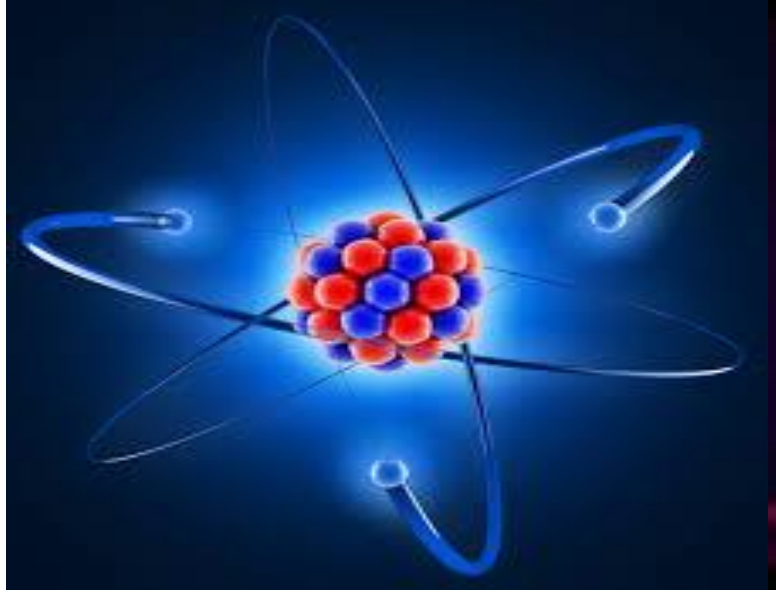


Term 2: Matter and Materials

Mrs Ramuhashi

COMPOUND- Is a pure substance that has two or more kinds of atoms for example water has two hydrogen atoms and one oxygen atoms.

ELEMENT

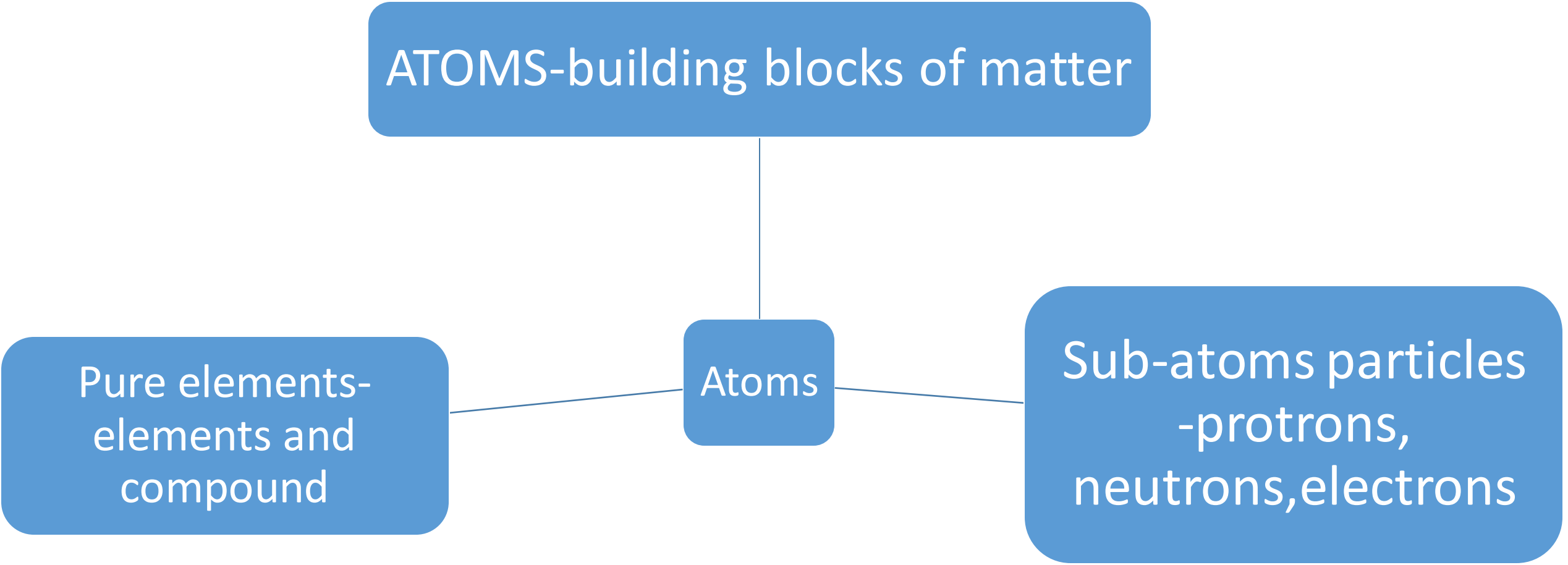
Has pure substances. Cannot be broken down into simpler substances. Use one or two letter symbol for an element's name e.g. H for hydrogen, C for calcium, Cl for chlorine

COMPOUND

- Has pure substances that has two or more kinds of atoms. Can be broken down into its elements by reaction or electrolysis. Each compound has chemical formula that shows which element are present in the compound and how many atoms of each element there are in one molecule e.g. the chemical formula for water H_20

The **definition** of an **atom** is the smallest component of an element, characterized by a sharing of the chemical properties of the element and a nucleus with neutrons, protons and electrons.

Atoms


ATOMS-building blocks of matter
Atoms
Pure elements-elements and compound
Sub-atoms particles -protrons, neutrons,electrons

- Is made up of tiny particles
- Our body and everything, we see ,taste or smell is made up by matter

matter

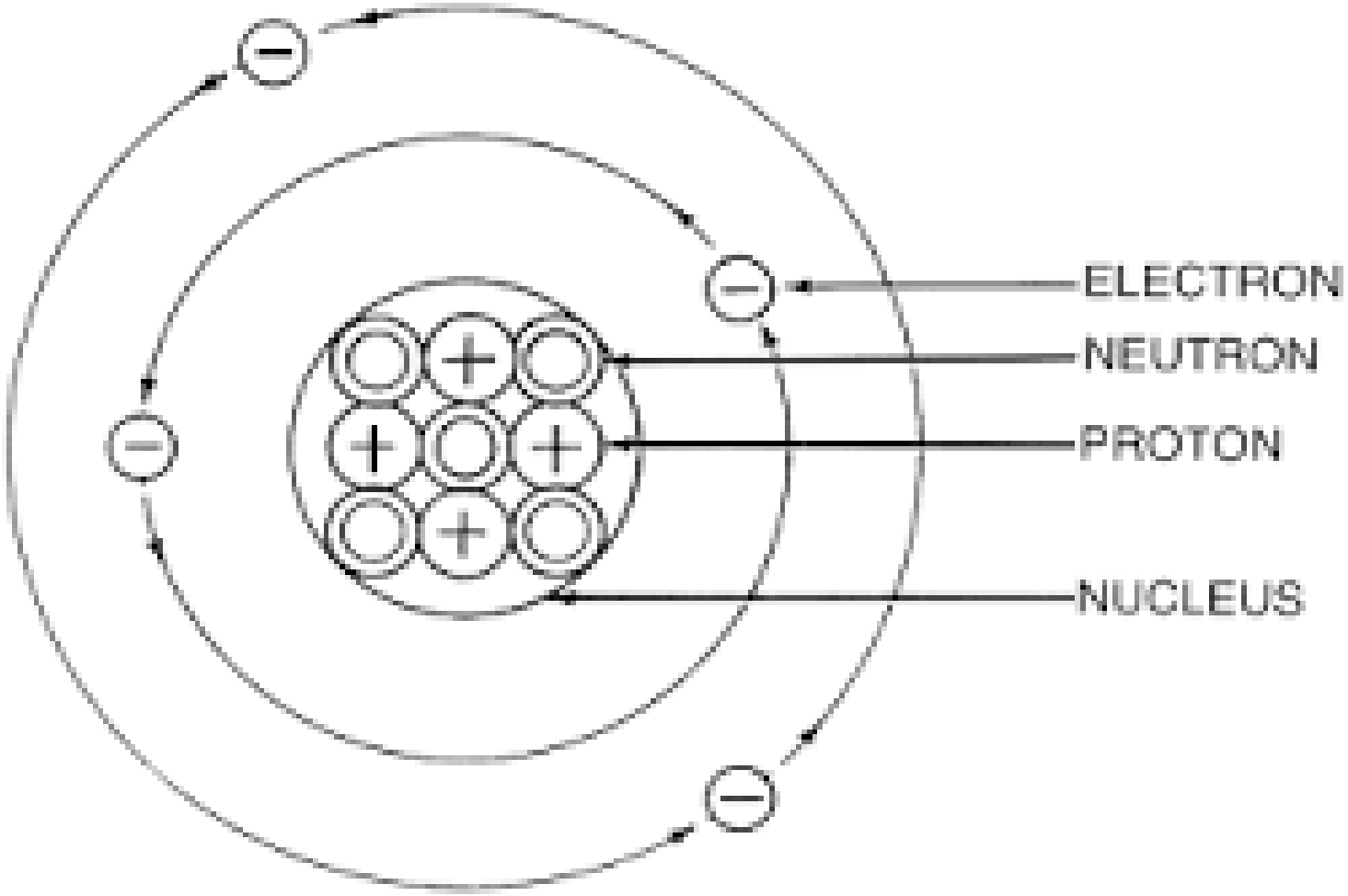
Atoms

- Building blocks of all matter
- Are very small to see even with the best microscopes

- Periodic table of elements
- Element is made of atoms of the same kind and cannot be broken down into other elements

