IB Chemistry Summer Review

Take some time to work through the following questions in preparation of IB Chemistry for the 2018-2019 school year. This is not "required" but is ENCOURAGED. Have a great summer and looking forward to seeing you all in August!!!

1. Calculate the number of molecules present in 13.8g of nitrogen dioxide.

   How many atoms of EACH element are present?

   Calculate the mass of 9.03×10^{23} molecules of aluminum chloride.

2. Give the number of protons, electrons, and neutrons of each of the following elements/ions.

   a. $^{13}_{6}C$ b. $^{86}_{38}Sr^{+2}$

3. Balance each of the following equations:

   a. $C_4H_{10} + O_2 \rightarrow CO_2 + H_2O$ b. $NH_3 + O_2 \rightarrow NO + H_2O$

4. Zinc reacts with silver nitrate to produce zinc nitrate and silver. If 52.3g of zinc are present, what mass of silver nitrate is required?

   What is the mass of each of the products?

5. Lithium reacts with nitrogen to produce lithium nitride according to the following balanced equation:

   $$6Li + N_2 \rightarrow 2Li_3N$$

   When 16.0g of lithium are combined with 12.0g of nitrogen, the reaction actually produces 20.0g of lithium nitride. Calculate the percent yield.

6. A sample of carbon dioxide has a volume of 125mL at 20*C and 1.20atm. Determine the number of moles, mass, and molecules of carbon dioxide present.

7. Calculate the molarity if 500mL of a solution contain 20.2g of potassium nitrate.

   Calculate the resulting molarity if 300mL of water are added to the solution.

8. Round each of the following to the indicated number of significant figures:

   a. 0.00034159 to three digits
   b. 17.9915 to five digits
   c. 103.351×10^2 to four digits
   d. 3.365×10^5 to three digits

9. Evaluate each of the following and write the answer to the appropriate number of significant figures:

a. 212.2 + 26.7 + 402.09 =
b. $2.01 \times 10^2 + 3.014 \times 10^3$ =
c. (6.404 x 2.91) / (18.7 - 17.1) =
d. $6.071 \times 10^{-5} - 8.2 \times 10^{-6} - 0.521 \times 10^{-4}$ =

10. Convert 3.45 years to seconds using **ALL relationships** listed: minutes, days, hours, years, weeks, months, seconds

11. For a pharmacist dispensing pills or capsules, it is often easier to weigh the medication to be dispensed than to count the individual pills. If a single antibiotic pill capsule weighs 0.65g and the pharmacist weights out 15.6g of capsules, how many capsules have been dispensed? SHOW WORK

12. Zirconium has a density of 6.52 g/cm^3. Calculate the mass (in kg) of a block of zirconium that measures 8.00cm by 2.40cm by 1.50cm.

Determine the volume (in mL) of 80.0g of zirconium.

13. Name each compound:

a. $CaCl_2$
b. HBr
c. $FeBr_3$
d. $HC_2H_3O_2$
e. $BaSO_4$
f. CCl_4
g. $Ni(NO_3)_2$
h. N_2O_5

14. Write the chemical formula for the following:

a. Sodium iodide
b. nitric acid
c. Lithium hydroxide
d. Selenium hexafluoride
e. cobalt (II) phosphate
f. Nitrogen trichloride

15. For each of the following sets of elements, label each as either Noble Gases, Halogens, Alkali Metals, Alkaline Earth Metals, or Transition Metals.

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a. Ti, Fe, Ag
b. Mg, Sr, Ba
c. Ne, Kr, Xe
d. F, Br, I

16. The number of protons in an atom determines the identify of the atom. What does the number and arrangement of electrons in an atom determine?

What does the number of neutrons in an atom determine?

ALSO, spend some time reviewing/learning the polyatomic ions - formula, oxidation number, and name

Common Ions and Their Charges

A mastery of the common ions, their formulas and their charges, is essential to success in AP Chemistry. You are expected to know all of these ions on the first day of class, when I will give you a quiz on them. You will always be allowed a periodic table, which makes indentifying the ions on the left "automatic." For tips on learning these ions, see the opposite side of this page.

From the table:	
Cations	**Name**
H^+	Hydrogen
Li^+	Lithium
Na^+	Sodium
K^+	Potassium
Rb^+	Rubidium
Cs^+	Cesium
Be^{2+}	Beryllium
Mg^{2+}	Magnesium
Ca^{2+}	Calcium
Ba^{2+}	Barium
Sr^{2+}	Strontium
Al^{3+}	Aluminum
Anions	**Name**
H^-	Hydride
F^-	Fluoride
Cl^-	Chloride
Br^-	Bromide
I^-	Iodide
O^{2-}	Oxide
S^{2-}	Sulfide
Se^{2-}	Selenide
N^{3-}	Nitride
P^{3-}	Phosphide
As^{3-}	Arsenide
Type II Cations	**Name**
Fe^{3+}	Iron(III)
Fe^{2+}	Iron(II)
Cu^{2+}	Copper(II)
Cu^+	Copper(I)
Co^{3+}	Cobalt(III)
Co^{2+}	Cobalt(II)
Sn^{4+}	Tin(IV)
Sn^{2+}	Tin(II)
Pb^{4+}	Lead(IV)
Pb^{2+}	Lead(II)
Hg^{2+}	Mercury(II)

Ions to Memorize	
Cations	**Name**
Ag^+	Silver
Zn^{2+}	Zinc
Hg_2^{2+}	Mercury(I)
NH_4^+	Ammonium
Anions	**Name**
NO_2^-	Nitrite
NO_3^-	Nitrate
SO_3^{2-}	Sulfite
SO_4^{2-}	Sulfate
HSO_4^-	Hydrogen sulfate (bisulfate)
OH^-	Hydroxide
CN^-	Cyanide
PO_4^{3-}	Phosphate
HPO_4^{2-}	Hydrogen phosphate
$H_2PO_4^-$	Dihydrogen phosphate
NCS^-	Thiocyanate
CO_3^{2-}	Carbonate
HCO_3^-	Hydrogen carbonate (bicarbonate)
ClO^-	Hypochlorite
ClO_2^-	Chlorite
ClO_3^-	Chlorate
ClO_4^-	Perchlorate
BrO^-	Hypobromite
BrO_2^-	Bromite
BrO_3^-	Bromate
BrO_4^-	Perbromate
IO^-	Hypoiodite
IO_2^-	iodite
IO_3^-	iodate
IO_4^-	Periodate
$C_2H_3O_2^-$	Acetate
MnO_4^-	Permanganate
$Cr_2O_7^{2-}$	Dichromate
CrO_4^{2-}	Chromate
O_2^{2-}	Peroxide
$C_2O_4^{2-}$	Oxalate
NH_2^-	Amide
BO_3^{3-}	Borate
$S_2O_3^{2-}$	Thiosulfate