May 21, 2019

1) answers balancing with mass WS
2) Types of Reactions (Combustion)

Test on Chapter 6 Tuesday May 28th!!

Warm-Up

Solution A has a mass of 15g. Solution B has a mass of 11g. When they are mixed together a chemical reaction occurs in which a gas is produced. If the mass of the final mixture is 20g, what mass of gas was produced?

Answers WS

1. Magnesium + Oxygen ------> Magnesium Oxide
   48.6 g + 32.0 g -----> 80.6 g

   A. What is the total mass of the product? 80.6g
   B. What is the total mass of reactants? 80.6g
   C. Does this experimental data support the Law of Conservation of Mass? Explain.

Yes. The Law of Conservation of mass states that mass is neither created or destroyed in a chemical reaction and since the total mass of the reactants and products is equal this supports the law.

2. Consider the following decomposition reaction

   $2\ H_2O_2 \rightarrow 2\ H_2O + O_2$

   ? → 72g + 64g
   → 136g

If 72 grams of water and 64 grams of oxygen are produced, what mass of H_2O_2 decomposed?
Since the mass of the reactants and products must be equal the mass of H_2O_2 that decomposed is 136g

3. Consider the following chemical reaction

   $2\ NaCl + Ca(OH) \rightarrow CaCl2 + 2\ NaOH$

   191g + 74g → ? + 80g
   265g → ? + 80g
   265g – 80g = 185g

If the mass of NaCl reacted is 191 grams and calcium hydroxide 74 grams and 80 grams of sodium hydroxide is produced, what mass of calcium chloride is produced?
The mass of calcium chloride produced is 185g.

4. If 50 grams of sodium reacts with chlorine to form 126 grams of salt. How many grams of chlorine reacted?

   Sodium (Na) + chlorine (Cl_2) → NaCl
   50g + ? → 126g
   126g – 50g = 76g
   76g of chlorine reacted.

5. If 178.8 g of water is separated into hydrogen and oxygen gas, and the hydrogen gas has a mass of 20.0 g. What is the mass of the oxygen gas produced?

   Water (H_2O) → hydrogen (H_2) + oxygen (O_2)
   178.8g → 20.0g + ?
   178.8g – 20.0g = 158.8g
   The mass of oxygen produced is 158.8g.

6. From a laboratory process, a student collects 28.0 g of hydrogen and 224.0 g of oxygen. How much water was originally involved in the process?

   water (H_2O) → Hydrogen (H_2) + oxygen (O_2)
   ? → 28.0g + 224.0g
   ? → 252g
   There was 252 g of water originally involved in the process.

7. A 10 gram sample of iron reacts with oxygen to form 18.2 grams of ferric oxide. How many grams of oxygen reacted?

   Iron (Fe) + oxygen (O_2) → FeO
   10g + ? → 18.2 g
   18.2 g – 10g = 8.2 g
   8.2 g of oxygen reacted.

8. A liquid has a mass of 55g. When it is mixed with a solution, a chemical reaction occurs. If the final total mass of products is 135g what was the mass of the solution?

   Liquid + solution → products
   55g + ? → 135g
   135g – 55g = 80g
   The mass of the solution was 80g.

9. Solution A has a mass of 45g. Solution B has a mass of 62g. When they are mixed, a chemical reaction occurs in which gas is produced. If that mass of the final mixture is 95g, what mass of gas was produced?

   Solution A + Solution B → final mixture
   45g + 62g → 95g
   107g → 95g
   The missing mass is the mass that was a gas and was lost into the atmosphere. Therefore the mass of the gas produced was 12g

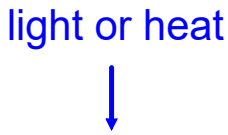
10. In an experiment 25g of magnesium reacts with 73g of hydrogen chloride to produce a gas and 95g of magnesium chloride.
    a. How much gas was produced?

Magnesium (Mg) + hydrogen chloride (HCl) → gas + magnesium chloride ($MgCl_2$)
25g + 73g → ? + 95g
98g → ? + 95g
98g – 95g = 3g.
3 g of gas was produced.

Types of Chemical Reactions

I. Combustion

The reaction of a substance with oxygen to produce oxides and energy.



Ex. fuel + oxygen ⇒ oxides + energy

There are two types of combustion reactions that can happen the reactants can burn completely (**complete combustion**) or when there is not enough oxygen available an (**incomplete combustion**) can occur.

Complete Combustion

Substance being 'burned' completely.

For hydrocarbons, the products will always be carbon dioxide and water vapour.

Ex. butane + oxygen ⇒ carbon dioxide + water vapour

$C_4H_{10} + O_2 \Rightarrow CO_2 + H_2O$ (skeletal)

Incomplete Combustion

Occurs when there is not enough oxygen available to burn a substance completely.

For hydrocarbons, the products will be carbon dioxide, carbon monoxide, carbon and water vapor.

Ex. butane + oxygen ⇒ carbon dioxide + carbon monoxide + carbon + water

$C_4H_{10} + O_2 \Rightarrow CO_2 + CO + C + H_2O$ (skeletal)

Example: Write balanced word and chemical equations to represent the complete combustion of methane (CH_4).

methane + oxygen ⇒ carbon dioxide + water

$CH_4 + 2O_2 \Rightarrow CO_2 + 2H_2O$

Example: Given the following chemical equation write the products of an incomplete combustion and balance the equation.

$\_\_\_C_6H_{14} + \_5\_\_O_2 \Rightarrow CO_2 + CO + 4C + 7H_2O$

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