Elements

FOUR SUB-ATOMS PARTICLES-atoms that cannot be divided



Nucleus –centre of each atoms is a region

Neutrons are neutral

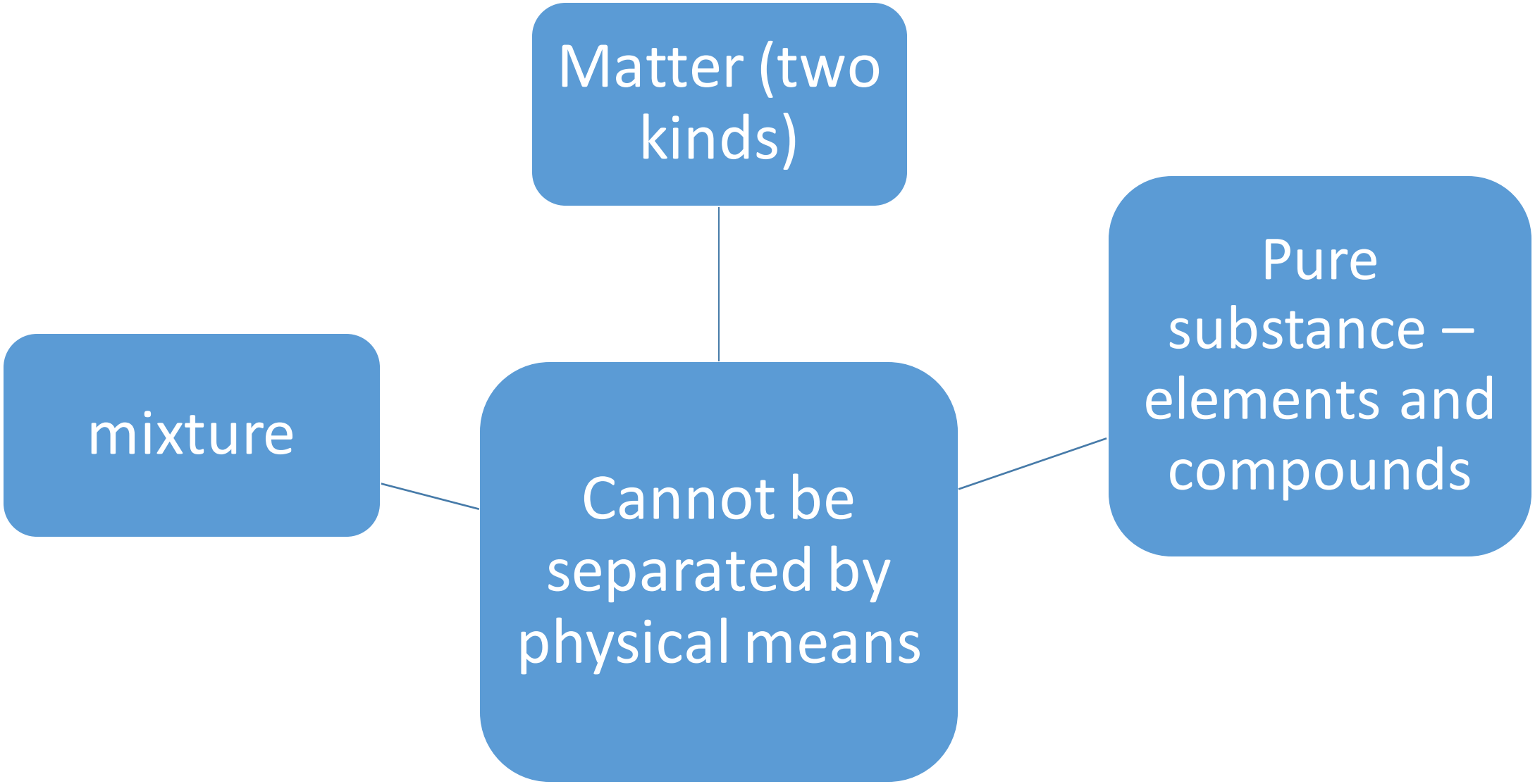
- No electric charge

Electrons are negative

- Has negative charge (-)

Protons are positive

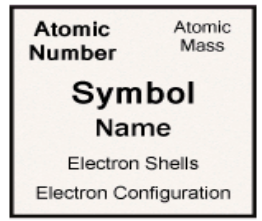
- Has positive charge


Matter (two kinds)
mixture
Cannot be separated by physical means
Pure substance – elements and compounds

Elements-periodic table

The periodic table, also known as the periodic table of elements, is a tabular display of the **chemical** elements, which are arranged by **atomic number**,**electron** configuration, and recurring **chemical** properties.

Periodic Table of the Elements



Element symbol represents state at room temperature.

Solid, Liquid or Gas

3 IIIB 3B	4 IVB 4B	5 VB 5B	6 VIB 6B	7 VIIB 7B	8	9 VIII 8	10	11 IB 1B	12 IIB 2B	13 IIIA 3A	14 IVA 4A	15 VA 5A	16 VIA 6A	17 VIIA 7A	18 VIIIA 8A
										5 10.811 **B** Boron 2 3 $[He]2s^2 2p^1$	6 12.011 **C** Carbon 2 4 $[He]2s^2 2p^2$	7 14.007 **N** Nitrogen 2 5 $[He]2s^2 2p^3$	8 15.999 **O** Oxygen 2 6 $[He]2s^2 2p^4$	9 18.998 **F** Fluorine 2 7 $[He]2s^2 2p^5$	2 4.003 **He** Helium 2 $1s^2$
										13 26.982 **Al** Aluminum 2 8 3 $[Ne]3s^2 3p^1$	14 28.086 **Si** Silicon 2 8 4 $[Ne]3s^2 3p^2$	15 30.974 **P** Phosphorus 2 8 5 $[Ne]3s^2 3p^3$	16 32.066 **S** Sulfur 2 8 6 $[Ne]3s^2 3p^4$	17 35.453 **Cl** Chlorine 2 8 7 $[Ne]3s^2 3p^5$	10 20.180 **Ne** Neon 2 8 $[He]2s^2 2p^6$
21 44.956 **Sc** Scandium 2 8 9 2 $[Ar]3d^1 4s^2$	22 47.88 **Ti** Titanium 2 8 10 2 $[Ar]3d^2 4s^2$	23 50.942 **V** Vanadium 2 8 11 2 $[Ar]3d^3 4s^2$	24 51.996 **Cr** Chromium 2 8 13 1 $[Ar]3d^5 4s^1$	25 54.938 **Mn** Manganese 2 8 13 2 $[Ar]3d^5 4s^2$	26 55.845 **Fe** Iron 2 8 14 2 $[Ar]3d^6 4s^2$	27 58.933 **Co** Cobalt 2 8 15 2 $[Ar]3d^7 4s^2$	28 58.693 **Ni** Nickel 2 8 16 2 $[Ar]3d^8 4s^2$	29 63.546 **Cu** Copper 2 8 18 1 $[Ar]3d^{10} 4s^1$	30 65.38 **Zn** Zinc 2 8 18 2 $[Ar]3d^{10} 4s^2$	31 69.723 **Ga** Gallium 2 8 18 3 $[Ar]3d^{10} 4s^2 4p^1$	32 72.631 **Ge** Germanium 2 8 18 4 $[Ar]3d^{10} 4s^2 4p^2$	33 74.922 **As** Arsenic 2 8 18 5 $[Ar]3d^{10} 4s^2 4p^3$	34 78.971 **Se** Selenium 2 8 18 6 $[Ar]3d^{10} 4s^2 4p^4$	35 79.904 **Br** Bromine 2 8 18 7 $[Ar]3d^{10} 4s^2 4p^5$	36 84.798 **Kr** Krypton 2 8 18 8 $[Ar]3d^{10} 4s^2 4p^6$
39 88.906 **Y** Yttrium 2 8 18 9 2 $[Kr]4d^1 5s^2$	40 91.224 **Zr** Zirconium 2 8 18 10 2 $[Kr]4d^2 5s^2$	41 92.906 **Nb** Niobium 2 8 18 12 1 $[Kr]4d^4 5s^1$	42 95.95 **Mo** Molybdenum 2 8 18 13 1 $[Kr]4d^5 5s^1$	43 98.907 **Tc** Technetium 2 8 18 14 1 $[Kr]4d^5 5s^2$	44 101.07 **Ru** Ruthenium 2 8 18 15 1 $[Kr]4d^7 5s^1$	45 102.906 **Rh** Rhodium 2 8 18 16 1 $[Kr]4d^8 5s^1$	46 106.42 **Pd** Palladium 2 8 18 18 $[Kr]4d^{10}$	47 107.868 **Ag** Silver 2 8 18 18 1 $[Kr]4d^{10} 5s^1$	48 112.414 **Cd** Cadmium 2 8 18 18 2 $[Kr]4d^{10} 5s^2$	49 114.818 **In** Indium 2 8 18 18 3 $[Kr]4d^{10} 5s^2 5p^1$	50 118.711 **Sn** Tin 2 8 18 18 4 $[Kr]4d^{10} 5s^2 5p^2$	51 121.760 **Sb** Antimony 2 8 18 18 5 $[Kr]4d^{10} 5s^2 5p^3$	52 127.6 **Te** Tellurium 2 8 18 18 6 $[Kr]4d^{10} 5s^2 5p^4$	53 126.904 **I** Iodine 2 8 18 18 7 $[Kr]4d^{10} 5s^2 5p^5$	54 131.249 **Xe** Xenon 2 8 18 18 8 $[Kr]4d^{10} 5s^2 5p^6$
57-71	72 178.49 **Hf** Hafnium 2 8 18 32 10 2 $[Xe]4f^{14} 5d^2 6s^2$	73 180.948 **Ta** Tantalum 2 8 18 32 11 2 $[Xe]4f^{14} 5d^3 6s^2$	74 183.84 **W** Tungsten 2 8 18 32 12 2 $[Xe]4f^{14} 5d^4 6s^2$	75 186.207 **Re** Rhenium 2 8 18 32 13 2 $[Xe]4f^{14} 5d^5 6s^2$	76 190.23 **Os** Osmium 2 8 18 32 14 2 $[Xe]4f^{14} 5d^6 6s^2$	77 192.217 **Ir** Iridium 2 8 18 32 15 2 $[Xe]4f^{14} 5d^7 6s^2$	78 195.085 **Pt** Platinum 2 8 18 32 17 1 $[Xe]4f^{14} 5d^9 6s^1$	79 196.967 **Au** Gold 2 8 18 32 18 1 $[Xe]4f^{14} 5d^{10} 6s^1$	80 200.592 **Hg** Mercury 2 8 18 32 18 2 $[Xe]4f^{14} 5d^{10} 6s^2$	81 204.383 **Tl** Thallium 2 8 18 32 18 3 $[Xe]4f^{14} 5d^{10} 6s^2 6p^1$	82 207.2 **Pb** Lead 2 8 18 32 18 4 $[Xe]4f^{14} 5d^{10} 6s^2 6p^2$	83 208.980 **Bi** Bismuth 2 8 18 32 18 5 $[Xe]4f^{14} 5d^{10} 6s^2 6p^3$	84 [208.982] **Po** Polonium 2 8 18 32 18 6 $[Xe]4f^{14} 5d^{10} 6s^2 6p^4$	85 209.987 **At** Astatine 2 8 18 32 18 7 $[Xe]4f^{14} 5d^{10} 6s^2 6p^5$	86 222.018 **Rn** Radon 2 8 18 32 18 8 $[Xe]4f^{14} 5d^{10} 6s^2 6p^6$
89-103	104 [261] **Rf** Rutherfordium 2 8 18 32 32 10 2 $[Rn]5f^{14} 6d^2 7s^{2*}$	105 [262] **Db** Dubnium 2 8 18 32 32 11 2 $[Rn]5f^{14} 6d^3 7s^{2*}$	106 [266] **Sg** Seaborgium 2 8 18 32 32 12 2 $[Rn]5f^{14} 6d^4 7s^{2*}$	107 [264] **Bh** Bohrium 2 8 18 32 32 13 2 $[Rn]5f^{14} 6d^5 7s^{2*}$	108 [269] **Hs** Hassium 2 8 18 32 32 14 2 $[Rn]5f^{14} 6d^6 7s^{2*}$	109 [268] **Mt** Meitnerium 2 8 18 32 32 15 2 $[Rn]5f^{14} 6d^7 7s^{2*}$	110 [269] **Ds** Darmstadtium 2 8 18 32 32 16 2 $[Rn]5f^{14} 6d^8 7s^{2*}$	111 [272] **Rg** Roentgenium 2 8 18 32 32 17 2 $[Rn]5f^{14} 6d^9 7s^{2*}$	112 [277] **Cn** Copernicium 2 8 18 32 32 18 2 $[Rn]5f^{14} 6d^{10} 7s^{2*}$	113 unknown **Uut** Ununtrium 2 8 18 32 32 18 3 $[Rn]5f^{14} 6d^{10} 7s^2 7p^{1*}$	114 [289] **Fl** Flerovium 2 8 18 32 32 18 4 $[Rn]5f^{14} 6d^{10} 7s^2 7p^{2*}$	115 unknown **Uup** Ununpentium 2 8 18 32 32 18 5 $[Rn]5f^{14} 6d^{10} 7s^2 7p^{3*}$	116 [298] **Lv** Livermorium 2 8 18 32 32 18 6 $[Rn]5f^{14} 6d^{10} 7s^2 7p^{4*}$	117 unknown **Uus** Ununseptium 2 8 18 32 32 18 7 $[Rn]5f^{14} 6d^{10} 7s^2 7p^{5*}$	118 unknown **Uuo** Ununoctium 2 8 18 32 32 18 8 $[Rn]5f^{14} 6d^{10} 7s^2 7p^{6*}$

