

# Atoms and Elements

An element is any substance made of only one type of atom.

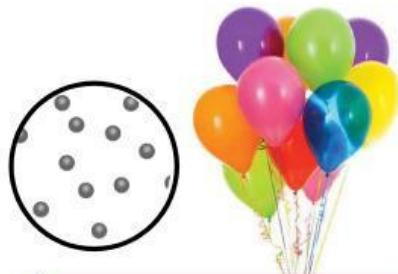
- For example:



Carbon is an element made of only carbon atoms.



Copper is an element made of only copper atoms.

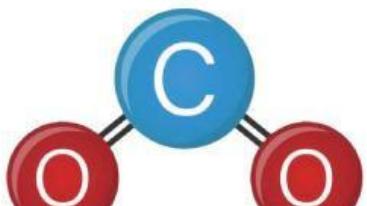


Helium is an element made of only helium atoms.

# Compounds

A **compound** is a substance formed when two or more chemical elements are chemically bonded together.

- The elements in compounds are always present in fixed ratios.
- Compounds can be broken down into the elements that make them, but only using chemical reactions.



$\text{CO}_2$  is always  
1 carbon:2 oxygen

Examples:  $\text{H}_2\text{O}$  (water),  $\text{CH}_4$  (methane),  
 $\text{NaCl}$  (salt),  $\text{C}_6\text{H}_{12}\text{O}_6$  (glucose/sugar).



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# The Periodic Table

The periodic table is organised by horizontal rows, and vertical columns.

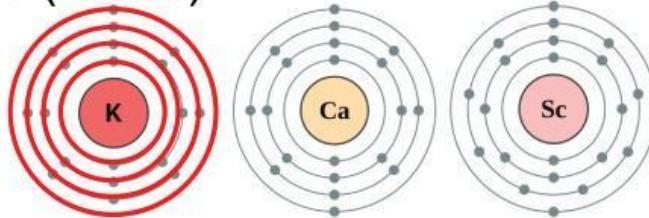
- The horizontal rows are called
- The vertical columns are called

group		1		2		3		4		5		6		7		0	
1	H	Alkali metals		2	Alkaline-earth metals			3	Halogens			4	Noble gases			5	
2	Be	Transition metals		3	Other metals			4	Halogens			5	Noble gases			6	
3	Li	Other nonmetals		4	Actinoid elements			5	Alkali metals			6	Alkaline-earth metals			7	Transition metals
4	Mg			5				6	Transition metals			7	Other metals			8	Other nonmetals
5	Na			6				7	Other nonmetals			8	Actinoid elements			9	Rare earth elements (21, 35, 57-71) and lanthanoid elements (57-71 only)
6				7				8				9				10	
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111				112				113				114				115	
112				113				114				115				116	
113				114				115				116				117	

# Periods

The horizontal rows are called

- There are 7 periods in the periodic table.
- All the elements in a period share the same number of electron shells (energy levels).
- For example, all of the elements in period 4 have 4 electron shells (levels).

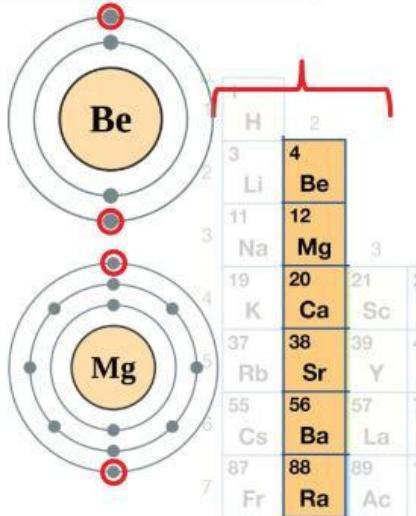


1	2	
3	4	Be
2	Li	
11	12	
3	Na	Mg
4	19 K	20 Ca
5	37 Rb	38 Sr
6	55 Cs	56 Ba
7	87 Fr	88 Ra
	39 Y	57 La
	89 Ac	

# Groups

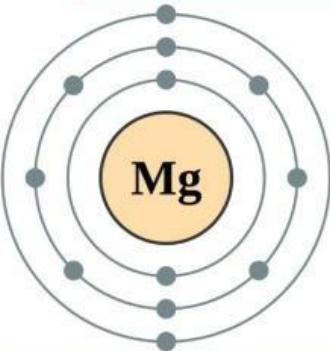
**The vertical columns are called “  
(sometimes called families).**

- There are 18 groups in the periodic table.
- All elements in a group have the same number of valence electrons (outer electrons).
- For example, all of the elements in group 2 have 2 valence electrons (outer electrons).
- This means the elements in each group share similar chemical and physical properties.



# Shell Models

If we know the number of shells and how many valence electrons, we can find which group and period the element is in.



