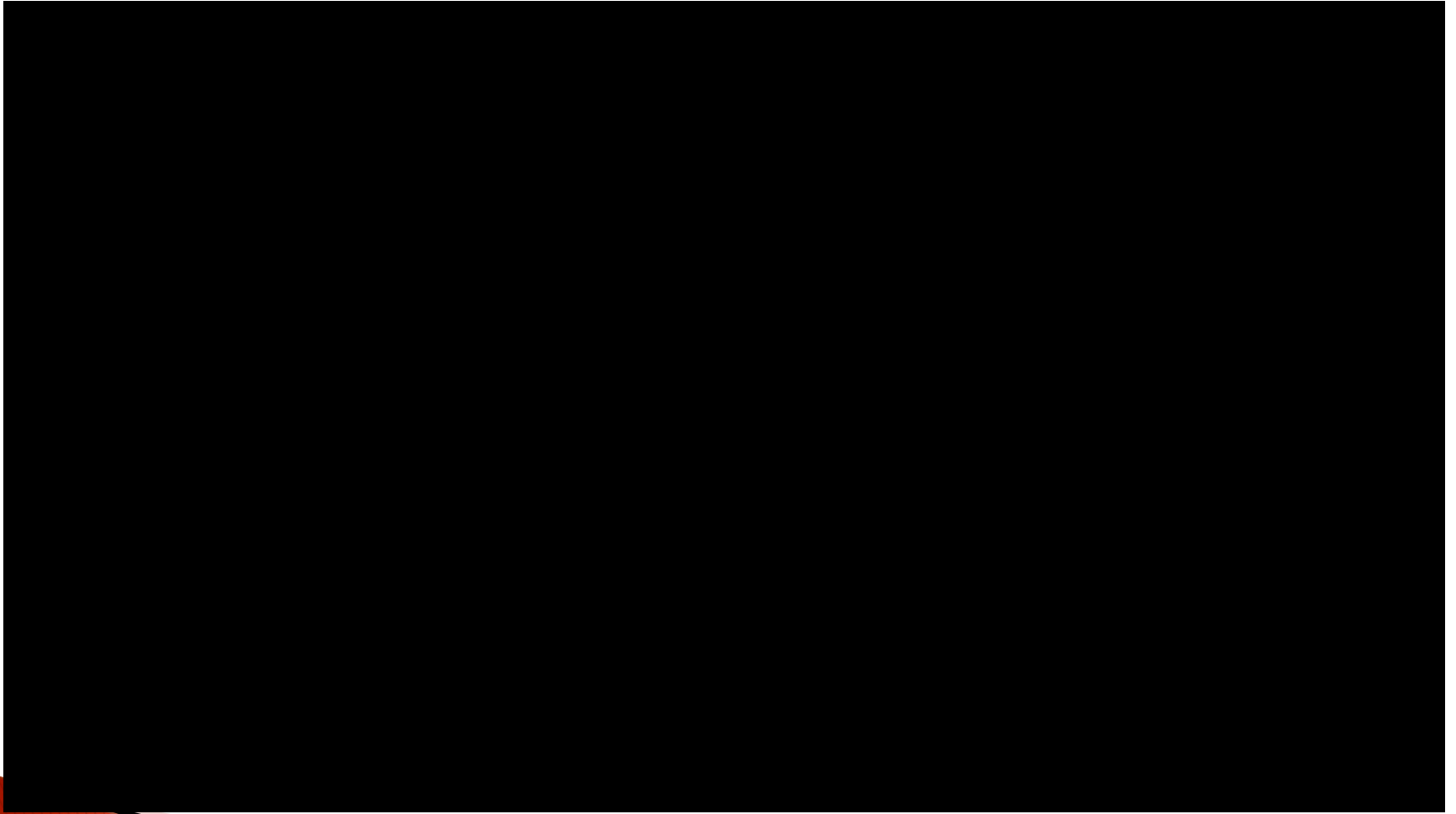


Law of Conservation of Mass

- ▶ Discovered in the 1700s by Antoine Lavoisier
- ▶ “In a chemical reaction matter is neither created or destroyed”
- ▶ Reactant 1 (8.5g) + Reactant 2 (1.5g)
- ▶ → Product (10g)
- ▶ $8.5\text{g} + 1.5\text{g} \rightarrow 10\text{g}$