Lanthanide series														
57 138.905 **La** Lanthanum 2 8 18 18 9 2 $[Xe]5d^1 6s^2$	58 140.116 **Ce** Cerium 2 8 18 20 8 2 $[Xe]4f^1 5d^1 6s^2$	59 140.908 **Pr** Praseodymium 2 8 18 21 8 2 $[Xe]4f^3 6s^2$	60 144.243 **Nd** Neodymium 2 8 18 22 8 2 $[Xe]4f^4 6s^2$	61 144.913 **Pm** Promethium 2 8 18 23 8 2 $[Xe]4f^5 6s^2$	62 150.36 **Sm** Samarium 2 8 18 24 8 2 $[Xe]4f^6 6s^2$	63 151.964 **Eu** Europium 2 8 18 25 8 2 $[Xe]4f^7 6s^2$	64 157.25 **Gd** Gadolinium 2 8 18 25 9 2 $[Xe]4f^7 5d^1 6s^2$	65 158.925 **Tb** Terbium 2 8 18 27 8 2 $[Xe]4f^9 6s^2$	66 162.500 **Dy** Dysprosium 2 8 18 28 8 2 $[Xe]4f^{10} 6s^2$	67 164.930 **Ho** Holmium 2 8 18 29 8 2 $[Xe]4f^{11} 6s^2$	68 167.259 **Er** Erbium 2 8 18 30 8 2 $[Xe]4f^{12} 6s^2$	69 168.934 **Tm** Thulium 2 8 18 31 8 2 $[Xe]4f^{13} 6s^2$	70 173.055 **Yb** Ytterbium 2 8 18 32 8 2 $[Xe]4f^{14} 6s^2$	71 174.967 **Lu** Lutetium 2 8 18 32 9 2 $[Xe]4f^{14} 5d^1 6s^2$
Actinide series														
89 227.028 **Ac** Actinium 2 8 18 32 18 9 2 $[Rn]6d^1 7s^2$	90 232.038 **Th** Thorium 2 8 18 32 18 10 2 $[Rn]6d^2 7s^2$	91 231.036 **Pa** Protactinium 2 8 18 32 20 9 2 $[Rn]5f^2 6d^1 7s^2$	92 238.029 **U** Uranium 2 8 18 32 21 9 2 $[Rn]5f^3 6d^1 7s^2$	93 237.048 **Np** Neptunium 2 8 18 32 23 8 2 $[Rn]5f^4 6d^1 7s^2$	94 244.064 **Pu** Plutonium 2 8 18 32 24 8 2 $[Rn]5f^6 7s^2$	95 243.061 **Am** Americium 2 8 18 32 25 8 2 $[Rn]5f^7 7s^2$	96 247.070 **Cm** Curium 2 8 18 32 25 9 2 $[Rn]5f^7 6d^1 7s^2$	97 247.070 **Bk** Berkelium 2 8 18 32 27 8 2 $[Rn]5f^9 7s^2$	98 251.080 **Cf** Californium 2 8 18 32 28 8 2 $[Rn]5f^{10} 7s^2$	99 [254] **Es** Einsteinium 2 8 18 32 29 8 2 $[Rn]5f^{11} 7s^2$	100 257.095 **Fm** Fermium 2 8 18 32 30 8 2 $[Rn]5f^{12} 7s^2$	101 258.1 **Md** Mendelevium 2 8 18 32 31 8 2 $[Rn]5f^{13} 7s^2$	102 259.101 **No** Nobelium 2 8 18 32 32 8 2 $[Rn]5f^{14} 7s^2$	103 [262] **Lr** Lawrencium 2 8 18 32 32 9 2 $[Rn]5f^{14} 6d^1 7s^2$

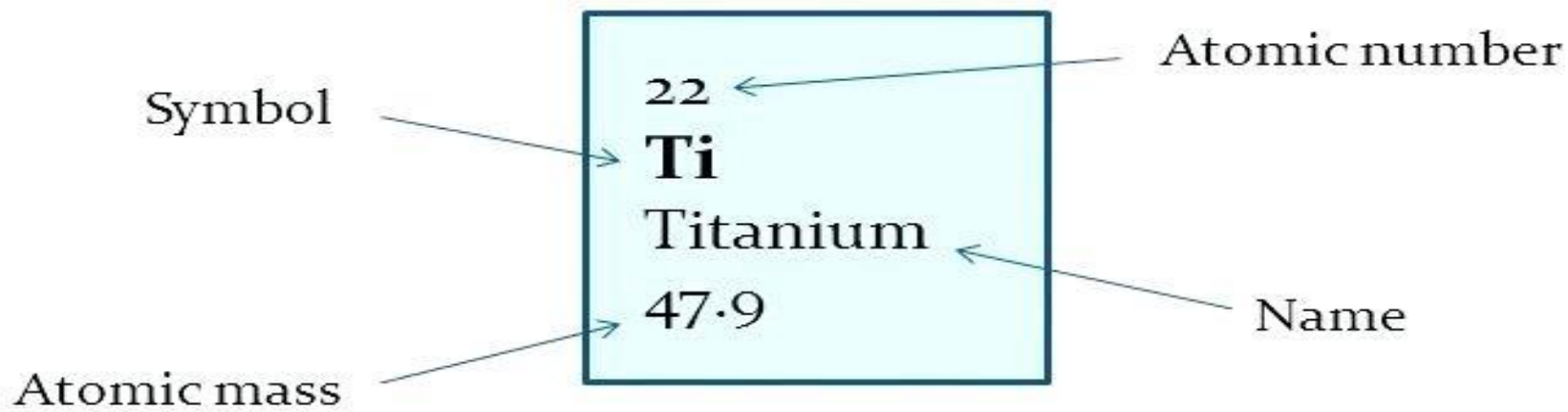
Alkali Metal | Alkaline Earth | Transition Metal | Basic Metal | Metalloid | Nonmetal | Halogen | Noble Gas | Lanthanide | Actinide

The first 20 elements of the periodic table :

1.H —Hydrogen
2.He—Helium
3.Li—Lithium
4.Be—Beryllium
5.B—Boron
6.C—Carbon
7.N—Nitrogen
8.O—Oxygen
9.F—Fluorine
10.Ne—Neon
11.Na—Sodium
12.Mg—Magnesium
13.Al—Aluminum
14.Si—Silicon
15.P—Phosphorus
16.S—Sulfur
17.Cl—Chlorine
18.Ar—Argon
19.K—Potassium
20.Ca—Calcium

Elements of the Periodic Table

- Although there are many versions of the periodic table, most contain the following properties:



NAME OF COMPOUND

- The chemical of a compound is worked out using the elements that make up the compound.e.g. sodium chloride or table salt (NaCl) is made of elements sodium(Na) and chlorine(Cl). Hydrogen sulphide(H_2S)is made of the elements hydrogen and sulfur.magnesium oxide(MgO) is made of elements magnesium and oxygen.

