

Chemistry – Unit 6 Worksheet 1

We have observed evidence that when M-NM compounds are dissolved, the metal particles tend to form positively charged ions (cations), while non-metal particles tend to form negatively charged ions (anions). However, when these same metal and non-metal particles are combined to form compounds they do not conduct electricity as solids. We will now examine the patterns that exist for the ratios in which these elements combine in order to determine the charges of the ions they form.

1. Write the formula and draw the particle diagram for each compound.
The ratio of ions in each compound is given.

Atoms involved	1 calcium 1 oxygen	2 lithium 1 oxygen	2 aluminum 3 sulfur	1 beryllium 1 sulfur
formula				
particle diagram				

Atoms involved	2 boron 3 oxygen	1 magnesium 1 oxygen	2 sodium 1 sulfur
formula			
particle diagram			

Atoms involved	1 magnesium 2 chlorine	1 lithium 1 fluorine	1 beryllium 2 bromine	1 boron 3 chlorine
formula				
particle diagram				

Atoms involved	1 sodium 1 chlorine	1 calcium 2 bromine	1 aluminum 3 chlorine
formula			
particle diagram			

2. Write each formula from Question 1 in the boxes corresponding to its elements.
For example, the compound formed from sodium and sulfur have been written in the box for sodium and in the box for sulfur. Now add the rest.

1A								8A							
Hydrogen 1 H							Helium 2 He								
		2A		3A		4A		5A		6A		7A			
Lithium 3 Li	Beryllium 4 Be	Boron 5 B	Carbon 6 C	Nitrogen 7 N	Oxygen 8 O	Fluorine 9 F	Neon 10 Ne								
Sodium 11 Na₂S	Magnesium 12 Mg	Aluminum 13 Al	Silicon 14 Si	Phosphorus 15 P	Sulfur 16 Na₂S	Chlorine 17 Cl	Argon 18 Ar								
Potassium 19 K	Calcium 20 Ca	Gallium 31 Ga	Germanium 32 Ge	Arsenic 33 As	Selenium 34 Se	Bromine 35 Br	Krypton 36 Kr								

3. What patterns do you find in the formulas of the compounds formed in the table in #2?

Based on these patterns, predict the formulas of the compounds formed by the ions below.

	<i>Ratio of ions in compound</i>		
Atoms involved	___ potassium ___ oxygen	___ calcium ___ sulfur	___ gallium ___ oxygen
formula			

4. How does a neutral atom become a positive ion? a negative ion?
5. Do the elements in group 1A behave more like top or bottom tape? How about the elements in group 7A? How so?
6. Make whatever generalizations you can about the charge of the ions formed by elements in columns 1A, 2A, 3A and 7A based on the ratio of atoms in each of the compounds they form. It might help to look at your particle diagrams in #1 and consider what charges the ions might have in order to result in neutral compounds.
7. Using the fact that compounds are also neutral, account for the fact that the ions combine in the ratios you have listed in the table in #2. Provide a couple of specific examples to support your explanation.