Date

Chemistry – class notes

Purpose: How do we predict what happens when the amounts of reactants are not perfectly matched?

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| --- |
| **Example 1:** Calculate the number of moles of water that should be produced when  6 molecules of hydrogen react with 6 molecules oxygen gas. |

**Visual solution:**

|  |  |  |
| --- | --- | --- |
| **before** |  | **after** |
| **try to show every particle that would be in the box** |  | **try to show every particle that would be in the box** |

**Math solution:**

**Balanced**

**reaction:**

Before

### Change

After

**Notes:**

|  |
| --- |
| **Example 2:** If seven molecules of zinc react with seven molecules of hydrochloric acid (HCl) to produce zinc chloride and hydrogen gas. |

**Visual solution:**

|  |  |  |
| --- | --- | --- |
| **before** |  | **after** |
| **try to show every particle that would be in the box** |  | **try to show every particle that would be in the box** |

**Math solution:**

**Balanced**

**reaction:**

Before

### Change

After

**Notes:**

|  |  |  |
| --- | --- | --- |
| *Before Change After*  CλeMis+ry: http://genest.weebly.com  Stop in for help every day at lunch and Tues &Thurs after school! |  | Name\_\_\_\_\_\_\_\_\_\_\_\_\_  Period\_\_\_\_\_\_\_\_\_\_\_\_\_ |

1. Write the balanced equation for the reaction between hydrogen and oxygen.

Balanced Equation:

Suppose that 4 molecules of hydrogen gas and 4 molecules of oxygen gas react to form water.

Make a drawing that represents the reaction container before and after the reaction.

*Before After*

How many molecules of water can be produced?

Which reactant is in excess? Why?

How many molecules of excess reactant are there?

*Construct a Before-Change-After Table for this reactant mixture:*

**Bal. Equation:**

**Before: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Change:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**After: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

According to the table you just made,

How many molecules of water can be produced?

Which reactant is in excess? Why?

How many molecules of excess reactant are there?

Based on your two methods of analysis above, what determines how much product can be made from a particular reactant mix?

1. Write the equation for the formation of ammonia from nitrogen gas and hydrogen gas.

Balanced Equation:

Given 6 molecules of nitrogen and 12 molecules of hydrogen, make a drawing that represents the reaction container before and after the reaction.

Before After

How many molecules of ammonia can be produced?

Which reactant is in excess? Why?

\_\_\_\_\_\_\_\_\_\_\_\_ How many molecules of excess reactant are there?

*Construct a Before-Change-After Table for this reactant mixture:*

**Bal. Equation:**

**Before: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Change:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**After: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

According to the table you just made,

How many molecules of ammonia can be produced?

Which reactant is in excess? Why?

How many molecules of excess reactant are there?

Describe what you must look for in a particular reactant mixture to decide which reactant will be in excess (have some left over after the reaction):

1. When 0.50 mole of aluminum reacts with 0.72 mole of iodine to form aluminum iodide, how many moles of the excess reactant will remain? \_\_\_\_\_\_\_\_\_\_\_\_  
   How many moles of aluminum iodide will be formed? \_\_\_\_\_\_\_\_\_\_\_\_\_

**Bal. Equation:**

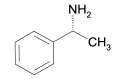
**Before: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Change:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**After: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

4. When sodium hydroxide reacts with sulfuric acid (H2SO4), water and sodium sulfate are the products. Calculate the mass of sodium sulfate produced when   
15.5 g of sodium hydroxide are reacted with 46.7 g of sulfuric acid. [Hint: which unit is used in all stoichiometry reasoning?]

1. A 22.4 g sample of oxygen gas is placed in a sealed container with 2.50 g of hydrogen gas. The mixture is sparked, producing water vapor. Calculate the mass of water formed. Calculate the number of moles of the excess reactant remaining.



phenylethylamine

1. Neuroscientists believe that the only chemical in chocolate that may have a feel-good effect on the human brain is phenylethylamine (PEA). Although the PEA in chocolate occurs naturally, PEA can be made in the laboratory by the following reaction:

CH5NO2 + C8H8O 🡪 C8H11N + CO2  + H2O

ammonium formate acetophenone phenylethylamine

(PEA)

How much PEA can be made from 75.0g of ammonium formate and 125g of acetophenone? What mass of the excess reactant remains?

4. 27.5 g 5. 22.5 g, 0.075 moles xs 6. 126 g, 9.45g xs