NAME OF COMPOUND

COMMON AND CHEMICAL NAMES OF SOME COMPOUNDS

Common Name	Chemical Name	Chemical Formulae
Dry Ice	Solid Carbondioxide	CO_2
Slaked Lime	Calcium Hydroxide	$Ca(OH)_2$
Bleaching Powder	Calcium Oxychloride	$CaOCl_2$
Nausadar	Ammonium Chloride	NH_4Cl
Caustic Soda	Sodium Hydroxide	$NaOH$
Rock Salt	Sodium Chloride	$NaCl$
Caustic Potash	Potassium Hydroxide	KOH
Potash Alum	Potassium Aluminium Sulphate	$K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$
Epsom	Magnesium Sulphate	$MgSO_4 \cdot 7H_2O$
Quick Lime	Calcium Oxide	CaO
Plaster of Paris	Calcium Sulphate	$(CaSO_4)^{1/2} H_2O$
Gypsum	Calcium Sulphate	$CaSO_4 \cdot 2H_2O$
Green Vitriol	Ferrous Sulphate	$FeSO_4 \cdot 7H_2O$
Mohr's Salt	Ammonium Ferrous Sulphate	$FeSO_4(NH_4)_2SO_4 \cdot 6H_2O$
Blue Vitriol	Copper Sulphate	$CuSO_4 \cdot 5H_2O$
White Vitriol	Zinc Sulphate	$ZnSO_4 \cdot 7H_2O$
Marsh Gas	Methane	CH_4
Vinegar	Acetic Acid	CH_3COOH
Potash Ash	Potassium Carbonate	K_2CO_3
Hypo	Sodium Thiosulphate	$Na_2S_2O_3 \cdot 5H_2O$
Baking Powder	Sodium Bicarbonate	$NaHCO_3$
Washing Soda	Sodium Carbonate	$Na_2CO_3 \cdot 10H_2O$
Magnesia	Magnesium Oxide	MgO
Chalk (Marble)	Calcium Carbonate	$CaCO_3$

PREFIX IN CHEMICAL NAME

number of atoms	prefix	example	
1	mono	NO	nitrogen monoxide
2	di	NO_2	nitrogen dioxide
3	tri	N_2O_3	dinitrogen trioxide
4	tetra	N_2O_4	dinitrogen tetraoxide
5	penta	N_2O_5	dinitrogen pentaoxide
6	hexa	SF_6	sulphur hexa fluoride
7	hepta	IF_7	iodine hepta fluoride
8	octa	P_4O_8	tetra phosphur decoxide
9	nona	P_4S_9	tetra phusphur nona sulphide
10	deca	AS_4O_{10}	tetra arsinic decoxide

Activity 1 TERM 2

TOP CLASS NATURAL SCIENCE TEXTBOOK

Write answers in your classwork book

QUESTIONS FOR REVISION

PAGE 90

QUESTION 1
QUESTION 2
QUESTION 3

CHEMICAL REACTION

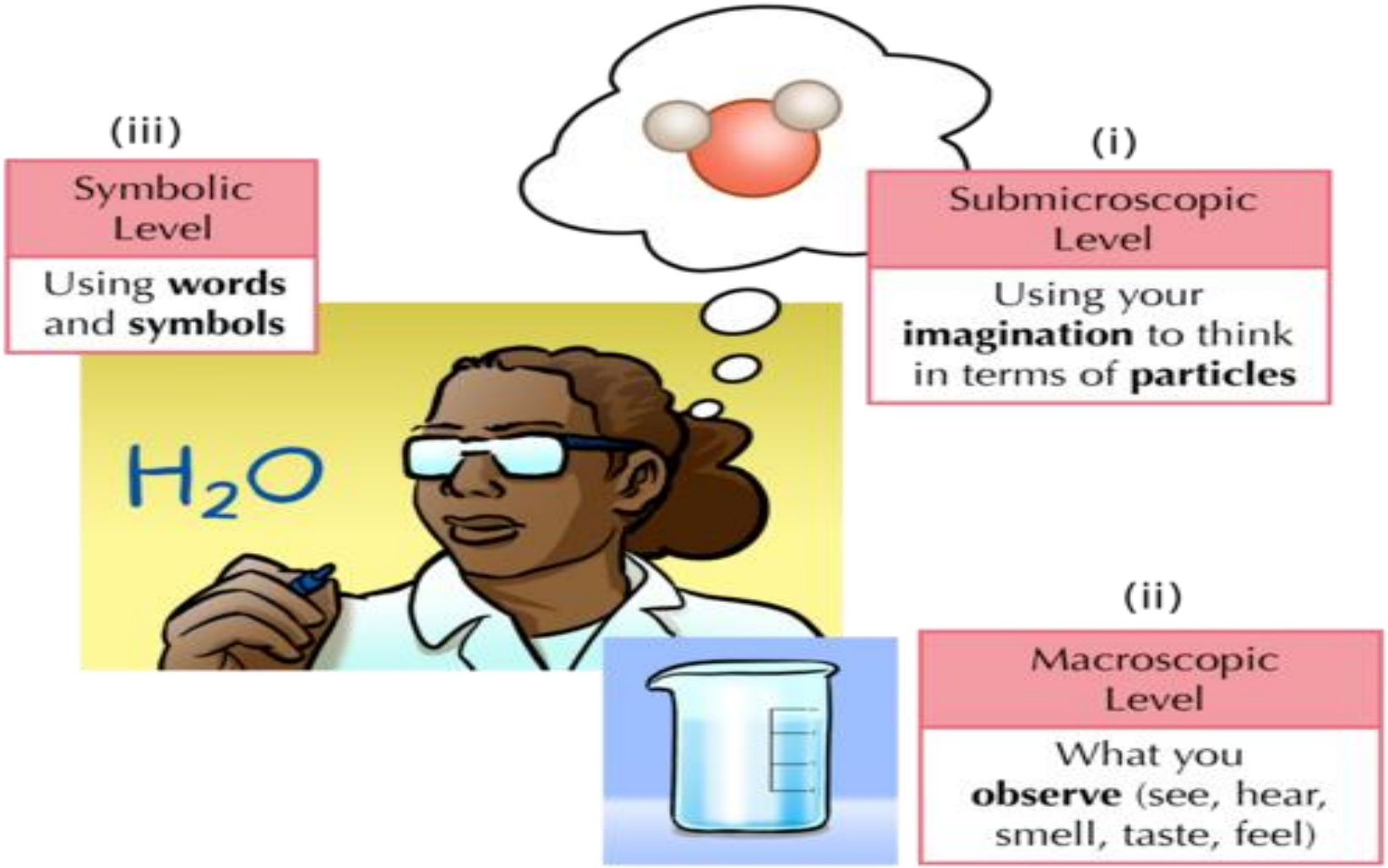
- During chemical reactions, materials are changed into new materials with new chemical and physical properties.
- The materials we start with are called **reactants**, and the new materials that form are called **products**.
- During a chemical reaction, atoms are rearranged. This requires that bonds are broken in the reactants and new bonds are formed in the products.

In this chapter we are going to build on these ideas. We will focus on two things:

- how to write chemical reaction equations; and
- how to balance chemical reaction equations.

compounds on three different levels

- Macroscopic
- Microscopic
- Submicroscopic



The water molecule in the top right shows what a particle of water would look like (i). We cannot see water particles with our eyes, therefore we have to imagine them. This is why the water molecule is inside a thought bubble. We call this a **submicroscopic representation**.

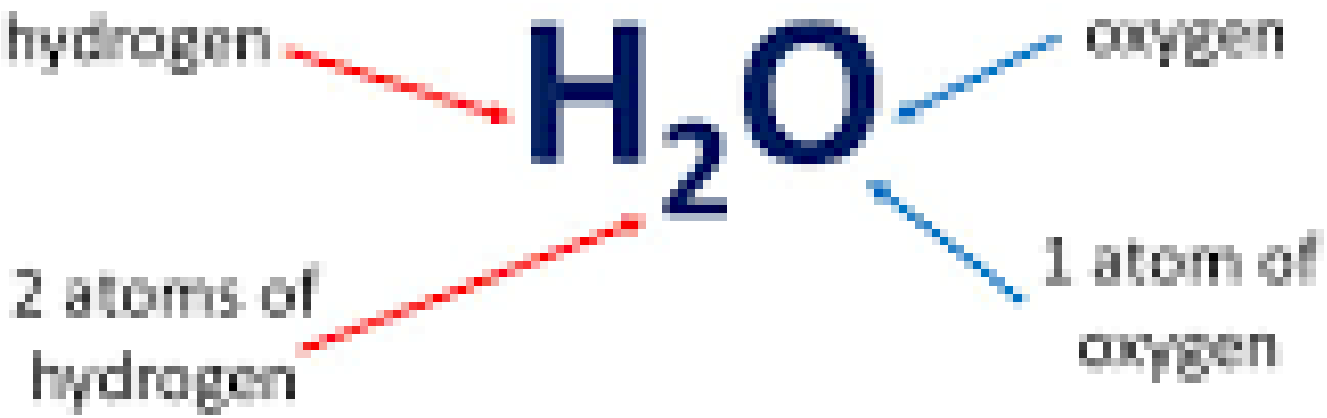
The beaker of water shows what water looks like to our eyes (ii). We call this a **macroscopic representation**, because it is observable. That means it can be observed by using our senses such as seeing, feeling, hearing, tasting or touching.

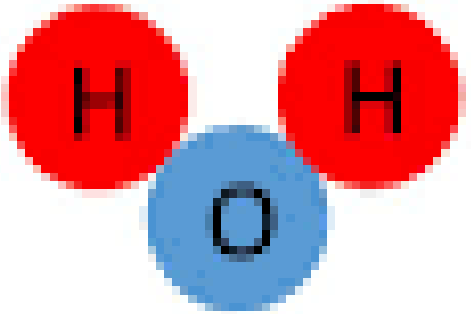
The chemical formula on the left uses chemical symbols to represent water (iii). We have learnt that chemical formulae are made up of element symbols. We can think of chemical symbols and formulae as a chemical 'language', because they tell a story. The 'story' told by the formula H_2O is that a water molecule consists of two atoms of H and one atom of O. The formula 'H_2O' is a **microscopic /symbolic representation**.

Chemical Formulae

- **Chemical formula**: tells you how many atoms of each element is in a molecule.

