

1. Mixtures, Compounds and Elements

Elements are made up of atoms

Compounds are made up of molecules

Mixtures are made up of at least two different types of particles

Classify the following substances as elements, compounds, or mixtures

a) Sugar is dissolved in water. mixture

b) Chocolate chips are mixed with nuts. mixture

c) Calcium is chemically combined with oxygen. compound

d) Droplets of glycerine are suspended in water. mixture

e) A sample of pure gold. element

Draw a diagram of the particles of an element, a compound, and a mixture.

| <u>element</u> | <u>compound</u> | <u>mixture</u> |
|-------------------------|-------------------|----------------|
| ○ ○ ○ ○ ○ ○ ○ ○ ○ | ○○○ ○○○ ○○○ | ○ ○ ○ ○ ○ |

2. Properties of elements

Give all the information you can on...

Electrons:

- negative charge
- take up the most space
- around nucleus in energy levels
- ~2000 times smaller than neutrons & protons

Protons:

- positive charge
- in the nucleus
- atomic mass = 1

Neutrons:

- neutral charge (no charge)
- in the nucleus
- atomic mass = 1

Find the chemical symbols for the following elements.

- a) boron B
- b) ruthenium Ru
- c) palladium Pd
- d) nitrogen N
- e) cesium Cs
- f) tin Sn

Complete the table

| Element | Symbol | Atomic number | Atomic mass | # of protons | # of neutrons | # of electrons |
|-------------|--------|---------------|-------------|--------------|---------------|----------------|
| Hydrogen | H | 1 | 1.0 | 1 | 0 | 1 |
| Molybdenum | Mo | 42 | 95.9 | 42 | 54 | 42 |
| Gallium | Ga | 31 | 69.7 | 31 | 39 | 31 |
| Einsteinium | Es | 99 | 252 | 99 | 153 | 99 |
| Krypton | Kr | 36 | 83.8 | 36 | 48 | 36 |

What do we call the table that organises all the known chemical elements?

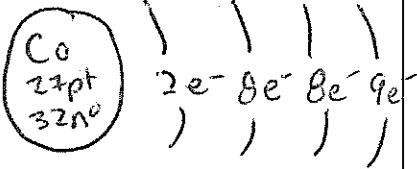
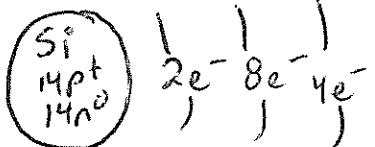
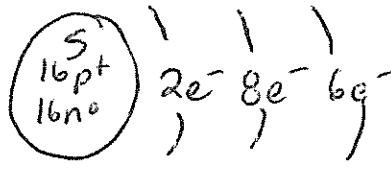
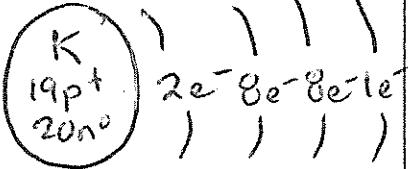
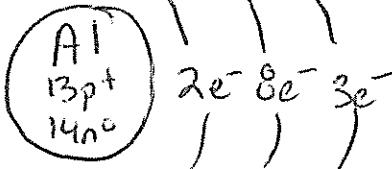
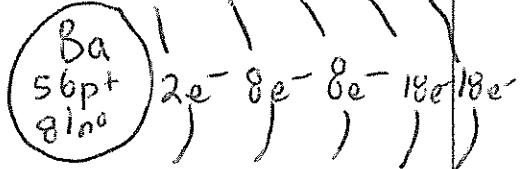
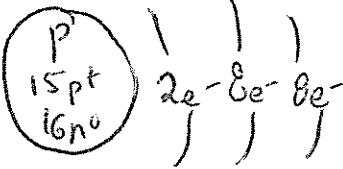
The periodic table of elements

