



Chemistry: Atoms, Elements & Compounds - PART 2

Lesson	Topic	Lesson	Learning Goals	Homework
1.10	Exploring the Periodic Table	<input type="checkbox"/> Historical Organization of Table <input type="checkbox"/> Modern Periodic Table	<ul style="list-style-type: none"> understand the fundamentals of the modern periodic table including development and historical arrangements know key patterns in the arrangement of the periodic table 	HW: pg190 Q#1-3 Pg193Q#1-2 Pg199Q#1-3
1.11	Groups of the Periodic Table	<input type="checkbox"/> Major Groups (4) <input type="checkbox"/> Metals, Non Metals, Metalloids	<ul style="list-style-type: none"> compare & contrast the physical/chemical properties of elements within a group and between other groups describe the characteristics of M, NM & Mlds 	HW: pg195 Q#1-4 Pg193Q#1-2
1.12	Ions & Stability	<input type="checkbox"/> Ions & Octet Rule - note <input type="checkbox"/> Ions - worksheet	<ul style="list-style-type: none"> understand why & how ions form from metals and nonmetals show how charges on ions are related to their formation 	HW: pg213 Q#1-5 Pg217Q#7-10
1.13	Formation of Compounds	<input type="checkbox"/> Forming & Naming Compounds: Ionic <input type="checkbox"/> Counting Atoms	<ul style="list-style-type: none"> demonstrate how to form a compound from ions identify the name & formula for common ionic compounds calculate the number of atoms in a specified compound 	HW: pg220 Q#1-3 Pg221-PracticeProblems Worksheet: Ionic Compounds
1.14	Are Chemicals Good for Us?	<input type="checkbox"/> Harmful Chemicals in Our Environment	<ul style="list-style-type: none"> assess social, environmental and economic impacts of the use of common elements or compounds 	
1.15	Review	<input type="checkbox"/> Review	<p style="text-align: center;">Pg 242 - unit outline Pg246-247 Q#1-20, 21a-c, 27-31, 35,36,51,55-57a-f</p>	
1.16	TEST	<input type="checkbox"/> Unit Test		

The Periodic Table

The periodic table of the elements was originally developed, in the form that we are familiar with, by a Russian chemist named _____ . His table was based on _____ of the elements known at the time. Mendeleev noticed that these _____ over and over again when the elements were _____. It was this repetition that led to the choice of the name _____ .

For our purposes the table organizes the elements in three ways:

Metals and Non-Metals

Elements that tend to _____ and become _____ are found on the _____ of the periodic table. These elements are _____ and have the characteristic properties of metals: they are _____, _____, _____, _____, _____.

		← Increasing metallic character																		
		1A	2A		3B 4B 5B 6B 7B 8B 1B 2B										3A	4A	5A	6A	7A	8A
	H	Li	Be	B	C	N	O	F	Ne											
	Na	Mg	Al	Si	P	S	Cl	Ar												
	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr		
	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe		
	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn		
	Fr	Ra	Ac																	
Metals			Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu				
Metalloids			Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr				
Nonmetals																				

Elements that tend to _____ and become _____ are found on the _____ of the periodic table. These elements are _____ and have the characteristic properties of non-metals: _____, _____, _____, _____.

There is no clear-cut division between the two types of elements but the _____, toward the right hand side of the table, _____ the metallic elements from the non-metallic elements. _____ may have properties of both types of elements and are called _____.

Families or Groups

The columns in the periodic table organize the elements into groups or families _____. Each group is identified by a Roman Numeral and may, or may not, use a letter of the alphabet. Groups of elements have _____ caused by their _____. In groups of _____, the _____ is at the _____. In groups of _____ the _____ element is at the _____. The elements of one family, group VIII, also called the _____ or the _____, are almost completely _____ because they have the _____ electron arrangement.

Periods

These are the _____ across the table. In a period there is a gradual change from metals to non-metals as the atomic number increases and as the number of electrons in the outside shell increases. A period always _____ in the outermost shell and ends with 8 electrons in this outer shell, period 1 being the only exception.

Groups of the Periodic Table



Chemical Group – the set of elements in the same column. These elements tend to have similar physical and chemical properties.