- Example: Water





Part 2 - Word Equations

To show what is happening during a chemical reaction we can write a word equation

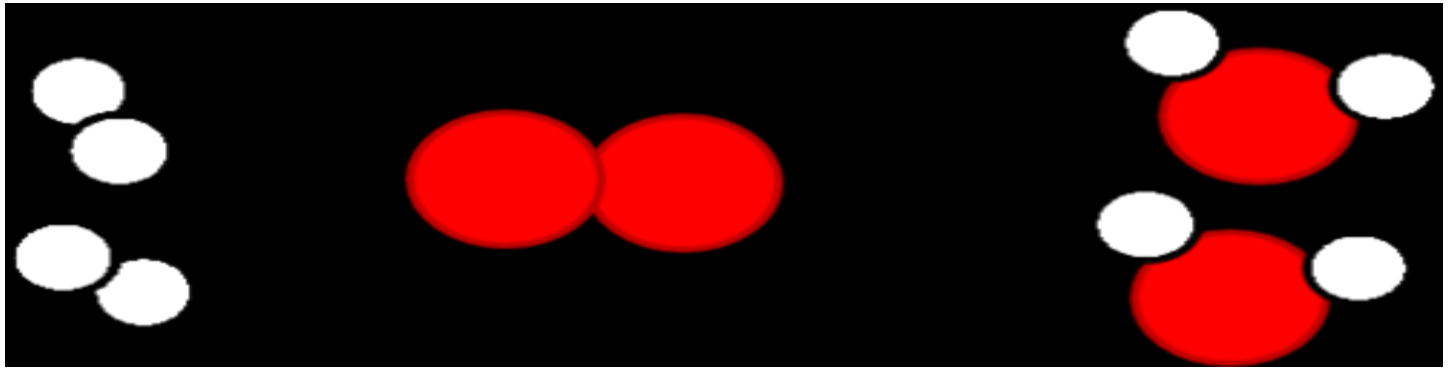
Eggs + flour + milk + butter → Cake

CHEMICAL EQUATIONS

1. Word equation

hydrogen + oxygen→ water

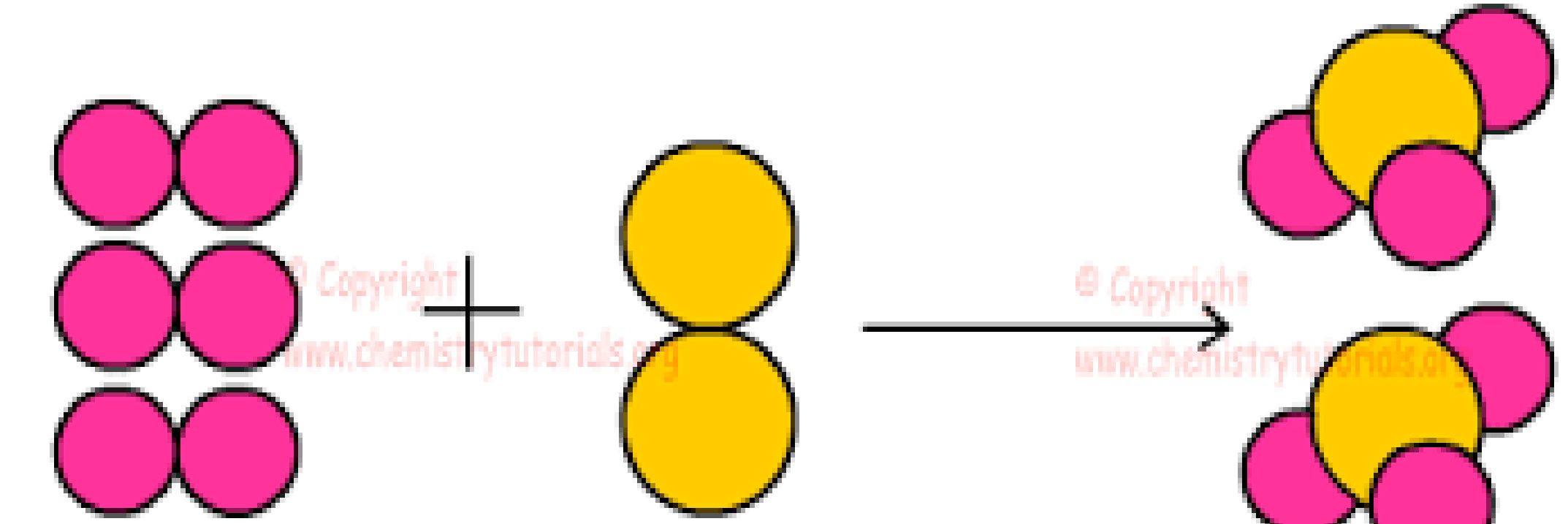
2. Picture equation

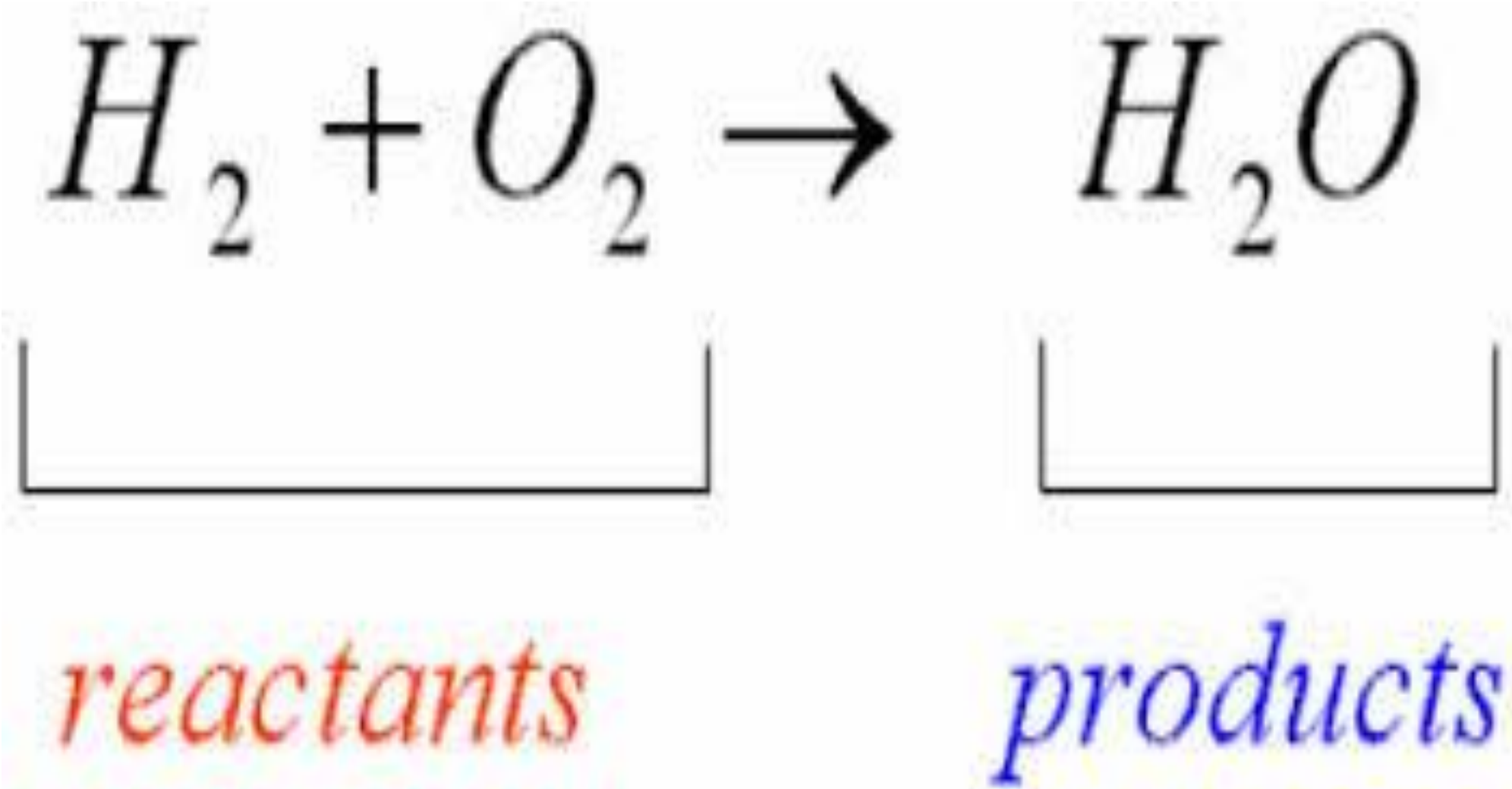


3. Chemical equation (balanced)

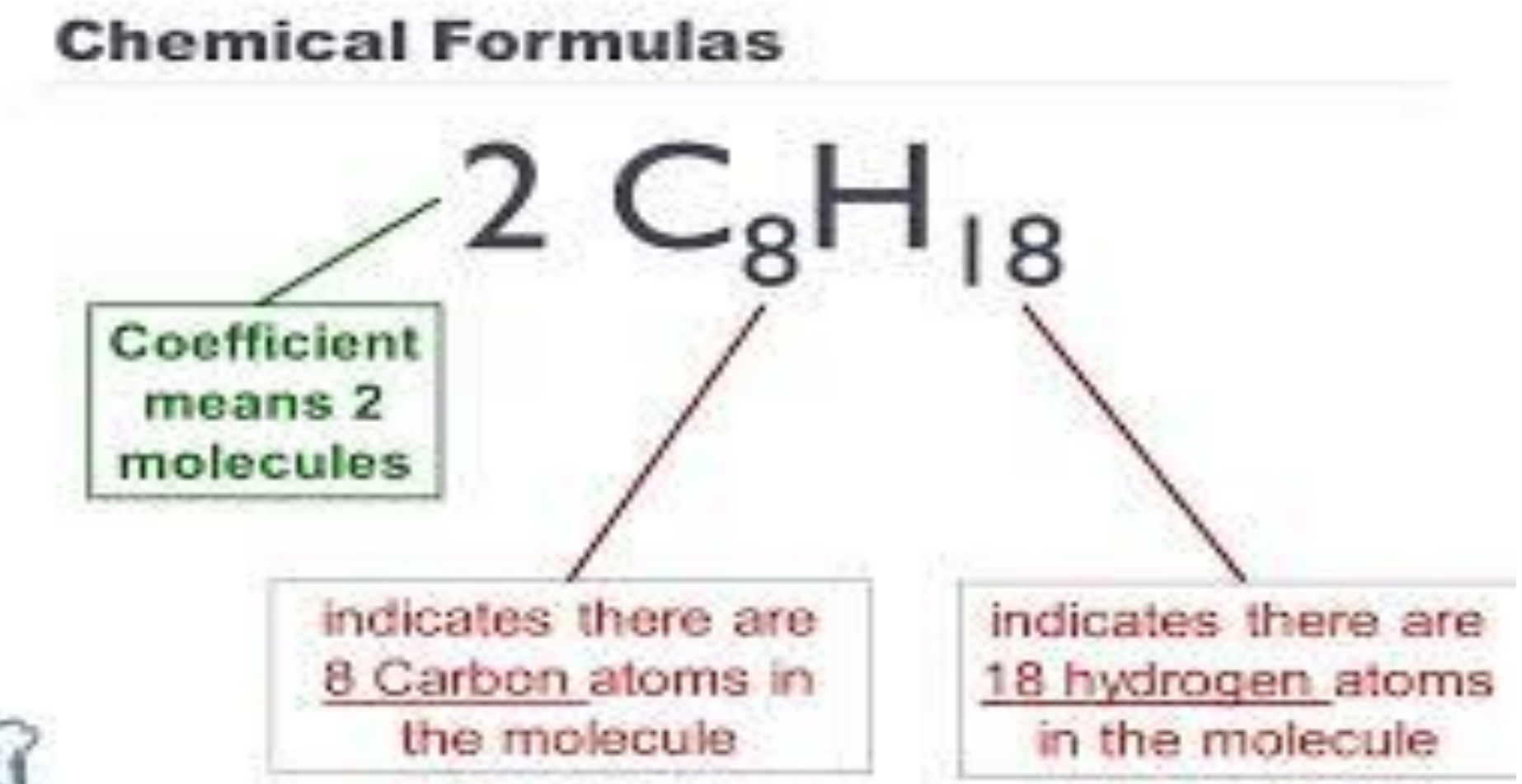
$$2\ H_2 + O_2 \rightarrow 2\ H_2O$$

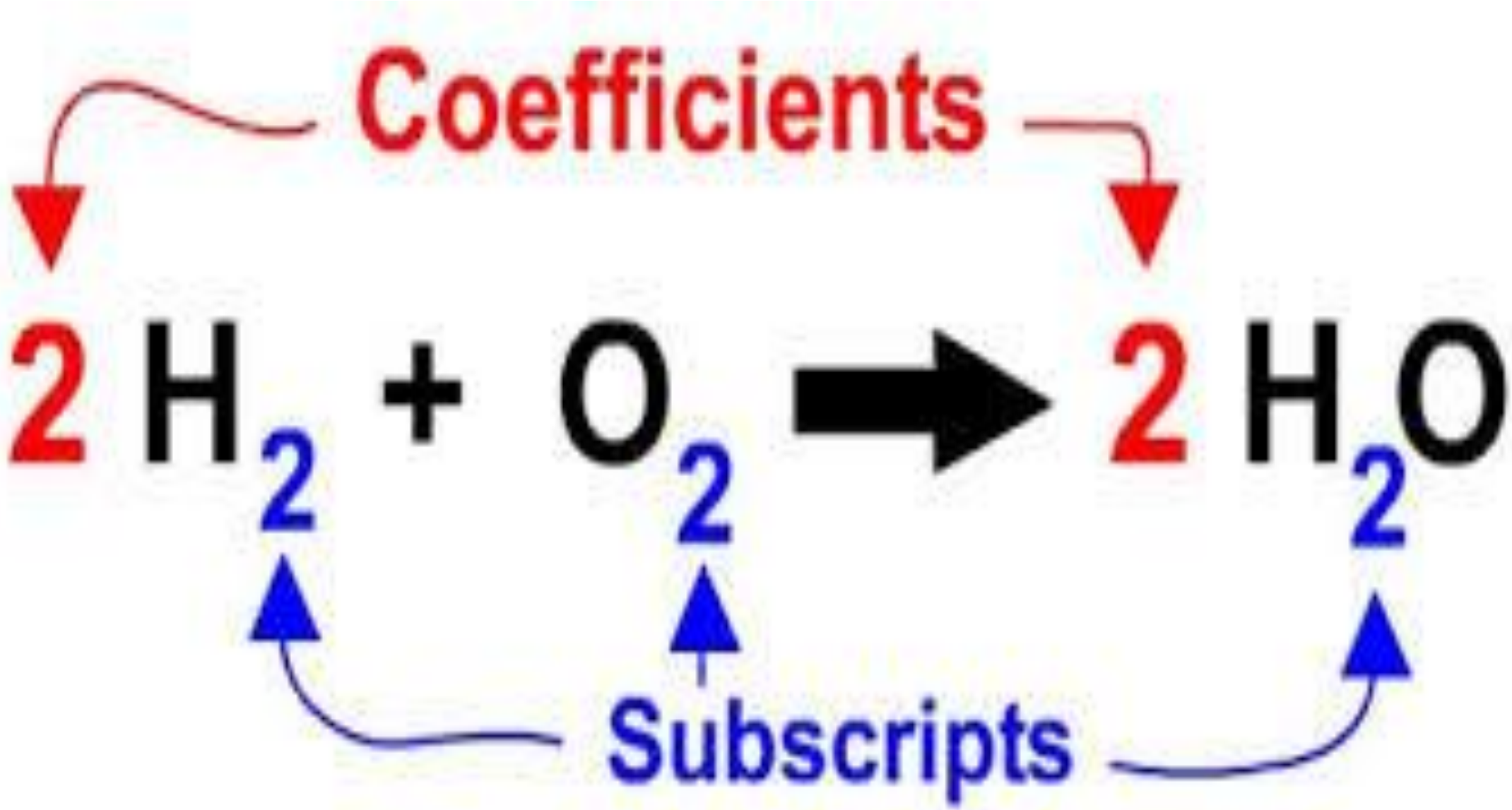
PICTURE,WORD AND CHEMICAL FORMULA




$H_2 + O_2 \rightarrow H_2O$
reactants
products

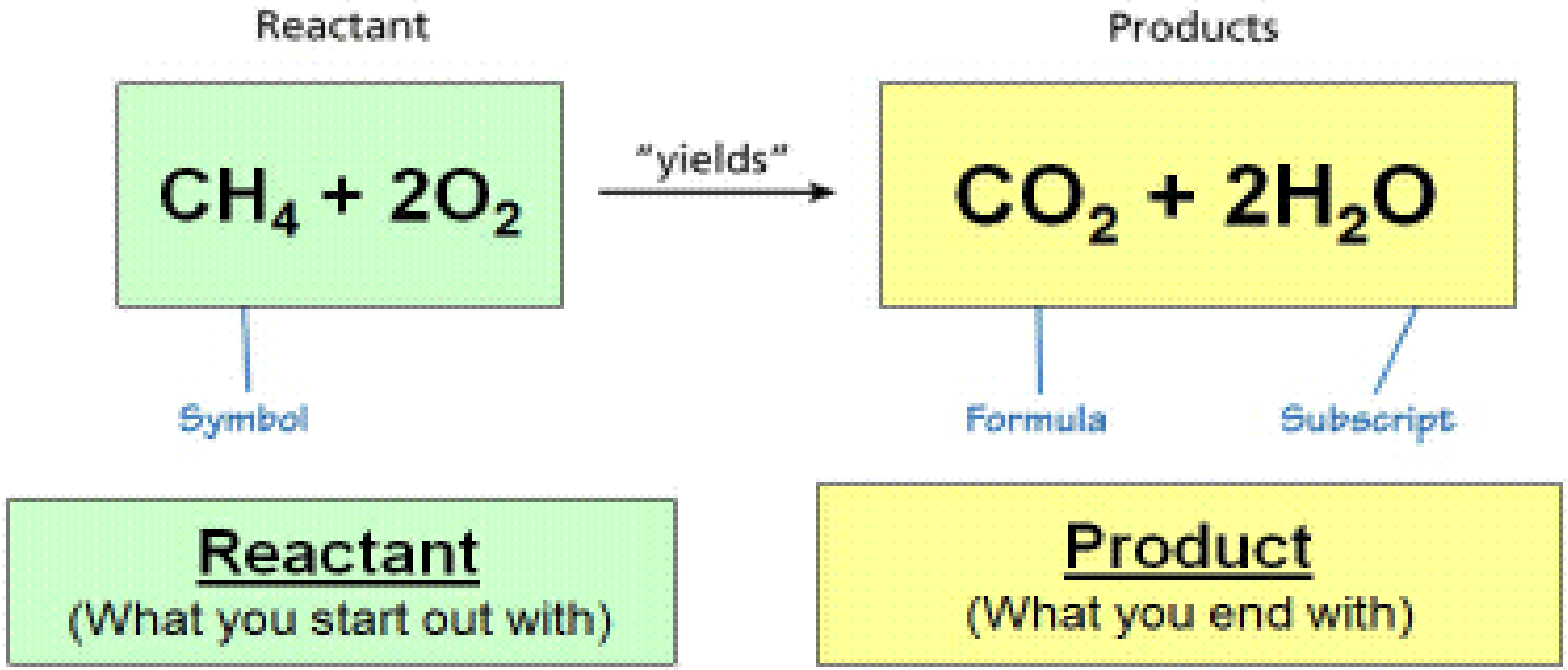
CHEMICAL FORMULAS




Coefficients