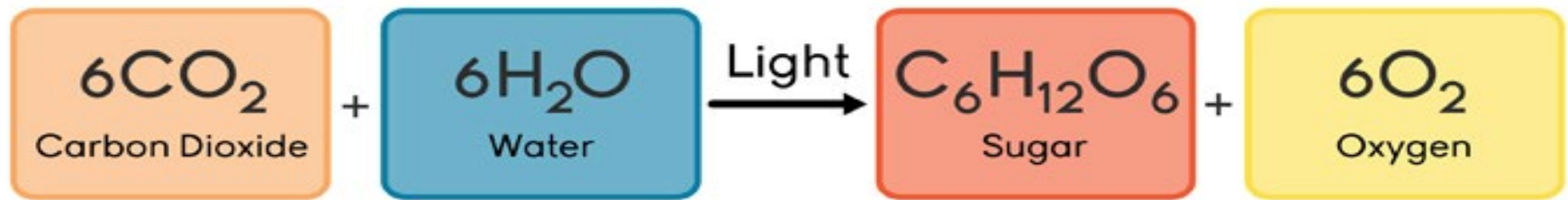


Video Time!



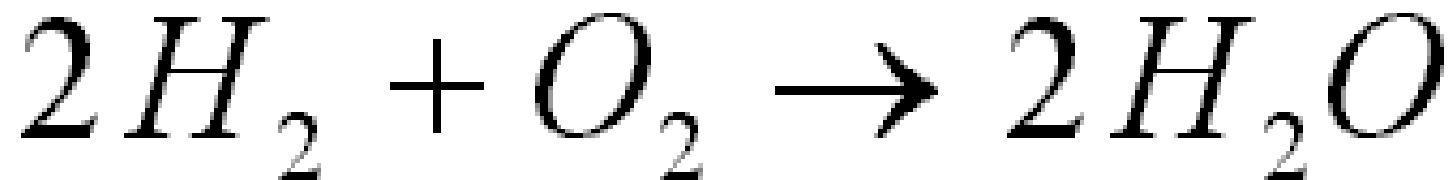
Staying Balanced

- ▶ Sometimes word equations aren't enough
- ▶ Metal + tire + glass + others → car
- ▶ Not very clear on the different amounts



- ▶ Subscript # show how many of that atom are in the compound or element, while coefficient # in front shows how many of that entire molecule there is

Chemical Equation



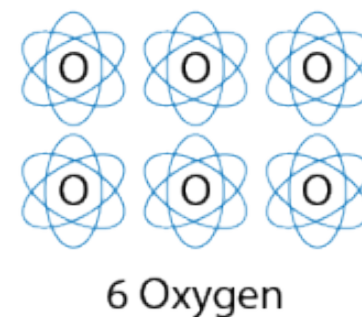
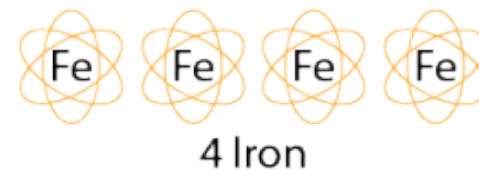
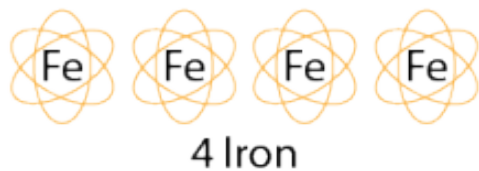
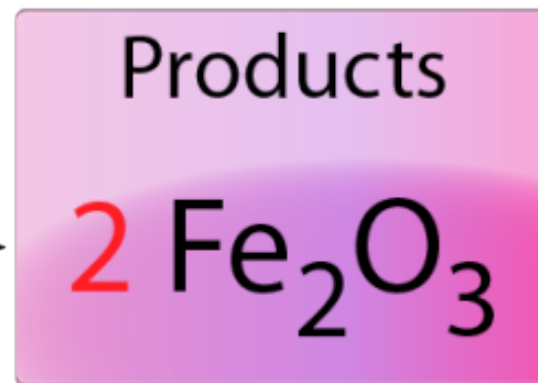
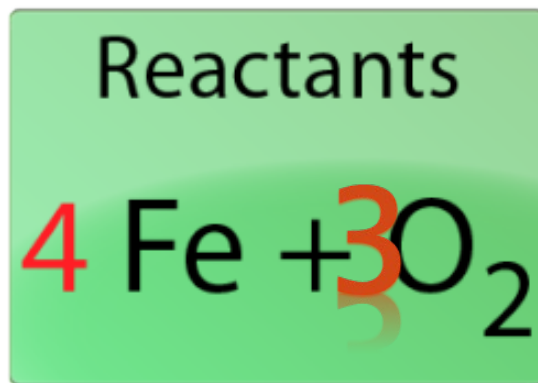
4H,

2O

=

4H, 2O

Practice



The End