

CHEM V20 Worksheet

Chapter 8

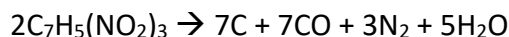
Name: _____

Mol-Mol Conversions

1. Benzene, C₆H₆, is a known carcinogen that burns in air according to the following equation:



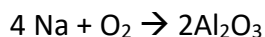
- What is the mol ratio of O₂ to C₆H₆?
 - How many mols of O₂ are required to react with 1.3 mol of C₆H₆?
 - How mols of H₂O can be produced with 53.3 mol of C₆H₆?
2. The balanced equation for the decomposition of TNT, C₇H₅(NO₂)₃, is



- What is the mol ratio of C and CO?
- How many mols of H₂O would form if 2.32 mol of C₇H₅(NO₂)₃ reacts?
- How many mols of C₇H₅(NO₂)₃ are required to produce 0.0424 mol of CO?

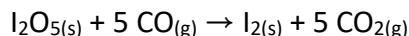
Mass-Mass Conversions

3. When active metals such as sodium are exposed to air, they quickly form a coating of metal oxide. The balanced equation for the reaction of sodium metal with oxygen gas is:



Suppose a sheet of pure aluminum gains 0.0900 g of mass when exposed to air. Assume that this gain can be attributed to its reaction with oxygen. What mass of O₂ reacted with the Al?

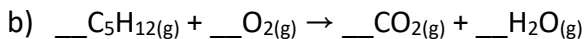
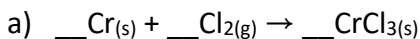
4. Diiodine pentoxide is used in respirators to remove carbon monoxide from air:



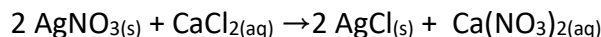
- What mass of carbon monoxide could be removed from air by a respirator that contains 50.0 g of diiodine pentoxide?

b) What mass of I₂ would remain in the respirator?

5. For each of the following unbalanced equations, balance the equation and then determine how many grams of the second reactant would be required to react completely with 0.600 g of the first reactant.

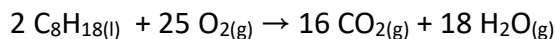


6. When silver nitrate is added to an aqueous solution of calcium chloride, a precipitation reaction occurs that removes the chloride ions from solution.



- a) If a solution contains 10.0 g CaCl₂, what mass of AgNO₃ should be added to remove all of the chloride ions from solution?
- b) When enough AgNO₃ is added so that all 10.0 g of CaCl₂ react, what mass of the AgCl precipitate should form?

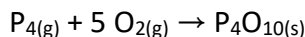
7. The balanced equation for the combustion of octane is:



What mass of oxygen is needed to react with 2.42 Kg of octane?

Limiting Reactants

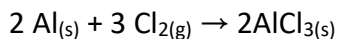
8. The balanced equation for the reaction of phosphorus and oxygen gas to form tetraphosphorus decoxide is:



What is the limiting reactant when each of the following sets of quantities of reactants is mixed?

- a) 0.50 mol P₄ and 5.0 mol O₂
- b) 0.20 mol P₄ and 1.0 mol O₂
- c) 0.25 mol P₄ and 0.75 mol O₂

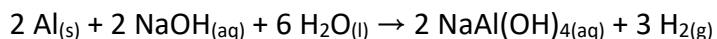
9. The balanced equation for the reaction of aluminum metal and chlorine gas is



Assume that 0.40 g of Al is mixed with 0.60 g of Cl₂.

- What is the limiting reactant?
- What is the maximum amount of AlCl₃, in grams, that can be produced?

10. Certain drain cleaners are a mixture of sodium hydroxide and powdered aluminum. When dissolved in water, the sodium hydroxide reacts with the aluminum and the water to produce hydrogen gas.



The sodium hydroxide helps dissolve grease, and the hydrogen gas provides a mixing and scrubbing action. What mass of hydrogen gas would be formed from a reaction of 2.48g Al and 4.75g NaOH in water?

11. A 5.0-g sample of greenish-yellow Cl₂ gas is added to a 10.0-g sample of gray potassium metal to form a white solid in a sealed container.

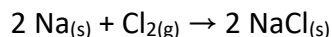
- Write a balanced equation for the combination reaction that should occur.
- Identify the limiting reactant.
- Predict the appearance of the substances left in the reaction container once the reaction is complete.
- Calculate the mass of product that should form.
- What mass of excess reactant should be mixed with the product after the reaction is complete?

Percent Yield

12. A student was synthesizing aspirin in the laboratory. Using the amount of limiting reactant, she calculated the mass of aspirin that should form as 8.95 g. When she weighed her aspirin product on the balance, its mass was 7.44 g.

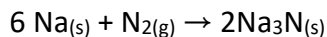
- What is the actual yield of aspirin?
- What is the theoretical yield of aspirin?
- Calculate the percent yield for this synthesis.

13. The combination reaction of sodium metal and chlorine gas to form sodium chloride is represented by the following balanced equation:



If 5.00 g of sodium metal reacts completely with excess chlorine gas, and 11.5 g NaCl is actually obtained, what is the percent yield of sodium chloride?

14. The combination reaction of sodium metal and nitrogen gas to form sodium nitride is represented by the following balanced equation:



If 0.30 mol of Na is mixed with 0.60 mol of N₂, and 0.092 mol of Na₃N is obtained, what is the percent yield for the reaction?

15. The decomposition reaction of calcium carbonate is represented by the following balanced equation:



After a 15.8-g sample of calcium carbonate was heated in an open container to cause decomposition, the mass of the remaining solid was determined to be 8.10g. The student is unsure if the reaction is complete, so the solid could contain unreacted CaCO₃.