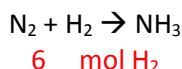


Extra Stoichiometry Practice

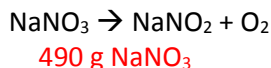
Answers are provided in red for you to check your work. **Make sure all equations are balanced before you begin!**

Part 1. Conversions involving mass and moles.

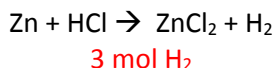
1. How many moles of hydrogen are needed to completely react with two moles of nitrogen in the following reaction?



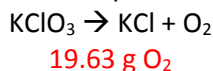
2. Sodium nitrate decomposes to yield sodium nitrite and oxygen gas. What mass of sodium nitrate is needed to yield 2.9 moles of oxygen?



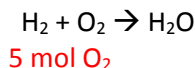
3. How many moles of hydrogen are produced from the reaction of three moles of zinc with an excess of hydrochloric acid?



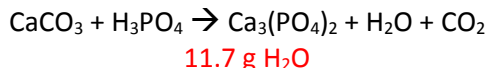
4. Oxygen can be produced by the decomposition reaction of potassium chlorate. How much oxygen (in grams) is produced when 49.89g of potassium chlorate are decomposed?



5. When hydrogen gas reacts with oxygen gas, water vapor is produced. How many moles of oxygen are required to react with 10 moles of hydrogen gas?



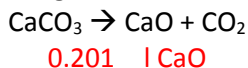
6. Limestone (CaCO₃) will react with most acids to form a calcium salt, water, and carbon dioxide. Determine the amount of water produced if 65.2g of calcium carbonate are allowed to react with excess phosphoric acid according to the following reaction.



7. Potassium chlorate decomposes into potassium chloride and oxygen gas. How many moles of oxygen gas are produced from 3.7 moles of potassium chlorate?



8. Limestone, CaCO₃, can be decomposed with heat to form lime, CaO, and carbon dioxide. How many moles of lime would be formed from the decomposition of 20.1 g of limestone?



9. 4.9 moles of propane (C₃H₈) burns in air (O₂) to yield carbon dioxide and water. What mass of water is produced?



10. Ethanol (C₂H₅OH) burns in oxygen to yield carbon dioxide and water. What mass of carbon dioxide is produced from 12.9 g of ethanol?



11. Calcium oxide reacts with carbon dioxide to yield calcium carbonate. What mass of calcium carbonate will be produced from 10.0 g of calcium oxide?

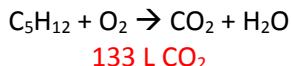


12. If 25.0 g of sodium reacts with chlorine gas, what mass of sodium chloride will be made?



Part 2. Conversions involving energy, volume, mass, and particles.

1. When pentane burns in the presence of oxygen, it produces carbon dioxide and water. If 85.5g of pentane, C₅H₁₂, are burned, how many liters of carbon dioxide are produced at STP?



2. If 10.0g of aluminum chloride are decomposed in the following reaction, how many molecules of Cl₂ are produced?



3. Propane, C_3H_8 burns in oxygen to produce carbon dioxide and water. How many molecules of propane could be combusted by 8.35 L of oxygen at STP?



4.49 10^{22} molecules propane

4. The synthesis of water from its elements releases 572 kJ of energy. The total volume of hydrogen gas needed to fill the Hindenburg was 2.0×10^8 L at STP. How much heat in kJ was evolved when the Hindenburg exploded, assuming all of the hydrogen reacted? $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

2.6×10^9 kJ

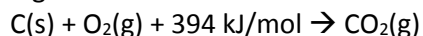
5. The burning of magnesium in oxygen produces 1204 kJ of heat.

a. Write a balanced equation for this process, including the heat in the reaction on the appropriate side, product or reactant $2\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO} + 1204 \text{ kJ}$

b. Give the value and sign for ΔH . Is this reaction endothermic or exothermic? -1204 kJ

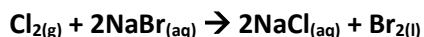
c. How many kilojoules are given off when 6.55 g of Mg react with excess of oxygen gas? 162 kJ

6. How much energy is required when 10.0 g of C reacts to form carbon dioxide according to the equation below?



328 kJ

7. Elemental chlorine oxidizes the bromide ion of sodium bromide as follows:



How many grams of elemental bromine are produced when 25.0 mL of elemental chlorine gas (density 2.898 g/L) is pumped slowly into a large excess of sodium bromide solution?

0.163 g Br_2

8. When nitrogen reacts with hydrogen, ammonia is formed. If 2.5×10^{23} molecules of nitrogen react, what volume of ammonia is produced if the density of ammonia is 2.9 g/mL?

4.9 mL