2 H2 + O2 → 2 H2O
Subscripts

What Are Chemical Equations?

- Chemical equations use chemical formulas and other symbols instead of words to summarize a reaction.



Compare to reading a book (L→R) on the story of the previous and post relationships.

Writing a Chemical Equation

Chemical symbols give a "before-and-after" picture of a chemical reaction

Reactants *Products*

$$MgO + C \longrightarrow CO + Mg$$

magnesium oxide reacts with carbon yields carbon monoxide and magnesium

BALANCING EQUATIONS

$NaC_2H_3O_2$

How many atoms of each element are in this molecule?

Sodium (Na)	1
Carbon (C)	2
Hydrogen (H)	3
Oxygen (O)	2

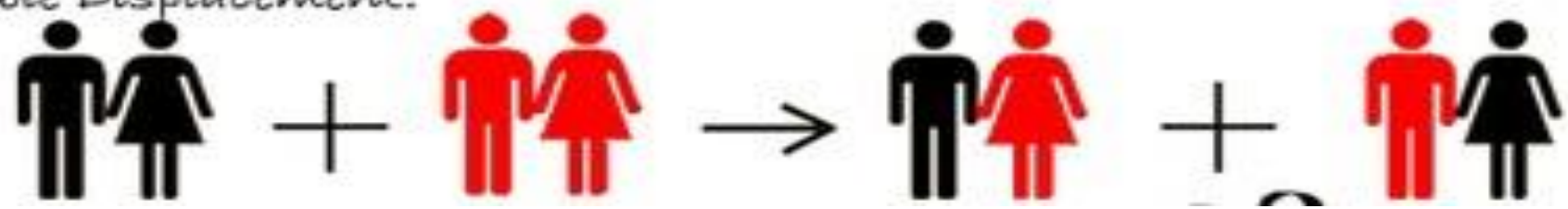
Chemical Reactions

Synthesis:

