MASS MOLE
STOICHIOMETRY WORKSHEET

1. Consider the following reaction:

$$N_2 + 2\ O_2 \rightarrow N_2O_4$$

a. If 15 g of N_2O_4 was produced, how many moles of O_2 were required?

b. If 4×10^{-3} moles of oxygen reacted, how many grams of N_2 were needed?

2. Consider the following reaction:

$$K_3PO_4 + Al(NO_3)_3 \rightarrow 3\ KNO_3 + AlPO_4$$

a. What is the mass of potassium nitrate produced when 2.04 moles of potassium phosphate react?

b. If 5.8 g of aluminum phosphate are formed, how many moles of aluminum nitrate reacted?

3. Consider the following reaction:

$$CaC_2 + 2\ H_2O \rightarrow Ca(OH)_2 + C_2H_2$$

a. If you have 5.5 mol of CaC_2, how much C_2H_2 do you get?

b. How many moles of water are needed when 65 g of CaC_2 have reacted?

4. Hydrogen sulfide gas burns in oxygen to produce sulfur dioxide and water vapor:

$$2\ H_2S\ (g) + 3\ O_2\ (g) \rightarrow 2\ SO_2\ (g) + 2\ H_2O\ (g)$$

What mass of oxygen gas is consumed in a reaction that produces 4.6 mol SO_2?

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Answers

1. Consider the following reaction:

$$N_2 + 2\ O_2 \rightarrow N_2O_4$$

a. If 15 g of N_2O_4 was produced, how many moles of O_2 were required?

15 g N_2O_4 x (1 mol N_2O_4/92 g N_2O_4) x (2 mol O_2/1 mol N_2O_4) = 0.326 mol O_2

b. If 4 x 10^{-3} moles of oxygen reacted, how many grams of N_2 were needed?

4 x 10-3 mol O_2 x (1 mol N_2/2 mol O_2) x (28 g N_2/1 mol N_2) = 0.056 g N_2

2. Consider the following reaction:

$$K_3PO_4 + Al(NO_3)_3 \rightarrow 3\ KNO_3 + AlPO_4$$

a. What is the mass of potassium nitrate produced when 2.04 moles of potassium phosphate react?

2.04 mol K_3PO_4 x (3 KNO_3 mol/1 mol K_3PO_4) x (101.1 g KNO_3/1 mol KNO_3) = 619 g KNO_3

b. If 5.8 g of aluminum phosphate are formed, how many moles of aluminum nitrate reacted?

5.8 g $AlPO_4$ x (1 mol $AlPO_4$/122 g $AlPO_4$) x (1 mol $Al(NO_3)_3$ /1 mol $AlPO_4$) = 0.0475 mol $Al(NO_3)_3$

3. Consider the following reaction:

$$CaC_2 + 2\ H_2O \rightarrow Ca(OH)_2 + C_2H_2$$

a. If you have 5.5 mol of CaC_2, how much C_2H_2 do you get?

5.5 mol CaC_2 x (1 mol C_2H_2/1 mol CaC_2) x (26 g C_2H_2/1 mol C_2H_2) = 143 g C_2H_2

b. How many moles of water are needed when 65 g of CaC_2 have reacted?

65 g CaC_2 x (1 mol CaC_2 /64.1 g CaC_2) x (2 mol H_2O/1 mol C_2H_2) = 2.03 mol H_2O

4. Hydrogen sulfide gas burns in oxygen to produce sulfur dioxide and water vapor:

$$2\ H_2S\ (g) + 3\ O_2\ (g) \rightarrow 2\ SO_2\ (g) + 2\ H_2O\ (g)$$

What mass of oxygen gas is consumed in a reaction that produces 4.6 mol SO_2?

4.6 mol SO_2 x (3 mol O_2/2 mol SO_2) x (32 g O_2/1 mol O_2) = 220.8 g O_2