



# Chemical Equations

Hi

# Physical Properties and Changes

Physical properties of matter are properties that are qualitative or quantitative.

Qualitative properties are descriptive

- shape
- state
- colour
- odour
- texture
- taste

Quantitative properties are measurable

- density
- heat conduction
- volatility
- boiling point
- melting point



# Physical Change

A physical change is a change in which no new substance is produced. The substance may have some different properties afterwards, but it is still the same substance.

Some examples are:

- changes of state
- bending a nail
- breaking a window
- tearing paper
- melting ice

# Chemical Properties and Changes

- Chemical properties of matter are properties which describe how a substance will react or undergo chemical changes.
- These properties can vary greatly from one substance to another.



# Chemical Change

- A chemical change results in the formation of a new substance with different physical and chemical properties than the initial substances.
- Such a change is called a chemical reaction.
- Most chemical reactions take place when particles of reactants collide with enough force to react.
- .

# Chemical Change

- Bonds between atoms are broken and new bonds form between different atoms.
- This breaking and forming takes place when particles of the original material collide with one another.



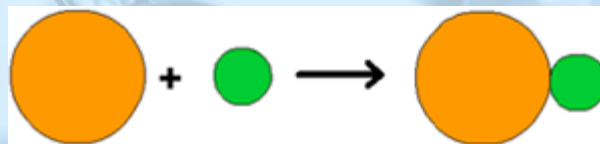
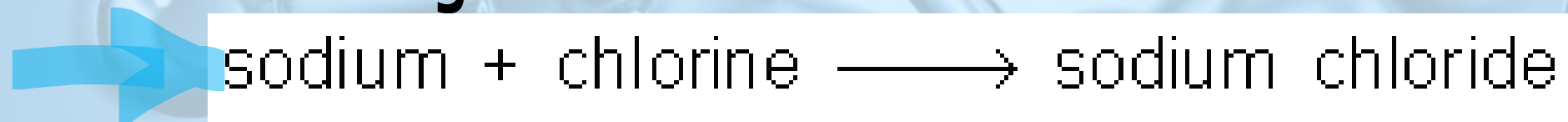
# Chemical Change

A chemical reaction has probably occurred when any of the following are observed:

- change of colour
- heat is released (exothermic)
- heat is absorbed (endothermic)
- light is produced
- a precipitate is formed
- a gas is produced (bubbling)
- change of smell

# Reminders...

- A word equation is a way to represent a chemical reaction using the names of the chemicals involved.



*Skeletal*

- A chemical **equation** is a more convenient way to represent a chemical reaction, using **symbols and formulas**.





# Law of Conservation of Mass

- This law states that matter cannot be created, or destroyed, during a chemical reaction.
- All atoms present in the reactants are also present in the products.
- Reactions that seem to gain, or lose, mass actually involve reactions with gases in the air.
- Although these gases cannot be seen, their masses can be measured.



# Reminders

In order to write a chemical equation, you need to know:

- The **reactants** and **products** in the reaction
- The **chemical formulas** of the reactants and products
- The **direction of the reaction**  
and,
- Remember the subscript (if any) indicates the number of atoms of an element in a molecule.





# Balancing Rx

These are the steps to take

1. Write a skeletal equation → *formula eg<sup>n</sup>*
2. Draw a line between the reactants and the products
3. Write the symbols for all elements in the reaction under the equation.
4. Determine the number of atoms of each element, keep the polyatomics together as one unit.

# Balancing Rx

These are the steps to take

5. Compare... if they are not balanced between reactants and products proceed to step 6.\

6. Using coefficients adjust the number compounds to balance the atoms. Try to balance atoms other than hydrogen and oxygen first.

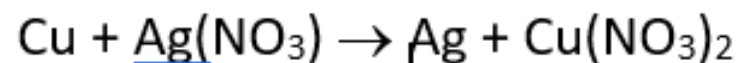
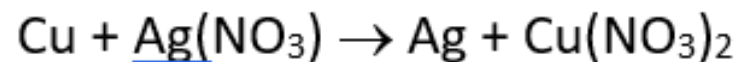
- **MAKE SMALL CHANGES!!**

7. Balance hydrogen and oxygen.

8. Check, Check, Check... when you change a coefficient you change the number of atoms of each of the elements in the compound!



Copper + Silver nitrate → Silver + Copper nitrate <



Cu - 1

Cu - 1

Ag - 1

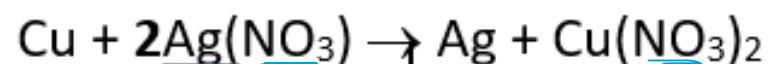
Ag - 1

(NO<sub>3</sub>) - 1

(NO<sub>3</sub>) - 2

It is not balanced... the nitrates are not the same on both sides so proceed to step 6

Try to balance the nitrates by adding a coefficient before the silver nitrate...



Cu - 1

Cu - 1

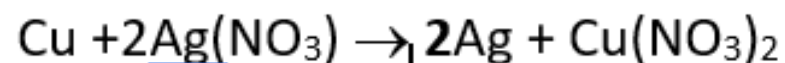
Ag - 2

Ag - 1

(NO<sub>3</sub>) - 2

(NO<sub>3</sub>) - 2

Now the nitrates are balanced but the Silver is not so changes are made to the coefficients to balance the silver...