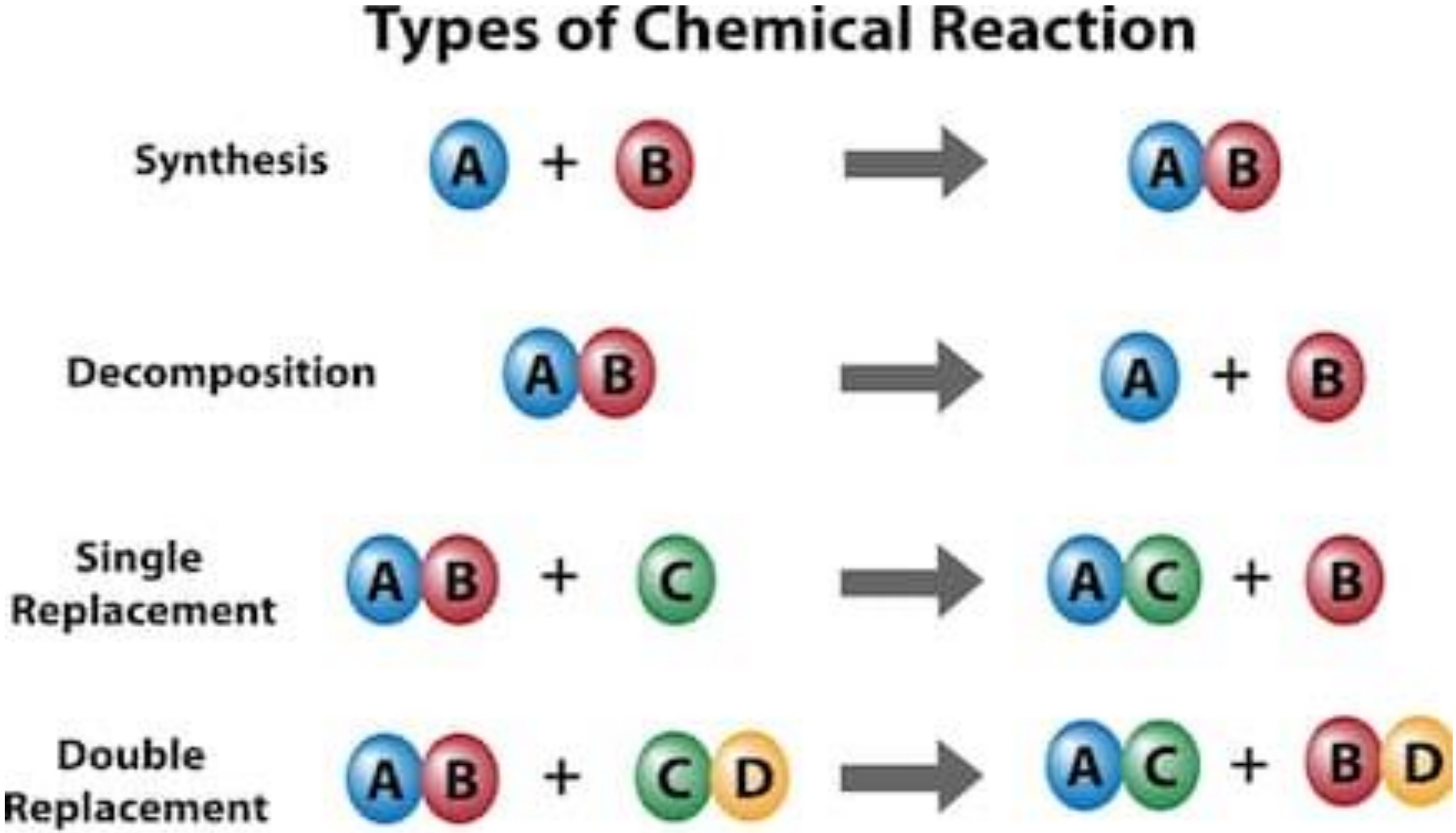
Decomposition:

Single Displacement:

Double Displacement:



Types of Chemical Reaction



Balancing Equations

$$C + 2H_2 \longrightarrow CH_4$$

C = 1 C = 1

H = 4 H = 4

$$AgNO_3 + NaCl \text{ ------> } AgCl + NaNO_3$$

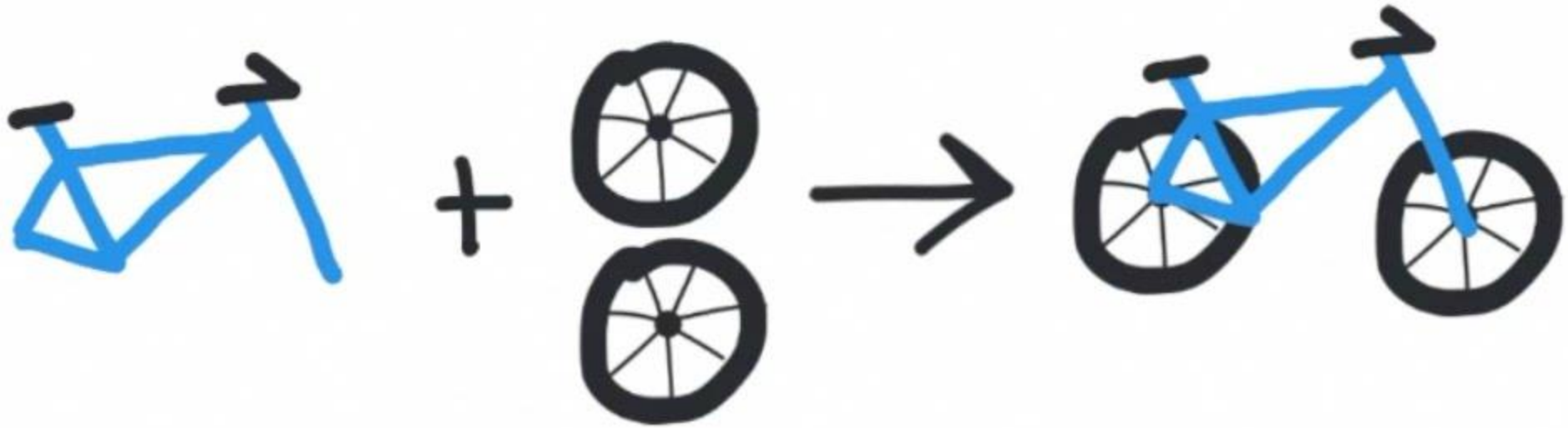
number of atoms at each side:

	Ag	N	O	Na	Cl
left	1	1	3	1	1
right	1	1	3	1	1

This equation is balanced

BALANCING CHEMICAL EQUATIONS

Unbalanced Scale



BALANCE CHEMICAL EQUATIONS

STEP BY STEP

Rules to Balance Chemical Equations

1. Counting number of elements in a given formula. For example the water formula as shown below;

$$H_2O$$

We have 2 Hydrogen atoms and 1 Oxygen atom in the above formula of water.

Let's add coefficients to it;

$$2H_2O$$

Now we got 4 Hydrogen atoms and 2 Oxygen atoms.

$$5H_2O$$

Now there are 10 Hydrogen atoms and 5 Oxygen atoms.

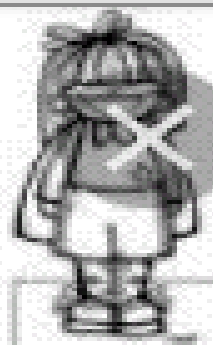
Let's try another molecule of Iron Oxide Fe_2O_3 we got two atoms of Iron and 3 atoms of Oxygen.

Using coefficients $2Fe_2O_3$

We got 4 Iron atoms and 6 Oxygen atoms.

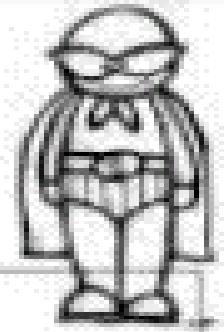
Very Important; Parenthesis

$Fe(OH)_2$ We got one Iron atom, two Hydrogen atoms and 2 Oxygen atoms.



Balance the Equations

Fill in the blank so that the two sides are balanced and equal.



5+3=7+ ☐	7+7=4+ ☐	3+7= ☐ +2
6+6= ☐ +9	☐ +3=8+5	☐ +4=8+8
9+7=5+ ☐	6+ ☐ =8+2	☐ +9=5+7
☐ +8=6+5	4+5=1+ ☐	6+8= ☐ +3

Balancing Equations

Directions: Look at the numbers in the box. Use the numbers to balance the scale.

7 4 1 4

□ + □ = □ + □

6 3 7 4

□ + □ = □ + □

4 1 3 6

□ + □ = □ + □

9 2 8 1

□ + □ = □ + □

3 3 4 2

□ + □ = □ + □

3 2 5 4

□ + □ = □ + □

Balance It!

Name _____

4 + 6 = □ + 8	5 + □ = 4 + 4
□ + 3 = 4 + 1	0 + 7 = 6 + □
9 + 1 = 4 + □	8 + □ = 0 + 9
2 + 3 = □ + 2	□ + 7 = 8 + 2
6 + 3 = □ + 4	5 + □ = 4 + 3

Step 1 – Take Inventory of the elements and atoms on the product and reactant side.

Step 2 – Is it balanced?

Step 3 – If unbalanced, change coefficients until it's balanced.

$$CH_4 + 4Cl_2 \rightarrow CCl_4 + 4HCl$$

C – 1	=	C – 1
H – 4	=	H – ~~1~~ 4
Cl – ~~2~~ 8	=	Cl – ~~5~~ 8

Balanced!

a.

$SO_2 + O_2 \longrightarrow SO_3$ START!

b

S = 1
O = 4

S = 1
O = 3

c. $2SO_2 + \_\_ O_2 \longrightarrow 2SO_3$

S = 2
O = 6

S = 2
O = 6

d. $2SO_2 + O_2 \longrightarrow 2SO_3$ FINISH!

S = 2
O = 6
✓

S = 2
O = 6
✓

Balanced!

An iron bar rusts. The iron reacts with oxygen in the air to make rust.

$$4Fe + 3O_2 \rightarrow 2Fe_2O_3$$

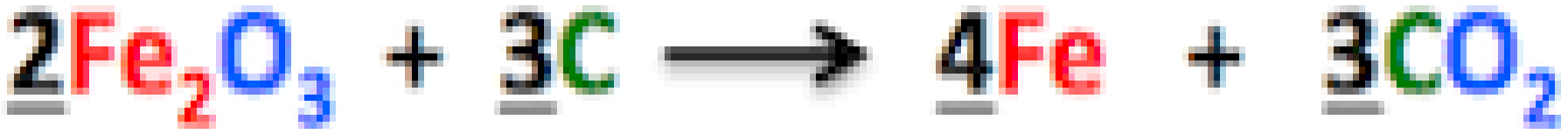
R P

Which chemical formula(s) represents the *reactants*?	Which chemical formula(s) represents the *products*?
$4Fe + 3O_2$	$2Fe_2O_3$
How many of each atom is present in the *reactants*? Fe - 4 ✓ O - 6 ✓	How many of each atom is present in the *products*? Fe - 4 ✓ O - 6 ✓
~~Is this a balanced equation?~~ Explain.	

