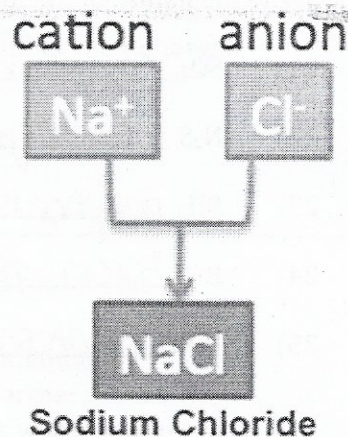


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|---|
| <ol style="list-style-type: none"> 1. Naming and Writing Formulas 2. Writing Chemical Equations 3. Balancing Reactions |
|---|

Naming and Writing Formulas

Key Points for naming **ionic compounds**:

- Cations (metals) are positively charged and are written first
- Anions (non-metals) are negatively charged and are written last
 - Change the ending of the anion to "ide"
- Don't forget: When naming compounds that have multivalent ions, use roman numerals
 - Example: iron (III) oxide



Name the following *ionic* compounds:

- 1) NaBr Sodium bromide
- 2) CaO Calcium oxide
- 3) CuS Copper (II) sulphide
- 4) MgBr_2 Magnesium bromide
- 5) $\text{Be}(\text{OH})_2$ beryllium hydroxide

Write the formulas for the following *ionic* compounds:

- | | |
|---|---|
| 6) potassium iodide
<u>KI</u> | 14) sodium phosphate
<u>Na_3PO_4</u> |
| 7) tin (IV) oxide
<u>$\text{Sn}_2\text{O}_4 \rightarrow \text{SnO}_2$</u> | 15) aluminum carbonate
<u>$\text{Al}_2(\text{CO}_3)_3$</u> |
| 8) aluminum chloride
<u>AlCl_3</u> | 16) nickel (II) chloride
<u>NiCl_2</u> |
| 9) sodium nitrate
<u>NaNO_3</u> | 17) sodium cyanide
<u>NaCN</u> |
| 10) calcium carbonate
<u>CaCO_3</u> | 18) aluminum oxide
<u>Al_2O_3</u> |
| 11) lithium sulfate
<u>Li_2SO_4</u> | 19) magnesium acetate
<u>$\text{Mg}(\text{CH}_3\text{COO})_2$</u> |
| 12) beryllium phosphide
<u>Be_3P_2</u> | 20) ammonium chloride
<u>NH_4Cl</u> |
| 13) magnesium hydroxide
<u>$\text{Mg}(\text{OH})_2$</u> | |

Prefixes

1	Mono
2	Di
3	Tri
4	Tetra
5	Penta
6	Hexa
7	Hepta
8	Octa

Key Points for naming covalent compounds:

- Covalent compounds form between two non-metals (anions)
- Use prefixes to indicate the number of atoms
 - Change the ending of the 2nd non-metal to "ide"
 - Exception: don't use mono- for the first atom
- Exceptions: water (H₂O), ammonia (NH₃), methane (CH₄)

Write the names of the following covalent compounds:

- | | |
|---|---|
| 21) SO ₃ <u>Sulphur trioxide</u> | 26) CO <u>carbon monoxide</u> |
| 22) N ₂ S <u>dinitrogen monosulphide</u> | 27) SiO ₂ <u>silicon dioxide</u> |
| 23) PH ₃ <u>phosphorus trihydride</u> | 28) SF ₆ <u>sulphur hexafluoride</u> |
| 24) BF ₃ <u>boron trifluoride</u> | 29) NH ₃ <u>nitrogen trihydride</u> |
| 25) P ₂ Br ₄ <u>diphosphorus tetrabromide</u> | 30) NO ₂ <u>nitrogen dioxide</u> |

Write the formulas of the following covalent compounds:

- | | |
|--|---|
| 31) nitrogen trichloride
<u> NCl₃ </u> | 36) sulfur dibromide
<u> SBr₂ </u> |
| 32) disilicon hexaiodide
<u> Si₂I₆ </u> | 37) diboron tetrahydride
<u> B₂H₄ </u> |
| 33) dinitrogen trioxide
<u> N₂O₃ </u> | 38) oxygen difluoride
<u> OF₂ </u> |
| 34) phosphorus pentafluoride
<u> PF₅ </u> | 39) carbon disulfide
<u> CS₂ </u> |
| 35) methane
<u> CH₄ </u> | 40) nitrogen monoxide
<u> NO </u> |

Reaction Types

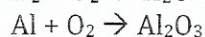
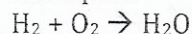
Synthesis

General Formula: $A + B \rightarrow AB$

Things you need to remember:

- When elements are by themselves, they are neutral
- $H_2 N_2 O_2 F_2 Cl_2 Br_2 I_2 P_4 S_8$
- When they partner up and form a molecule, you need to remember their charge!

