**How to Solve Stoichiometry Problems**

Step 1 – Write and balance the equation

Step 2 – Determine the type of stoichiometry problem.

* Is it a mole/mole problem? Go to step 4.
* Is it a mass/mole problem? Go to step 3, then 4.
* Is it a mass/mass problem? Go to step 3, then 4, then 5.
* Is it a mole/mass problem? Go to step 4 then 5.

Step 3 – Use the balanced equation to covert from mass of your given substance in the question to moles of given substance. Just like converting mass to moles using your mole map.

|  |  |
| --- | --- |
| mass given from ? | 1 mol given |
|  | molar mass of given |

Step 4 - Use the balanced equation to covert from moles of your given substance to moles of unknown substance.

|  |
| --- |
| mol unknown from balanced equation |
| mol given from balanced equation |

Step 5 - Convert your moles of unknown substance back into grams, just like going from moles to mass using your mole map.

|  |
| --- |
| molar mass of unknown |
| 1 mol unknown |

**Mole/Mole Example** Al(s) + F2(g) → AlF3(s)

How many moles of aluminum fluoride are produced from the reaction of 15.0moles of fluorine gas with excess aluminum?

Use steps 1 and 4 only!

Step 1: 2Al(s) + 3F2(g) → 2AlF3(s)

Step 4: 15.0~~mol~~ ~~F~~~~2~~ 2 mol AlF3  = 10.0 mol AlF3

 3 ~~mol~~ ~~F~~~~2~~

**Mass/Mole Example:** Al(s) + F2(g) → AlF3(s)

How many moles of aluminum fluoride are produced from the reaction of 76.0g of fluorine with excess aluminum?

Step 1: 2Al(s) + 3F2(g) → 2AlF3(s)

Step 3 and 4:

|  |  |  |  |
| --- | --- | --- | --- |
| 76.0~~g F~~~~2~~ | 1 ~~mol F~~~~2~~ | 2 mol AlF3 |  = 13.3 mol AlF3 |
|  | 38.00~~g F~~~~2~~ | 3 ~~mol F~~~~2~~ |  |

**Mass/Mass Example** Al(s) + F2(g) → AlF3(s)

What is the mass, in grams, of aluminum fluoride produced from the reaction of 190.0g of fluorine with excess aluminum?

Step 1: 2Al(s) + 3F2(g) → 2AlF3(s)

Step 3, 4, and 5:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 190.0 ~~g F~~~~2~~ | 1 ~~mol F~~~~2~~ | 2 ~~mol AlF~~~~3~~ | 83.98 ~~g AlF~~~~3~~ |  = 279.9g AlF3 |
|  | 38.00 ~~g F~~~~2~~ | 3 ~~mol F~~~~2~~ | 1 ~~mol AlF~~~~3~~ |  |