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**How to become a formulation hero**

**Basics – you will need to know these…and a couple more!**

**Write the symbols and oxidation numbers for these elements** (*hint: these only have one ox. number*)**:**

1. Lithium, sodium and potassium (*Group 1 elements*)
2. Beryllium, magnesium and calcium (*Group 2 elements*)
3. Boron and aluminium (*Group 3 elements*)
4. Oxygen
5. Zinc
6. Silver

**For these elements** (*hint: these have more than one*)**:**

1. Carbon
2. Nitrogen
3. Sulfur
4. Chlorine, bromine, iodine and astatine
5. Iron, cobalt and nickel
6. Palladium and platinum
7. Copper and mercury
8. Gold

**Formulate the ions and include the charges on each:**

1. *Example – Ox****ide*** *🡪 O2-*

*(Any ion that ends in “****ide****” only contains 1 type of element)*

1. Perox**ide** (*the only time that oxygen does not have a oxidation number of -2)*
2. Hydr**ide**
3. Chlor**ide**, iod**ide** and brom**ide**

(*Any ion that ends with “ite” or “ate” always contain oxygen)*

1. **Hypo**chlor**ite**, **hypo**iod**ite**, **hypo**brom**ite**
2. Chlor**ite**, iod**ite**, brom**ite**
3. Chlor**ate**, iod**ate**, brom**ate**
4. **Per**chlor**ate**, **per**iod**ate**, **per**brom**ate**
5. Sulfide
6. Sulfite
7. Sulfate
8. Nitride
9. Nitrite
10. Nitrate
11. Carbonate
12. Silicate
13. Borate
14. Phosphate
15. Arsenate
16. Chromate and **di**chromate
17. Manganate and **per**manganate

**Hint for formulation**

When we are formulating chemical compounds we must follow 1 simple rule. When we add the oxidation numbers (of the element) and the charges on the ions, we must ensure that they equal 0.

**Example 1:**

*Lithium sulfate – Lithium is in group 1 so will have an oxidation state of +1. The sulfate ion has a charge of 2- (SO42-). So, to formulate this compound I will need 2 lithium atoms and 1 sulfate ion…*

***+1 +1 -2 = 0***

***Li2SO4***

**Example 2:**

*Gold(III) silicate – In this case gold has an oxidation state of +3 (remember it can also have +1). The silicate ion has a charge of 4- (SiO44-). So, to formulate this compound I will need 4 gold atoms and 3 silicate ions…*

***+3 +3 +3 +3 -4 -4 -4 = 0***

***Au4(SiO4)3***

**Easy formulation**

1. ****Lithium hydride
2. Magnesium hydride
3. Aluminium hydride
4. Calcium oxide
5. Iron(II) sulfide
6. Zinc carbonate
7. Gold(I) bromide
8. Gold(III) fluoride
9. Cobalt(III) hydroxide
10. Cobalt(II) nitride
11. Fe2O3
12. Pt(OH)2
13. Pt(OH)4
14. NiO
15. NiBr3
16. CuS
17. Cu2O
18. CuO2
19. HgCl
20. HgCl2

**Some common names that you just have to remember:**

* NH3 ammonia
* CH4 methane
* BH3 borane
* B2H6 **di**borane (*because it is formed by 2 boranes*)
* H2O water

**If you can do these then you are a formulation hero.**

**Congratulations!**

