

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.

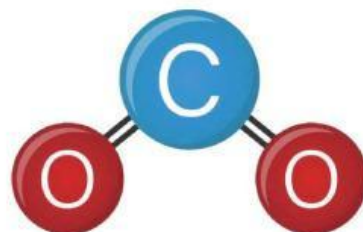


Helium is an element made of only helium atoms.

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.



CO₂ is always
1 carbon:2 oxygen

**Examples: H₂O (water), CH₄ (methane),
NaCl (salt), C₆H₁₂O₆ (glucose/sugar).**


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- The horizontal rows are called

period

group

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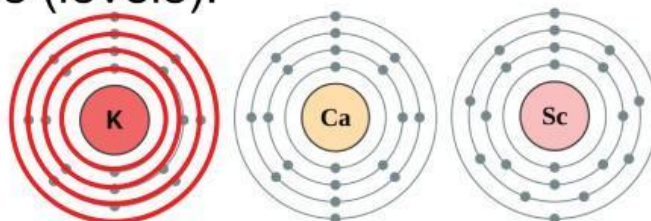
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Periods

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).

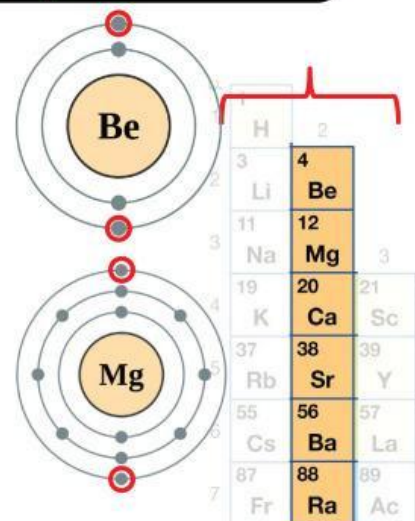


4	1	2		
	1	H		
	2	3	4	
	2	Li	Be	
	3	11	12	3
	3	Na	Mg	
	4	19	20	21
4	K	Ca	Sc	
5	37	38	39	
5	Rb	Sr	Y	
6	55	56	57	
6	Cs	Ba	La	
7	87	88	89	
7	Fr	Ra	Ac	

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.

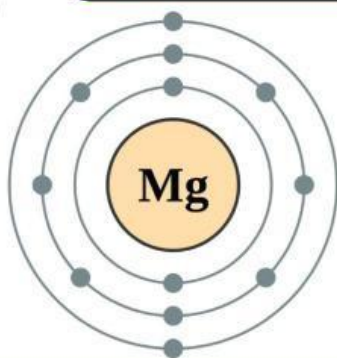


The diagram shows the atomic structures of Beryllium (Be) and Magnesium (Mg). Be has 2 protons and 2 electrons, with 2 valence electrons in its outer shell. Mg has 12 protons and 12 electrons, with 2 valence electrons in its outer shell. To the right, a portion of the periodic table is shown, with Group 2 elements (Be, Mg, Ca, Sr, Ba, Ra) highlighted in orange. A red bracket groups these elements together, indicating they belong to the same group.

1	H	2	
3	Li	4	Be
11	Na	12	Mg
19	K	20	Ca
37	Rb	38	Sr
55	Cs	56	Ba
87	Fr	88	Ra

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.

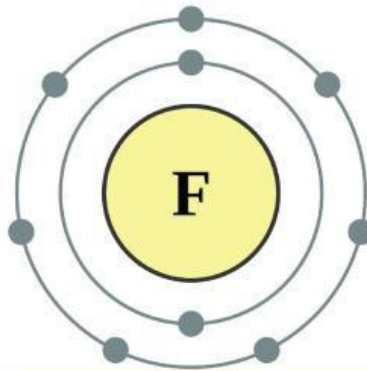
period	group 1*	2
1	1 H	
2	3 Li	4 Be
3	11 Na	12 Mg
4	19 K	20 Ca
5	37 Rb	38 Sr

Shell Models

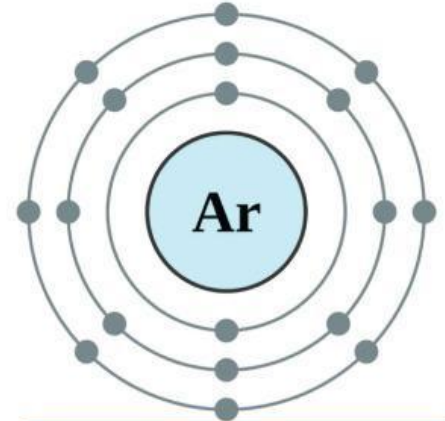
You try: What is the period and group for these elements?



