Ions and Percent Purity

- Ions are the pieces that many compounds will fall apart into when forced apart.

- % Purity = $\frac{\text{Grams Pure}}{\text{Grams Impure}} \times 100\%$

Ions

- So NaCl can be separated into $1Na^{+1}$ and $1Cl^{-1}$
- MgCl will separate into $1Mg^{+1}$ and $2Cl^{-1}$
- This can be used to figure out moles of ions present
- If you have 5 moles of $MgCl_2$ that means you will have 5 moles of Mg^{+1} and 10 mole of Cl^{-1}
- You can just use conversion factors to make the changes ex 1mol $MgCl_2$ = 2 mol Cl^{-1}

Ions example

- If you have 145.2grams of Al_2O_3 how many moles of Al_2O_3 do you have?
- 145.2g/101.96g/mol= 1.424 mole Al_2O_3
- How many moles of Aluminium ions?
- $\frac{1.424 \text{ mole } Al_2O_3}{} \left| \frac{2 \text{Mole Al ions}}{1 \text{mole } Al_2O_3} \right| = 2.848 \text{ mol Al ions}$

* Purity will change the amount of grams by decreasing mass of reagent available

$$X \text{ grams pure} = \frac{\%\ \text{Pure (grams impure)}}{100\ \%} = \text{grams pure}$$

If given grams they are grams impure
If given Mole calculated grams are pure grams

- $\dfrac{\text{Grams A}}{\text{Molar Mass}} \left| \dfrac{1\ \text{mol A}}{} \right| \quad \text{Moles of pure A}$

*If moles ions are needed

X grams pure $=$ $\frac{\%\ \text{Pure (grams impure)}}{100\ \%}$ = grams pure

- $\text{Grams A} \times \frac{1\ \text{mol}}{\text{Molar Mass}} \times \frac{\text{Moles of Ions}}{\text{Moles Source}}$

120. grams of copper II chloride $CuCl_2$ that is 98.8 % pure, how many moles of copper II chloride are available?

$$\frac{X \text{ grams pure}}{120.\text{ g impure}} = \frac{98.8\ \%}{100\%}$$

$$= 119 \text{ grams pure}$$

- $\frac{119\text{ g}}{134.4\text{ g}} \left| \frac{1 \text{ mol A}}{} \right.$ 0.885 Moles of $CuCl_2$

$$\frac{119\text{ g}}{134.4} \left| \frac{1 \text{ mol A}}{1\text{mol A}} \right. \left| \frac{2\text{moles } Cl^-}{} \right.$$ 1.77Moles Cl^-

* Purity will change the amount of grams needed by increasing mass required

- $\frac{\text{Moles A} \mid \text{Molar Mass g}}{1 \text{ mol}}$ = grams of solid of if pure

$$\frac{\text{grams pure}}{\text{X grams impure}} = \frac{\%\text{Pure}}{100}$$ = grams impure to mass out

How many grams of a 95.8 % pure stock bottle of copper II nitrate $Cu(NO_3)_2$ are needed to mass out if a chemist needed 0.250 moles for an experiment

- $\frac{0.250 \quad | \quad 187.5\ g}{\quad | \quad 1\ mol}$ If Mole NO_3 ($2molNO_3/1mol\ Cu(NO_3)_2$ to convert to mole compound

= 46.9 grams of solid of if pure

$\frac{46.9}{X\ grams\ impure} = \frac{95.8\ \%}{100}$ = 49.0 grams to mass out

*Given ion moles

- $\frac{\text{Moles Ions}}{\text{mole ions}} \times \frac{\text{mol Source}}{1} \times \frac{\text{Molar Mass g}}{1\text{moles}}$

= grams of solid of if pure

$$\frac{\text{grams pure}}{\text{X grams impure}} = \frac{\%}{100}$$

= grams impure to mass out