Group 1 – _____

- all shiny, silver-coloured metals
- _____
- found _____ and easily form compounds with other elements

Group 2 – _____

- fairly reactive, but _____

Group 7 – _____

- the _____
- they often appear as part of a compound rather than as elements

Group 8 – _____

- these elements are _____
- _____ (almost never react with other elements)

1	2											3	4	5	6	7	0
																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg							

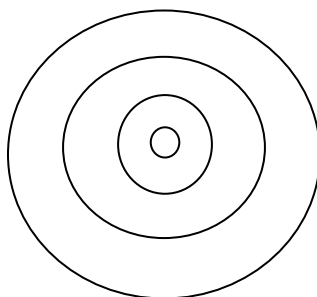
 Alkali metals	 Halogens
 Transition metals	 Noble gases

The Stable Octet and Ion Formation

Atoms (elements) are _____ when they have a _____. For many elements, they are stable when the outer shell holds eight electrons. This electron arrangement is called a _____.

Some _____ have a full outer electron shell (_____), for example, helium, neon and argon. Because these elements do not want to lose or gain electrons, they are _____ - they do not react.

eg. Argon, atomic number 18



However, for the _____, the _____ have a _____ electron arrangement. These atoms will tend to _____ to achieve a Stable Octet and _____.

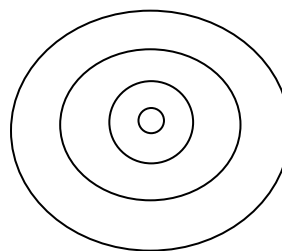
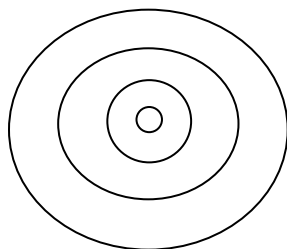
An _____ is a _____, in which the _____

When an atom _____ valence electron(s), it will form a _____ ion. When an atom _____ valence electron(s), it will form a _____ ion.

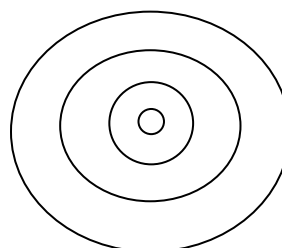
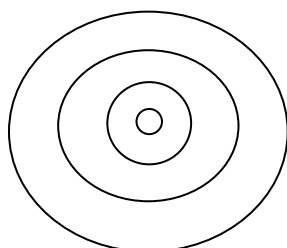
Metals

When an atom has 1, 2 or 3 electrons in its outer shell (**VALENCE SHELL**), it will tend to lose these electrons to achieve a stable octet electron arrangement.

eg. ${}_{3}\text{Li}$



eg. ${}_{13}\text{Al}$

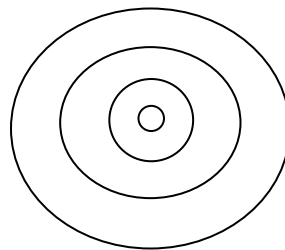
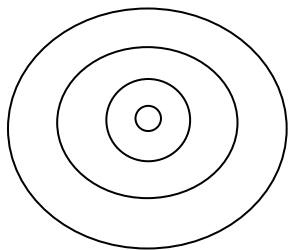


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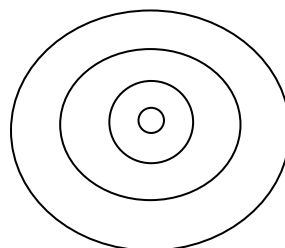
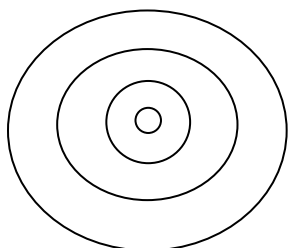
Non-metals

When an atom has 5, 6 or 7 electrons in its outer shell (**VALENCE SHELL**), it will tend to gain electrons to achieve a stable octet electron arrangement.

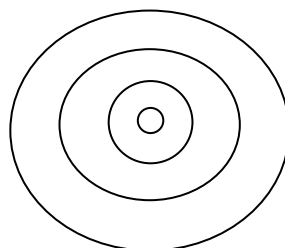
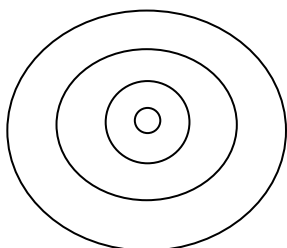
eg. ${}_{9}\text{F}$



eg. ${}_{8}\text{O}$



eg. ${}_{15}\text{P}$



Ionic Bonds: Forming Ionic Compounds

Electrons _____ (well, almost never), exist just free in space. When one atom loses an electron, the electron is always transferred to _____. That is, in order for one atom to lose electrons, _____.

