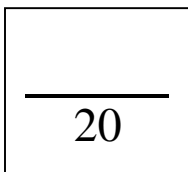


Activity # 9



Name _____

Date _____

Date due _____

Assignment on Ionic Compounds and Formulas

NOTE: This assignment is based on material given in your notes as well as pages 193-200 in the Science Probe textbook.

1. Which family of elements has just enough electrons in their highest orbits to completely fill them up? _____
2. Draw the Bohr diagram for a Lithium atom (3 electrons).
3. In order for Lithium to have the same number of electrons as Helium (a Noble Gas), it would have to _____ one electron.
4. Draw a Bohr diagram for a Fluorine atom (9 electrons).
5. In order for Fluorine to have the same number of electrons as Neon (a Noble Gas), it would have to _____ one electron.

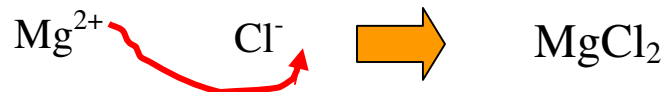
6. If Lithium is combined with Fluorine, the Lithium atom will _____ an electron to the Fluorine atom. Show this using the Bohr diagrams:
7. When Lithium has **lost** an electron, it now has ____ protons (*remember, it doesn't lose any protons*), and ____ electrons. Because protons are positive (+) and electrons are negative (-), the charge left over is _____. The Lithium is no longer a neutral atom, but is a charged atom, which is called a Lithium _____.
8. When Fluorine has **gained** an electron, it now has ____ protons (*remember, it doesn't lose any protons*), and ____ electrons. Because protons are positive (+) and electrons are negative (-), the charge left over is _____. The Fluorine is no longer a neutral atom, but is a charged atom, which is called a **Fluoride** _____.
9. Because the lithium ion (Li^+) and the fluoride ion (F^-) have opposite charges, they _____ each other. This attraction forms an _____ **ic** bond.
10. Draw the Bohr diagram for a Magnesium (Mg) atom (12 electrons)
11. In order to be stable like the Noble Gas Neon, magnesium would have to _____ electrons.

12. Because magnesium needs to lose 2 electrons to have the same number of electrons as a Noble gas, it is said to have an ion charge of _____
13. Aluminum (13 electrons) needs to lose _____ electrons to have the same number of electrons as the Noble Gas Neon, therefore Aluminum is said to have a combining capacity of _____
14. Fluorine needs to _____ one electron to have the same number of electrons as the Noble Gas, Neon. Therefore, Fluorine is said to have an ion charge of _____
15. Oxygen needs to _____ two electrons to have the same number of electrons as the Noble Gas, Neon. Therefore, Oxygen is said to have an ion charge of _____
16. Generally, **ion charge** means the number of _____ an atom needs to **lose** or **gain** in order to have the same number of electrons as a _____
_____.
17. Where do you find the ion charge for an element on the Periodic Table?

18. If an element has a *positive (+) ion charge*, that means it (lose/gains) _____ electrons to end up with the same number of electrons as a Noble Gas.
19. If an element has a *negative (-) ion charge*, that means it (lose/gains) _____ electrons to end up with the same number of electrons as a Noble Gas.
20. If a metal has *more than one ion charge* (eg. Titanium (#22), has an ion charge of 3+ or 4+.
See it on the Periodic Table.), a _____ Numeral after the name of the metal tells which ion charge to use.
- eg.) The ion charge of Titanium (III) is _____
The ion charge of Titanium (IV) is _____
- eg.) The ion charge of Iron (II) is _____
The ion charge of Iron (III) is _____

21. Use the Periodic Table and the method shown to you by the teacher to write the correct formulas for the following ionic compounds. The first one is done as an example:

a) magnesium chloride



b) aluminum fluoride

the formula is _____

c) calcium oxide

the formula is _____

d) lithium oxide

the formula is _____

e) sodium chloride

the formula is _____

f) potassium sulphide

the formula is _____

g) zinc bromide

the formula is _____

h) iron (III) chloride(Remember the (III) means that the ion charge of iron is 3+.)

the formula is _____

- i) manganese (II) sulphide*(Remember, if both the ion charges are both multiples of "2", they must each be divided by 2 to simplify the formula!)*

the formula is _____

- j) iron (III) sulphide.....