**Example:** Magnesium

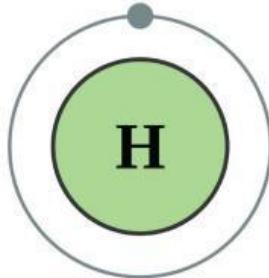
- It has 3 electron shells
- It has 2 valence electrons

**Remember:** Valence electrons are the electrons in the outermost shell.

period	group	
1	1*	
1	1	H
2	3	Li
2	4	Be
3	11	Na
3	12	Mg
4	19	K
4	20	Ca
5	37	Rb
5	38	Sr

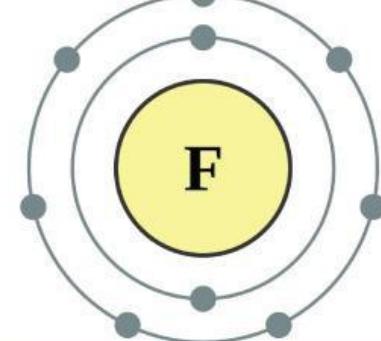
# Shell Models

**You try:** What is the period and group for these elements?



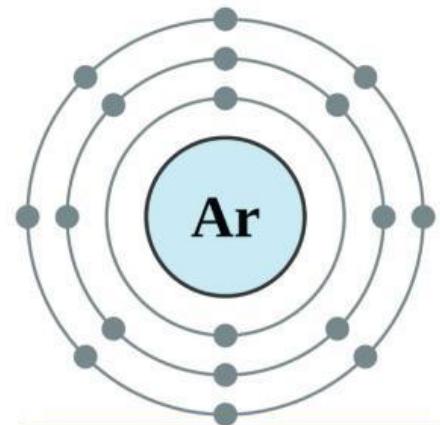
1 electron shell

1 valence electrons



2 electron shell

7 valence electrons



3 electron shell

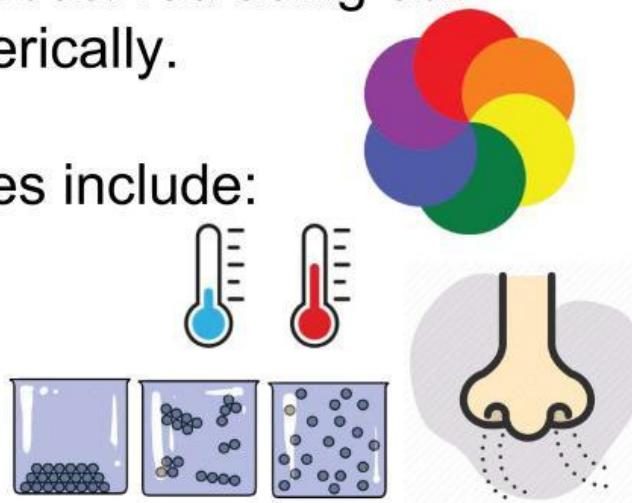
8 valence electrons

The **physical properties** of an element don't involve changing the chemistry of the element.

- Physical properties can be observed using our senses and measured numerically.

Examples of physical properties include:

- 
- 
- 
- 



are when there is a change in the structure of the element.

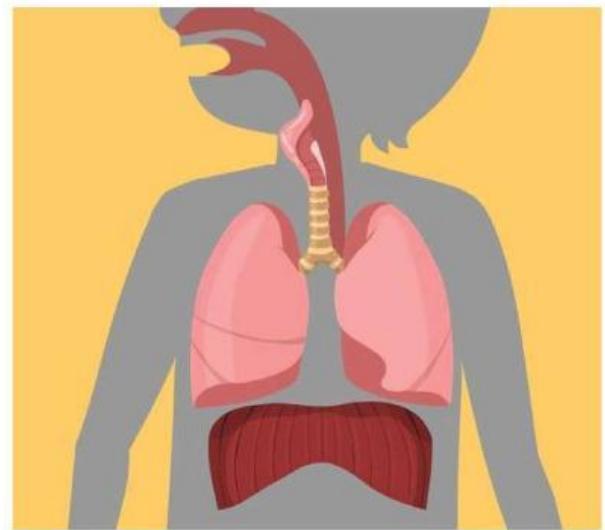
- are only observable during a chemical reaction.
- Elements in the same group have similar



# Respiratory System

The **respiratory system** is the group of organs we use for respiration and breathing.

**Respiration** is the process of moving air in and out of the lungs - like when you take a breath. **Cellular respiration** is the reaction, carried out in cells, which produces energy.