When an atom loses one or more electrons, it becomes _____.

A _____ charged ion is called a _____.

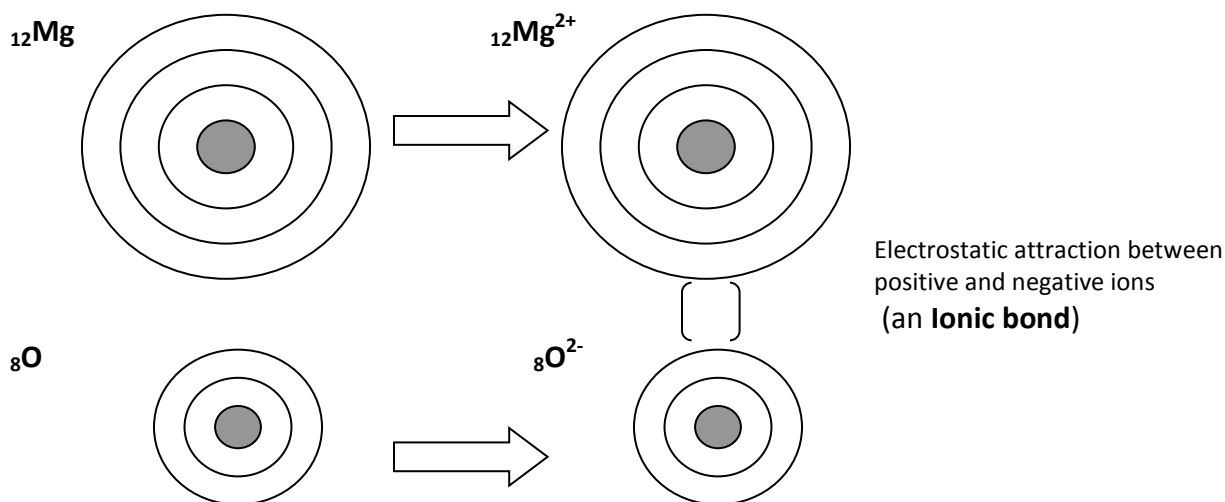
When an atom gains one or more electrons, it becomes _____.

A _____ charged ion is called a _____.

From earlier studies, you may know that _____. This attraction is called _____.

This attraction is true for ions as well. When an atom loses an electron and becomes _____, it will be attracted to the negatively charged ion that was created when another atom _____.

For example:



The attraction between the positive and negative ions that is created when electrons are transferred is called an _____.

When the ions of metals and non-metals are attracted to each other and an _____ is formed, the new substance that is formed is called an _____.

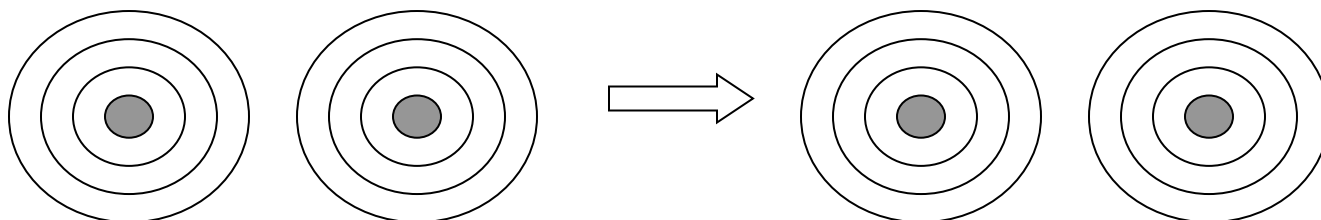
We can find the chemical formulas for ionic compounds using the “_____” rule:

1. Write the _____, including its charge.
2. Write the _____, including its charge.
3. Criss-cross just the _____ of the charges.
4. If the subscripts can be reduced to _____, do so.

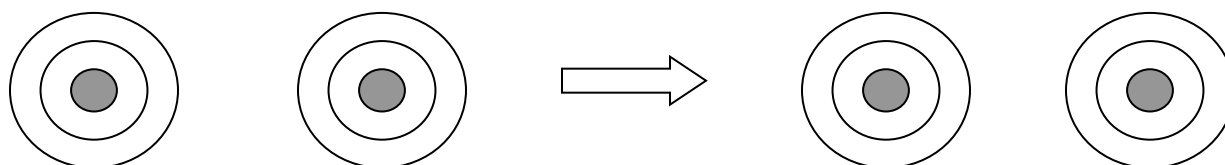
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Practice Questions:

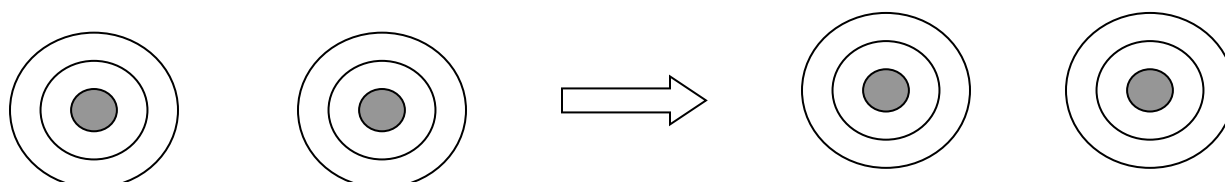
1. sodium and chlorine



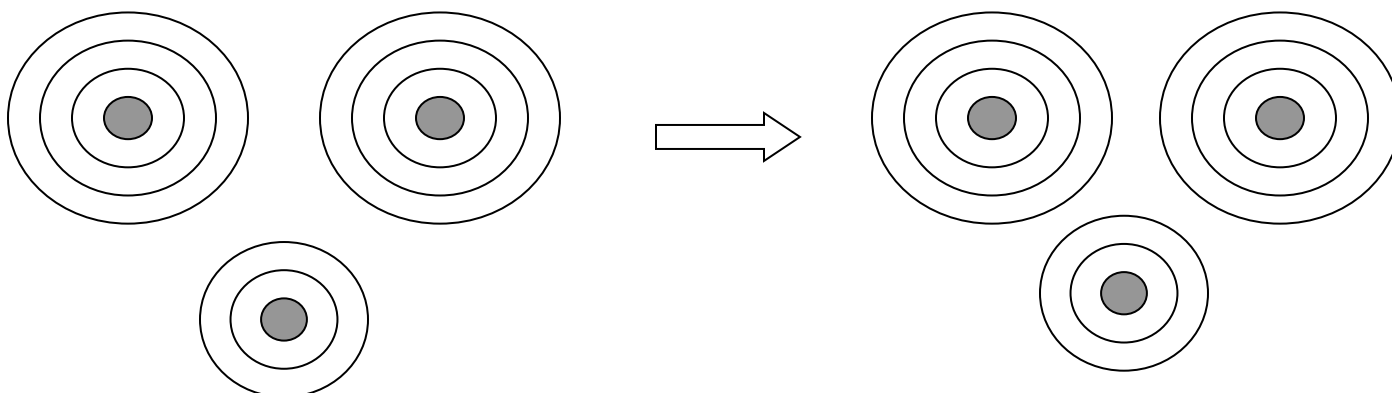
2. lithium and fluorine



3. beryllium and oxygen



4. sodium and oxygen



Naming ionic compounds:

1. Name the metal first, use its regular name
2. Name the non-metal second, change the ending of its name to "ide" (the names are written on your ion chart)

** only the non-metals have "ide" names

For example,

Calcium & fluorine _____

Lithium & sulphur _____



Ions & Ionic Bonding

1. Complete the following chart. Be sure to look at the net charge!

Element	Atomic Number	Number of Protons	Number of Electrons	Number of Neutrons	Mass Number	Net Charge
Be				5		0
	16				35	-2
Fe			24		60	
		55		73		0
	84		84		202	
		13				+3
	38					+2
I			54			
					197	+1
		87	86			
	82					-4
				35		+1
Po			86			
					35	-1
		1	0			

2. Complete the formation of ionic compounds using the elements listed below. Be sure to complete all steps to show the transfer of electrons, and name the end products of your reaction.

- | | | |
|--------------|---------------|---------------|
| 1. Li and F | 9. Cs and C | 17. K and S |
| 2. Ca and S | 10. Sr and Se | 18. Ga and Cl |
| 3. Al and N | 11. B and S | 19. Be and S |
| 4. Mg and Cl | 12. Be and I | 20. Mg and P |
| 5. Na and O | 13. i and N | 21. Al and F |
| 6. K and Br | 14. Ba and C | 22. Fr and O |
| 7. Sc and S | 15. Na and Br | 23. B and Br |
| 8. Al and O | 16. Li and O | 24. Sc and S |

NAMING IONIC COMPOUNDS



1. Write the formula for the following binary compounds:

sodium fluoride	zinc nitride
silver nitride	strontium oxide
aluminum chloride	aluminum carbide
barium oxide	lithium sulfide
magnesium bromide	beryllium iodide
calcium sulfide	calcium bromide
lithium oxide	potassium chloride
barium sulfide	silver sulfide
potassium phosphide	zinc carbide
magnesium carbide	boron nitride