the formula is _____

- k) beryllium phosphide

the formula is _____

- l) aluminum iodide

the formula is _____

- m) lithium selenide

the formula is _____

- n) manganese (IV) oxide*(Remember, if both the ion charges are multiples of "2", they must each be divided by 2 to simplify the formula!)*

the formula is _____

- o) gold (III) bromide.....

the formula is _____

- p) cadmium sulphide.....

the formula is _____

q) molybdenum (III) oxide.....

the formula is _____

r) vanadium (IV) phosphide.....

the formula is _____

22. Certain groups of atoms which behave like a single atom when forming compounds are called

_____ atomic ions.

23. A polyatomic ion made up of one nitrogen atom and three oxygen atoms is called

_____. It has an ion charge of _____ (look it up on the sheet of "Common Ions" that the teacher has given you.)

24. A polyatomic ion made up of one chromium atom and four oxygen atoms is called

_____. It has an ion charge of _____ (look it up on the sheet of "Common Ions" that the teacher has given you.)

25. A polyatomic ion made up of one phosphorus atom and four oxygen atoms is called

_____. It has an ion charge of _____ (look it up on the sheet of "Common Ions" that the teacher has given you.)

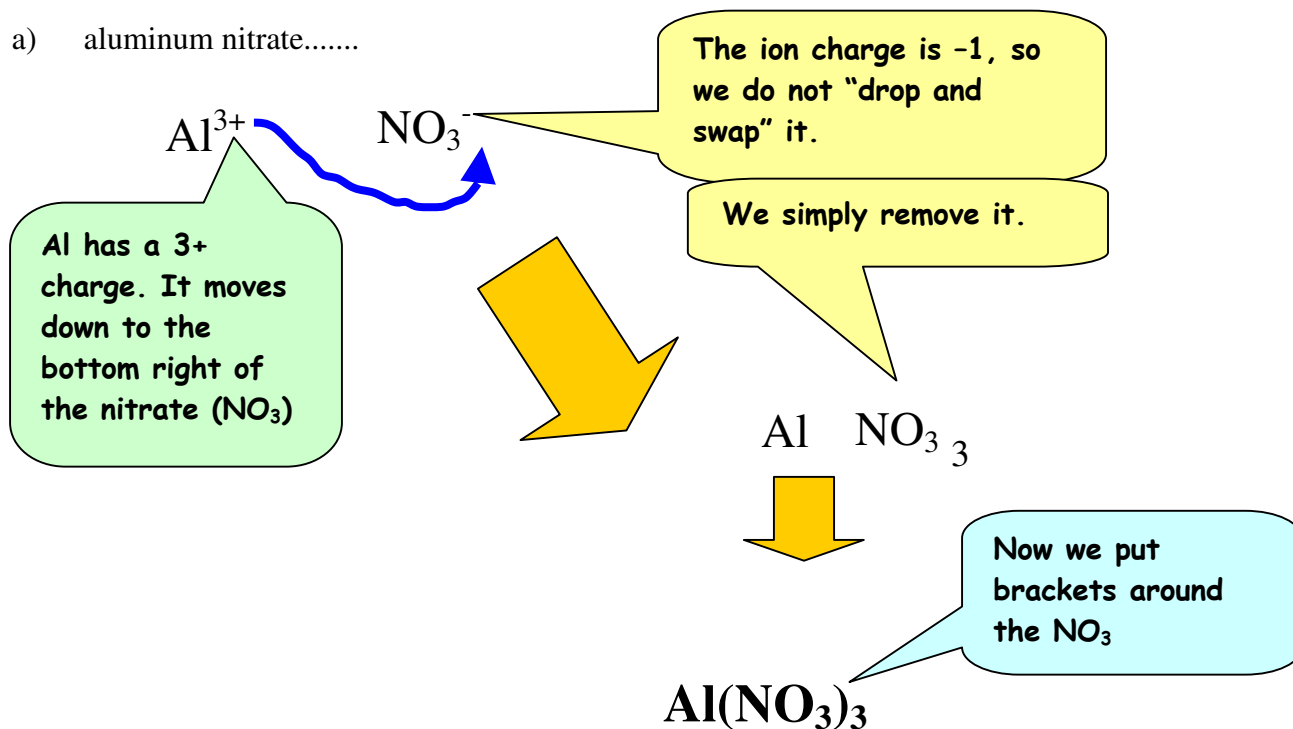
26. When a polyatomic ion is used in a compound it _____ loses or changes any of its little numbers (*subscripts*)!!