1 electron shell
1 valence electrons



2 electron shell
7 valence electrons



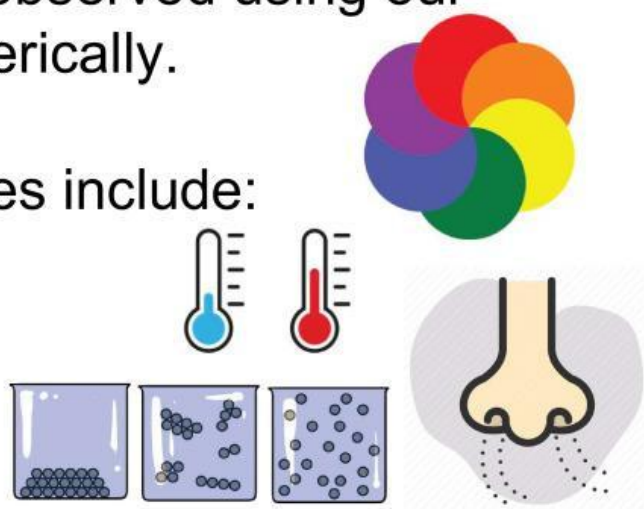
3 electron shell
8 valence electrons

The _____ of an element don't involve changing the chemistry of the element.

- _____ 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 _____ is the group of organs we use for respiration and breathing.

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

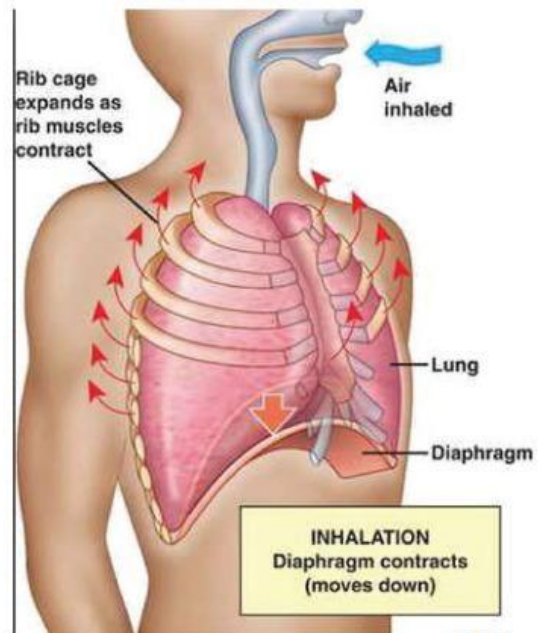


Breathing in - inhalation

_____ 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.



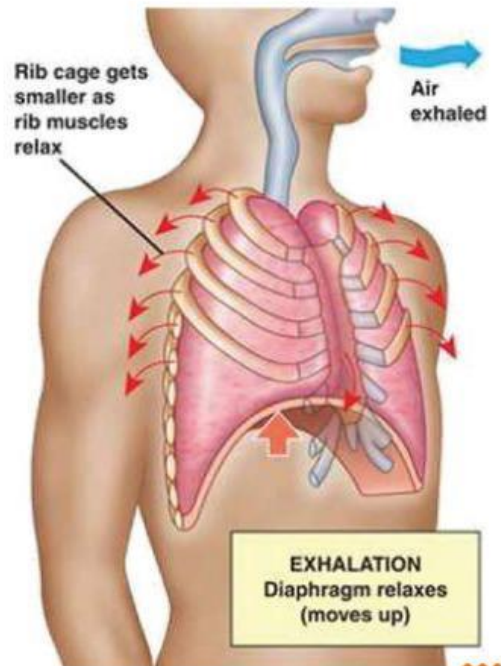
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Breathing out - exhalation

_____ 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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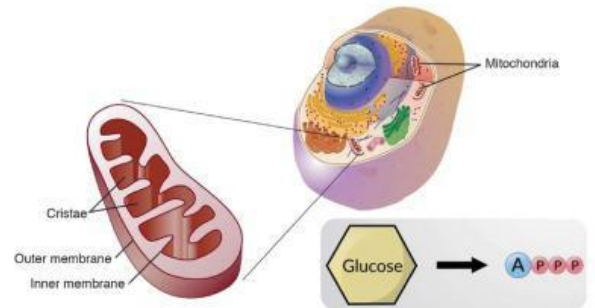
Aerobic Respiration

happens
in the mitochondria in plant
and animal cells.

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

Water and 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



ATP

Energy

21%

0.04%

78%

16%

4%

78%

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