2. Name the following binary compounds:

Na_2O	Zn_3P_2
Li_4C	Ba_3N_2
MgBr_2	MgO
CsI	CaS
Ag_3N	BeO
Sr_2C	ZnBr_2
CaCl_2	NaF
BaO	Sr_3P_2
AlBr_3	AgI

Naming Ionic Compounds

Write the correct name for:

1) MgS _____

2) KBr _____

3) Ba₃N₂ _____

4) Al₂O₃ _____

5) NaI _____

6) SrF₂ _____

7) Li₂S _____

8) RaCl₂ _____

9) CaO _____

10) AlP _____

11) K₂S _____

12) LiBr _____

13) Sr₃P₂ _____

14) BaCl₂ _____

15) NaBr _____

16) MgF₂ _____

17) Na₂O _____

18) SrS _____

19) BN _____

20) AlN _____

SNC 1D

Write the correct formula for:

1) magnesium oxide _____

2) lithium bromide _____

3) calcium nitride _____

4) aluminum sulfide _____

5) potassium iodide _____

6) strontium chloride _____

7) sodium sulfide _____

8) radium bromide _____

9) magnesium sulfide _____

10) aluminum nitride _____

11) cesium sulfide _____

12) potassium chloride _____

13) strontium phosphide _____

14) barium iodide _____

15) sodium fluoride _____

16) calcium bromide _____

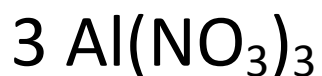
17) beryllium oxide _____

18) strontium sulfide _____

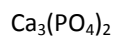
19) boron fluoride _____

20) aluminum phosphide _____

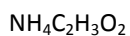
Counting Atoms



Type of Atom <i>(Provide the name of the element)</i>	# of Atoms
TOTAL:	



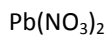
Type of Atom <i>(Provide the name of the element)</i>	# of Atoms
TOTAL:	



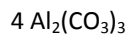
Type of Atom <i>(Provide the name of the element)</i>	# of Atoms
TOTAL:	



Type of Atom <i>(Provide the name of the element)</i>	# of Atoms
TOTAL:	



Type of Atom <i>(Provide the name of the element)</i>	# of Atoms
TOTAL:	



Type of Atom <i>(Provide the name of the element)</i>	# of Atoms
TOTAL:	

All substances, natural and manufactured, are chemicals. Our society relies heavily on manufactured chemicals such as paints, plastics, fertilizers, and pesticides. Issues involving the use of chemicals go beyond whether the product we end up with is safe. It includes concerns about the health of workers exposed to toxic substances during manufacture. It also means preventing toxic substances from escaping into the environment.

INSTRUCTIONS

Read the assigned section(s) and then answer the question(s) on a separate sheet of paper.

PART 1 - Working with Toxic Elements (P.200)

1. In the 18th and 19th centuries, mercury was used in hat making. Why was this a problem?
2. Who else might be in danger? How can they be protected?

PART 2 - Heavy Metals in Fish (P.201)

3. What are the main causes of heavy metal pollution?
4. Suppose you go fishing at a pond contaminated with mercury and catch a minnow (a fish at the bottom of the food chain) and a large trout (a fish at the top of the food chain, which eats other fish). Which fish would have a higher concentration of mercury in its body? Why?
5. Why might Aboriginal people and people in remote communities feel the effects of heavy metal contamination of fish more than most groups in Canada?

PART 3 - Diamonds: Responsible Mining and Production (P.205)

6. List 3 benefits and 3 drawbacks to diamonds and diamond mining.

PART 4 - Elements and Compounds in the Environment (P.232-235)

7. What are some of the health problems associated with exposure to mercury?
8. What is the effect of ozone in the upper atmosphere?
9. CFCs were originally thought to be safe and useful. Why were they determined to be unsafe?
10. List four ways to aid in the safe handling of regulated substances.

PART 5 - POPs and Pesticides (P.236)

11. What does POPs stand for? What is it? Why are they of a concern?
12. What four properties of POPs allow them to bioaccumulate and biomagnify?

PART 6 - Fluoridation of Drinking Water (P.237)

13. Fluoride is often added to drinking water to help prevent tooth decay. However, some people argue that fluoridation of drinking water is unsafe. Why is tooth decay a complicated process?