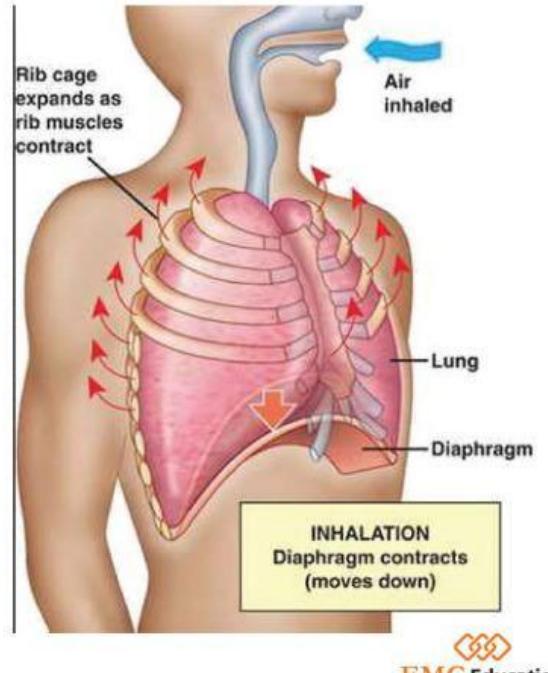


# Breathing in - inhalation

contract pulling  
the chest walls up and out.

The contracts and moves  
down.

The increase in size, causing air  
to rush in from the nose or mouth.



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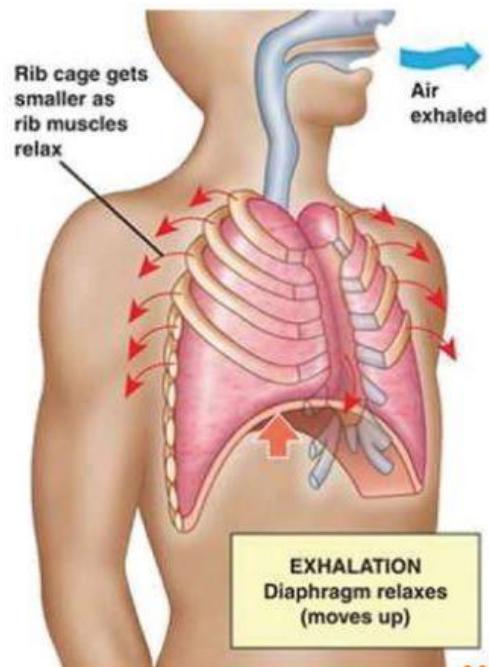
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# Breathing out - exhalation

relax, pushing  
the chest walls down and in.

The **muscle relaxes and  
bulges up.**

The **decrease in size, so air is  
pushed out through the nose or  
mouth.**



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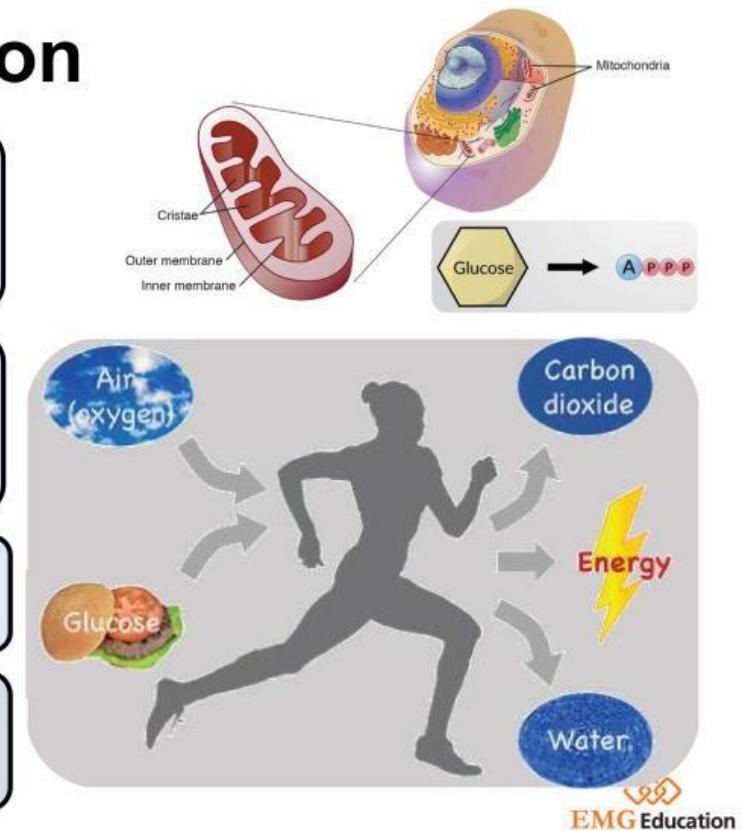
# Aerobic Respiration

happens in the mitochondria in plant and animal cells.

use glucose and oxygen to make an energy molecule called ATP.

Water and  $\text{CO}_2$  are waste products of cellular respiration.

Don't Copy. Only FYI:  
ATP = adenosine triphosphate



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# Aerobic Respiration Equation

word equation

glucose + oxygen  $\rightarrow$  carbon dioxide + water + Energy!

balanced chemical equation



the cell organelle that releases energy from food molecules



mitochondrion

ATP Energy

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21%

0.04%

78%

16%

4%

78%

Gas	<i>Amount in inhaled air</i>	<i>Amount in exhaled air</i>
oxygen		
carbon dioxide		
nitrogen		
water vapour	<b>Variable</b>	