Examples:



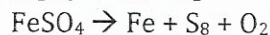
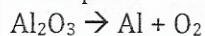
Decomposition

General Formula: $AB \rightarrow A + B$

Things you need to remember:

- Breaks down into its elements
- When elements are by themselves, they are neutral
- $H_2 N_2 O_2 F_2 Cl_2 Br_2 I_2 P_4 S_8$
- When they partner up and form a molecule, you need to remember their charge!

Examples:



Single Replacement

General Formula: $AB + C \rightarrow AC + B$

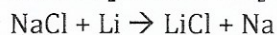
<OR> $AB + D \rightarrow DB + A$

- C = will form a negative charge
- D = will form a positive charge

Things you need to remember:

- The "incoming" element's charge is important because it determines whether "A" or "B" is replaced
- When they partner up and form a molecule, you need to remember their charge!

Examples:



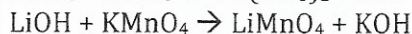
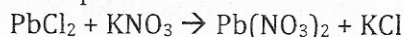
Double Replacement

General Formula: $AB + CD \rightarrow AD + CB$

Things you need to remember:

- The ions switch partners!
- The positive ion is written first!
- When they partner up and form a molecule, you need to remember their charge!

Examples:



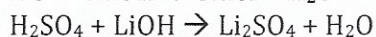
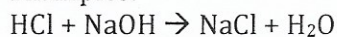
Neutralization

General Formula: Acid + Base \rightarrow Salt + Water

Things you need to remember:

- Acid = Usually starts with "H-" (ex. HCl, H₂SO₄, H₃PO₄)
- Base = Ends with "-OH" (ex. NaOH, Ca(OH)₂)
- Products are always a salt (has a positive and negative ion) and water
- It is essentially a double replacement

Examples:



Combustion

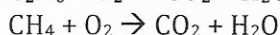
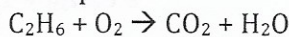
General Formula:

HYDROCARBON + O₂ \rightarrow H₂O + CO₂

Things you need to remember:

- Hydrocarbon = contains carbon and hydrogen and sometimes oxygen
- Key word: BURN \rightarrow means to react with oxygen!
- Products are always carbon dioxide (CO₂) and water (H₂O)

Examples:



Writing Chemical Equations

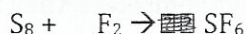
Write the type chemical reaction on the line—synthesis, decomposition, combustion, single replacement, or double replacement. It is not necessary to balance the equations.



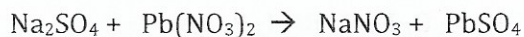
 D



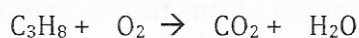
 SR



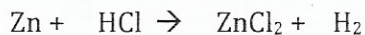
 S



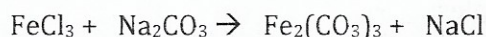
 DR



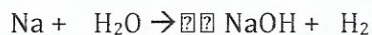
 C



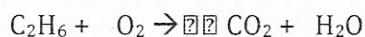
 SR



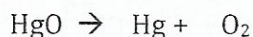
 DR



 SR



 C



 D

Balancing Reactions

Methods:

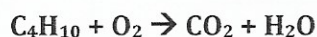
1. Inspection

- Quick & easy; good for simple equations

2. Algebraic

- Longer & more involved; good for equations that cannot be solved by inspection

Steps:



1. Place coefficients in front of each molecule in the equation (w, x, y, z)



2. For each atom, write out an equation using the unknowns

$$\text{For carbon: } 4x = z$$

$$\text{For hydrogen: } 10x = 2w$$

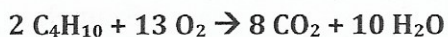
$$\text{For oxygen: } 2y = 2z + w$$

3. Let one of your coefficients be equal to 1, and solve for the remaining coefficients

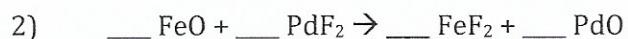
$$\text{Let } x = 1$$

$$\text{If } x=1, z=4, w=5 \text{ and } y=6.5$$

Can't have 0.5's, so multiply everything by 2

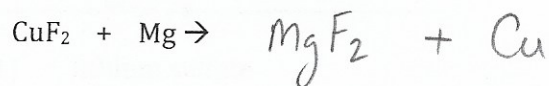
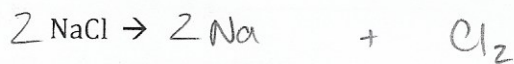


Balance these equations!