Cu - 1

Cu - 1

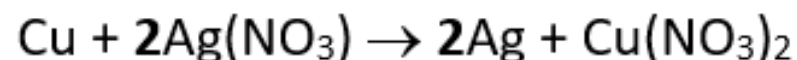
Ag - 2

Ag - 2

(NO<sub>3</sub>) - 2

(NO<sub>3</sub>) - 2

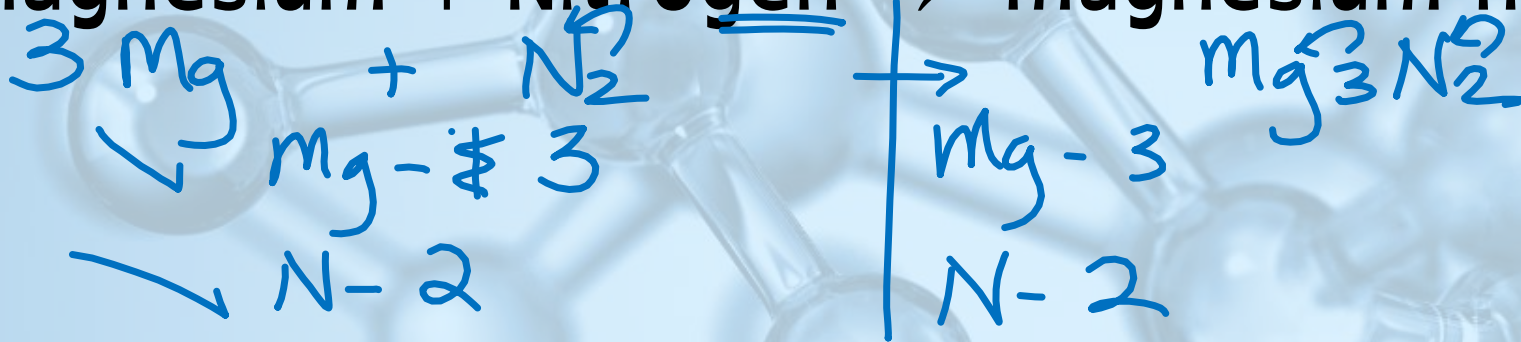
Checking all the values it is clear that the equation is balanced at;



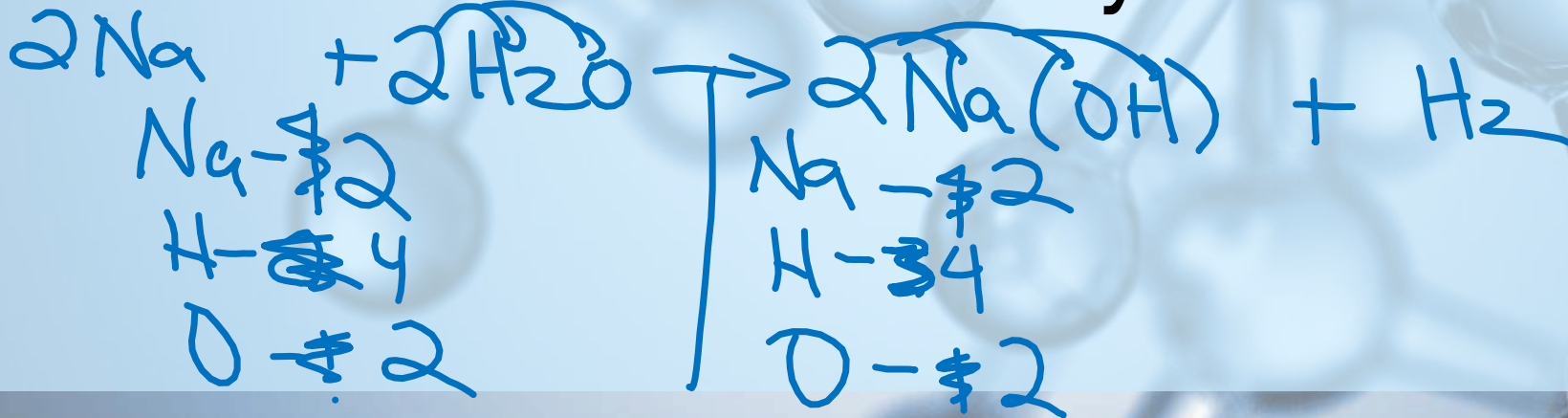
Try....

$\boxed{H}$   $\boxed{NO}$   
diatomics

• Magnesium + Nitrogen  $\rightarrow$  magnesium nitride



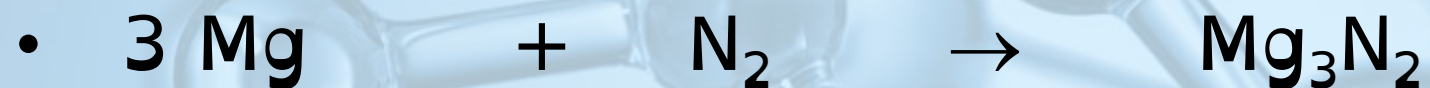
• Sodium + water  $\rightarrow$  sodium hydroxide + hydrogen





# Try....

• Magnesium + Nitrogen → magnesium nitride



• Sodium + water → sodium hydroxide + hydrogen