Yes! The reactants = the products

$\rightarrow = \rightarrow$

Fe = 2	Fe = 1
O = 3	O = 2
C = 1	C = 1



Fe = 4

O = 6

C = 3

Fe = 4

O = 6

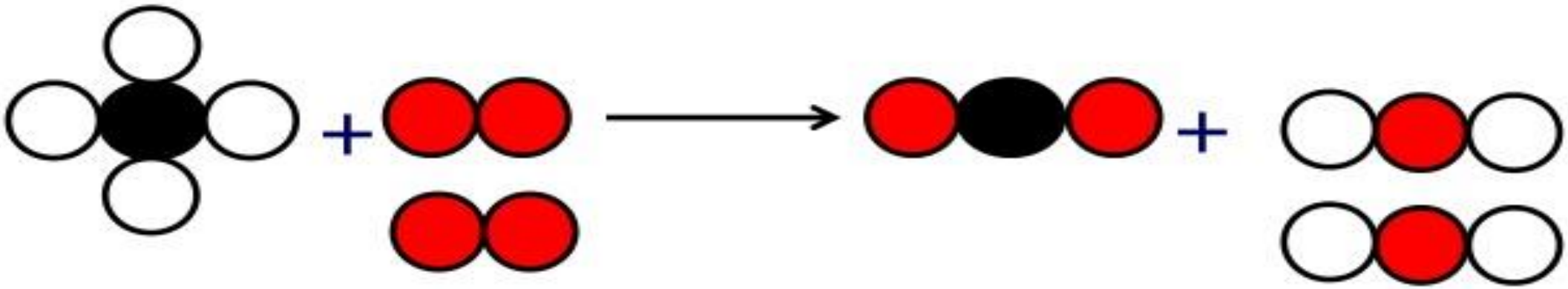
C = 3

$$2Na_3PO_4 + 3MgCl_2 \longrightarrow 6NaCl + Mg_3(PO_4)_2$$

Na = 6	Na = 6
PO_4 = 2	PO_4 = 2
Mg = 3	Mg = 3
Cl = 6	Cl = 6

Balancing equations

$CH_4 + 2\,O_2 \longrightarrow CO_2 + 2\,H_2O$

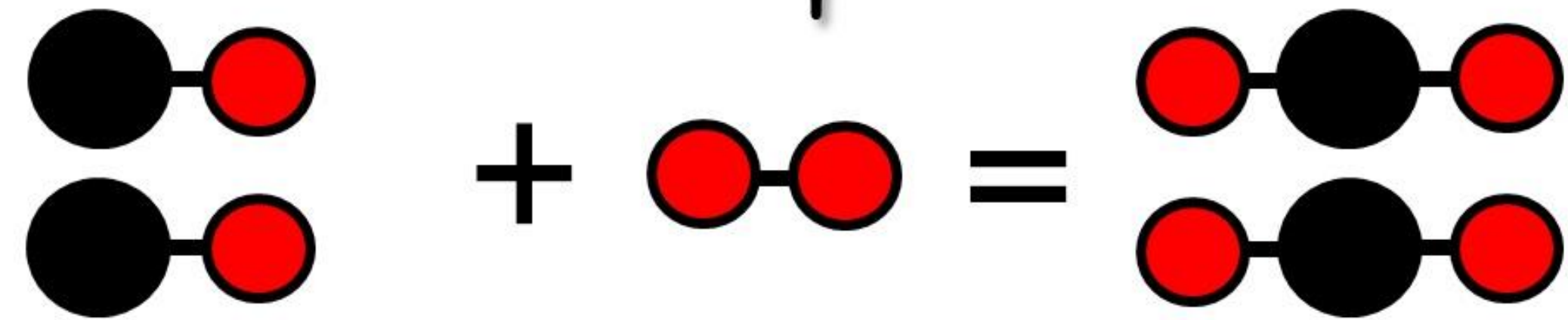


Carbon

Hydrogen

Oxygen

$$2CO + O_2 = 2CO_2$$



2 carbon monoxides + oxygen = 2 carbon dioxides

Balance the following chemical equations.

(a) $HNO_3 + Ca(OH)_2 \longrightarrow Ca(NO_3)_2 + H_2O$

(b) $NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + H_2O$

(c) $NaCl + AgNO_3 \longrightarrow AgCl + NaNO_3$

(d) $BaCl_2 + H_2SO_4 \longrightarrow BaSO_4 + HCl$

Answer

(a) $2HNO_3 + Ca(OH)_2 \longrightarrow Ca(NO_3)_2 + 2H_2O$

(b) $2NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + 2H_2O$

(c) $NaCl + AgNO_3 \longrightarrow AgCl + NaNO_3$

(d) $BaCl_2 + H_2SO_4 \longrightarrow BaSO_4 + 2HCl$

Activity 2 TERM 2

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QUESTIONS FOR REVISION

PAGE 95

QUESTION 1
QUESTION 2
QUESTION 3

Difference between Important Chemical Properties of metals and non-metals	
Metal	Non-metal
Forms basic oxides when it reacts with oxygen.	Forms acidic oxides when it reacts with oxygen.
Some metals displace hydrogen from water	Non-metals do not react with water.
Some metals displace hydrogen from dilute acids.	Non-metals do not react with dilute acids.
Metals form ionic compounds.	Non-metals form covalent compounds.

Equations: reactions of metals with oxygen

What is the balanced symbol equation for each reaction?

magnesium	+	oxygen	→	magnesium oxide
2Mg	+	O_2	→	2MgO

copper	+	oxygen	→	copper oxide
2Cu	+	O_2	→	2CuO

iron	+	oxygen	→	iron oxide
4Fe	+	$3O_2$	→	$2Fe_2O_3$

Reaction of Metals with Oxygen.

$4\ Fe + 3O_2 \longrightarrow 2\ Fe_2O_3$

Iron Oxygen Iron Oxide

$4\ Al + 3O_2 \longrightarrow 2\ Al_2O_3$

Aluminium Aluminium Oxide

Reaction of Non Metals with Oxygen.

$S + O_2 \longrightarrow SO_2$

Sulphur Sulphur Dioxide

$C + O_2 \longrightarrow CO_2$

Carbon Carbon Dioxide

Formation of rust

Corrosion is defined as the chemical or electrochemical degradation of metals due to their reaction with the environment. The corrosion of iron, better known as rusting, is an oxidation-reduction process that destroys iron objects left out in open, moist air.

Methods of preventing corrosion and rusting

1. Tarring
2. Painting
3. Enameling
4. Galvanizing
5. Sheradising
6. Tin plating
7. electroplating

Activity 3 TERM 2

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QUESTIONS FOR REVISION

PAGE 101

QUESTION 1
QUESTION 2

Activity 4 TERM 2

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QUESTIONS FOR REVISION

PAGE 105

QUESTION 1
QUESTION 2
QUESTION 3

pH Scale


Acid
Neutral
Alkaline
0
Battery Acid
1
Concentrated Sulfuric Acid
2
Lemon Juice, Vinegar
3
Orange Juice, Soda
4
Tomato Juice, Acid Rain
5
Black Coffee, Bananas
6
Urine, milk
7
Pure water
8
Sea Water, Eggs
9
Baking Soda
10
Milk of Magnesia, Great Salt Lake
11
Ammonia Solution
12
Soapy Water
13
Bleach, Oven Cleaner
14
Liquid Drain Cleaner

(a) Indicators are organic compounds which when added in small amounts to a solution; indicate the nature (acidity or alkalinity) of the solution.

(b) Universal indicators are preferred to acid- base indicators because these give different colours in different pH ranges. A solution containing a drop of universal indicator is matched against a standard colour chart to find the pH of the solution.

pH range	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Colour of universal inducator		Red		Pink		Yellow		Green		Blue		Indigo		Violet	

Activity 5 TERM 2

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QUESTIONS FOR REVISION

PAGE 111

QUESTION 1
QUESTION 2

The **reaction** of an **acid** with a **base**

Is called a neutralization **reaction**. The products of this **reaction** are a salt and water. ... For example, the **reaction** of hydrochloric **acid**, HCl, with sodium hydroxide, NaOH, solutions produces a solution of sodium chloride, NaCl, and some additional water molecules.

It has three parts

1,Neutralisation and ph

2, The general reaction of an acid with a metal oxide and hydroxide (base)

3,The general reaction of an acid with metal carbonate(base)

SALTS

- A SALT is a compound formed when a metal is ionically bonded to a non-metal.
- Salts are formed in many acid-base reactions.

Acid + Metal → SALT + hydrogen
Acid + Metal Oxide → SALT + water
Acid + Metal hydroxide → SALT + water
Acid + Metal carbonate → SALT + carbon dioxide + water
Acid + Metal hydrogen carbonate → SALT + carbon dioxide + water

SALT	ACID	BASE	ACID	BASE	SALT
$MgCl_2$			HCl	$Mg(OH)_2$	$MgCl_2$
$Fe(NO_3)_2$			H_2SO_3	NaOH	Na_2SO_3
$MgCO_3$			H_2CO_3	CaO	$CaCO_3$
$Al_2(SO_4)_3$			H_2CO_3	$CaCO_3$	$CaCO_3$
$(NH_4)_3PO_4$			H_2SO_4	Mg	$MgSO_4$

Activity 6 TERM 2

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QUESTIONS FOR REVISION

PAGE 124

QUESTION 1
QUESTION 2

Reaction of acids with metal

- When an **acid** reacts with **metal**, a salt and hydrogen are produced: **acid** + **metal** → salt + hydrogen An example: nitric **acid** + calcium → calcium nitrate + hydrogen The salt that is produced depends upon which **acid** and which **metal react.**

Acids + Metals

1. Acids react with **some metals** to form a **salt** and **hydrogen gas**.

Acid + Metal → Salt + Hydrogen gas

hydrochloric acid + **magnesium** → **magnesium chloride** + **hydrogen gas**

sulfuric acid + **magnesium** → **magnesium sulfate** + **hydrogen gas**

Activity 7 TERM 2

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QUESTIONS FOR REVISION

PAGE 130

QUESTION 1
QUESTION 2
QUESTION 3