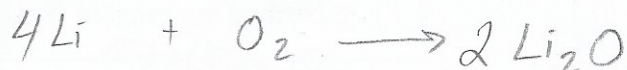


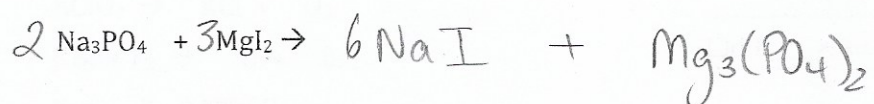
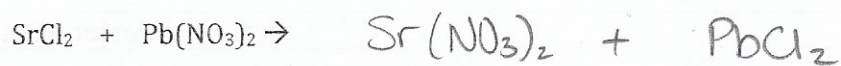
- 3) $\underline{\quad} P_4 + \underline{6} Br_2 \rightarrow \underline{4} PBr_3$
- 4) $\underline{2} LiCl + \underline{\quad} Br_2 \rightarrow \underline{2} LiBr + \underline{\quad} Cl_2$
- 5) $\underline{\quad} PbBr_2 + \underline{2} HCl \rightarrow \underline{2} HBr + \underline{\quad} PbCl_2$
- 6) $\underline{2} CoBr_3 + \underline{3} CaSO_4 \rightarrow \underline{3} CaBr_2 + \underline{\quad} Co_2(SO_4)_3$
- 7) $\underline{2} Na_3P + \underline{3} CaF_2 \rightarrow \underline{6} NaF + \underline{\quad} Ca_3P_2$
- 8) $\underline{2} Mn + \underline{6} HI \rightarrow \underline{3} H_2 + \underline{2} MnI_3$
- 9) $\underline{\quad} Li_3PO_4 + \underline{3} NaBr \rightarrow \underline{\quad} Na_3PO_4 + \underline{3} LiBr$
- 10) $\underline{\quad} CaF_2 + \underline{\quad} Li_2SO_4 \rightarrow \underline{\quad} CaSO_4 + \underline{2} LiF$
- 11) $\underline{2} HBr + \underline{\quad} Mg(OH)_2 \rightarrow \underline{\quad} MgBr_2 + \underline{2} H_2O$
- 12) $\underline{2} LiNO_3 + \underline{\quad} CaBr_2 \rightarrow \underline{\quad} Ca(NO_3)_2 + \underline{2} LiBr$
- 13) $\underline{\quad} AgNO_3 + \underline{\quad} Li \rightarrow \underline{\quad} LiNO_3 + \underline{\quad} Ag$
- 14) $\underline{\quad} Si(OH)_4 + \underline{4} NaBr \rightarrow \underline{\quad} SiBr_4 + \underline{4} NaOH$
- 15) $\underline{2} NaCN + \underline{\quad} CuCO_3 \rightarrow \underline{\quad} Na_2CO_3 + \underline{\quad} Cu(CN)_2$

Predict the products for the following reactions. Then balance the reactions.

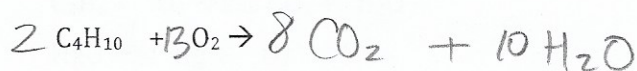


Lithium + oxygen \rightarrow

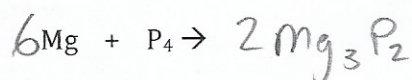




Aluminum oxide \rightarrow



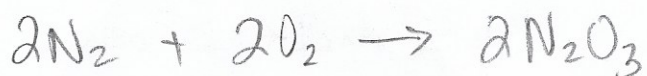
Tin + gold (III) nitrate \rightarrow



Glycerine ($\text{C}_3\text{H}_8\text{O}_3$) + oxygen \rightarrow



Nitrogen + oxygen \rightarrow



Barium hydroxide + lead (IV) bromide \rightarrow