Give all the information that you can find about each of the following elements

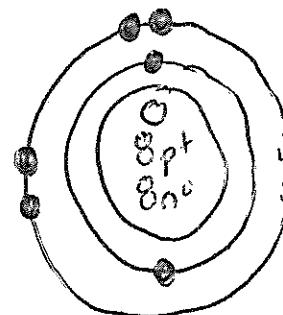
- a) Neon
 - non-metal
 - atomic mass = 20.2
 - nobel gas
 - $10e^-$, $10p^0$, $10n^0$
 - Group 18, Period 2
 - Ionic charge = 0
- b) Silver
 - metal
 - atomic mass = 107.9
 - $47e^-$, $47p^0$, $61n^0$
 - Group 11, Period 5
 - Ionic charge = +1
- c) Cesium
 - metal
 - alkali metal
 - atomic mass = 132.9
 - $55e^-$, $55p^0$, $78n^0$
 - Group 1, Period 6
 - Ionic charge = -1

3. Bohr Models

Draw the Bohr model for

| | |
|---|---|
| Hydrogen | Cobalt |
|  |  |
| Silicon | Sulfur |
|  |  |
| K | Al |
|  |  |
| Ba ²⁺ | P ³⁻ |
|  |  |

Use a Bohr model to explain what happens when oxygen becomes an ion. Explain.



oxygen will gain 2 electrons
to become a negative ion (O^{2-})

4. Compounds

What is an ionic compound?

- compound formed by a metal & a non-metal (a positive & a negative ion)
- the positive ion gives one or more e^- to the negative ion

What is a covalent compound?

- compound formed by 2 non-metals that share electrons

Is ionic or covalent? Explain.

- N_2O_3 covalent \rightarrow 2 non-metals
- BaO ionic \rightarrow Ba = metal O = non-metal
- CO_2 covalent \rightarrow 2 non-metals

How many of each atom is in the compound?

- Na_3P 3 sodium, 1 phosphorus
- $Mg(NO_3)_2$ 1 magnesium, 2 nitrogen, 6 oxygen
- NH_4F 1 nitrogen, 4 hydrogen, 1 fluorine
- $Sc(OH)_3$ 1 scandium, 3 oxygen, 3 hydrogen

Name the compounds

- NaF sodium fluoride
- $MgCl_2$ magnesium chloride
- Be_3P_2 beryllium phosphide
- LiH lithium hydride

Write the formulae of the compounds. Show your work.

- aluminium oxide $\overset{+3}{Al} \times \overset{-2}{O} \rightarrow \boxed{Al_2O_3}$
- calcium nitride $\overset{+2}{Ca} \times \overset{-3}{N} \rightarrow \boxed{Ca_3N_2}$
- yttrium carbide $\overset{+3}{Y} \times \overset{-4}{C} \rightarrow \boxed{Y_4C_3}$
- scandium phosphide $\overset{+3}{Sc} \times \overset{-3}{P} \rightarrow \boxed{Sc_3P}$



4b. Compounds...again

How many of each atom is in the compound?

- a) H_2SO_4 2-hydrogen, 1-sulfur, 4-oxygen
- b) $(\text{NH}_4)_2\text{S}$ 2-nitrogen, 8-hydrogen, 1-sulfur
- c) $\text{Ba}(\text{OH})_2$ 1-barium, 2-oxygen, 2-hydrogen

Name the following compounds

| | |
|-----------------------------------|------------------------|
| Example : Ti_2S_3 | thallium (III) sulfide |
| 1. CaCl_2 | calcium chloride |
| 2. $\text{Zr}(\text{NO}_3)_4$ | zirconium nitrate |
| 3. K_3P | potassium phosphide |
| 4. Fe_2O_3 | iron III oxide |
| 5. YN | yttrium nitride |
| 6. CdSO_4 | cadmium sulphate |

Write the formulae for the following compounds

| | |
|--|----------------------|
| 1. $\text{K} \cancel{\text{I}} = \text{KI}$ | potassium iodide |
| 2. $\text{Ni} \cancel{\text{C.}} = \text{Ni}_2\text{O}_3$ | nickel III oxide |
| 3. $\text{Ba} \cancel{\text{OH}} = \text{Ba}(\text{OH})_2$ | barium hydroxide |
| 4. $\text{Ca} \cancel{\text{CN}} = \text{Ca}(\text{CN})_2$ | calcium cyanide |
| 5. $\text{V} \cancel{\text{P}} = \text{V}_3\text{P}_5$ | vanadium V phosphide |
| 6. $\text{Cu} \cancel{\text{SO}_4} = \text{CuSO}_4$ | copper II sulfide |

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