27. If more than one of a particular polyatomic ion is used in a compound (*eg. 2 nitrates*), the polyatomic ion must have _____ around it.

eg.) $\text{Mg}(\text{NO}_3)_2$

28. Use the sheet of "Common Ions" and the rules for writing formulas to complete the formulas for the following compounds: (*The first one is done as an example and some explanation is given.*)

a) aluminum nitrate.....



b) sodium phosphate.....(NOTE: Phosphide is P³⁻, while *Phosphate* is PO₄³⁻)

the formula is _____

c) calcium chromate.....

the formula is _____

d) lithium hydroxide.....

the formula is _____

- e) magnesium hydroxide.....(NOTE: If there is more than one "hydroxide" needed it must STILL have brackets around it because it still is a polyatomic ion - even if it doesn't have little numbers on it)

the formula is _____ **Mg(OH)₂** _____

- f) vanadium (V) hydroxide.....

the formula is _____

- g) potassium chromate.....

the formula is _____

- h) sodium dichromate.....(look up "dichromate" on the "Common Ion" chart. They are listed alphabetically.)

the formula is _____

- i) copper (I) oxalate.....

the formula is _____

- j) strontium sulphate.....(NOTE: sulphide is S^{2-} while sulphate is SO_4^{2-})

the formula is _____

- k) magnesium hypochlorite.....

the formula is _____

- l) sodium bicarbonate.....(NOTE: "bicarbonate" is just another name for "hydrogen carbonate" on the "Common Ion" table.)

the formula is _____

- m) beryllium bisulphide.....(NOTE: "bisulphide" is just another name for "hydrogen sulphide, on the "Common Ion" table.)

the formula is _____

- n) potassium permanganate.....

the formula is _____

- o) lithium sulphite.....(Be careful! "sulphite" (SO_3^{-2}) is spelled a lot like "sulphate" (SO_4^{-2}). Don't get them mixed up!)

the formula is _____

- p) magnesium hydrogen carbonate.....

the formula is _____

- q) manganese (II) bisulphite.....

the formula is _____

- r) iron (III) acetate.....

the formula is _____

- s) mercury (II) phosphate.....

the formula is _____

29. In the compound: $\text{Mn}(\text{OH})_2$, the Mn ion has a charge of _____ and the manganese ion is called manganese ____.
30. In the compound: $\text{X}(\text{OH})_3$, the X ion has a charge of _____ and the OH ion has a charge of _____.
31. In the compound: $\text{Mn}(\text{SO}_4)_2$, the SO_4 ion has a charge of _____ and the manganese ions is called manganese ____.
32. In the compound: $\text{X}_2(\text{CO}_3)_3$, one CO_3 ion has a charge of _____ and there are _____ CO_3 ions in the formula so the TOTAL NEGATIVE CHARGE = _____ Therefore the TOTAL POSITIVE CHARGE MUST BE = _____. Since there are _____ atoms of "X" to share the total positive charge, the charge on One "X" ion must be _____.
33. In the compound: $\text{Y}_3(\text{PO}_4)_2$, one PO_4 ion has a charge of _____ and there are _____ PO_4 ions in the formula so the TOTAL NEGATIVE CHARGE = _____ Therefore the TOTAL POSITIVE CHARGE MUST BE = _____. Since there are _____ atoms of "Y" to share the total positive charge, the charge on One "Y" ion must be _____.
34. An element "Q" forms two stable compounds: $\text{Q}_2(\text{SO}_4)_3$ and $\text{Q}(\text{OH})_2$. Can "Q" ions have more than one different ion charge? _____.
- a) What is the ion charge of "Q" in $\text{Q}_2(\text{SO}_4)_3$? _____
- b) What is the ion charge of "Q" in $\text{Q}(\text{OH})_2$. ? _____
- c) Two possible ions formed by "Q" could be _____ or _____
- d) Could the element "Q" be an Alkaline Earth element? _____ Explain why or why not. _____
- _____
- _____
- _____