STOICHIOMETRY Worksheet

1. How many moles of sodium will react with water to produce 4.0 mol of hydrogen in the following reaction?

$$2\ Na\ (s) + 2\ H_2O\ (l) \rightarrow 2\ NaOH\ (aq) + H_2\ (g)$$

2. Ammonia is made industrially by reacting nitrogen and hydrogen under high pressure and temperature and in the presence of a catalyst. The equation is:

$$3\ H_2\ (g) + N_2\ (g) \rightarrow 2\ NH_3\ (g)$$

If 4.0 mol of H_2 react, how many moles of NH_3 will be produced?

3. Phosphorous burns in oxygen to produce phosphorous oxide in the following reaction:

$$4\ P\ (s) + 5\ O_2\ (g) \rightarrow P_4O_{10}\ (s)$$

a. What amount (in moles) of phosphorous will be needed to produce 3.25 mol of P_4O_{10}?

b. How many moles of P_4O_{10} are produced from 2.74 moles of phosphorous?

4. How many moles of lithium chloride will be formed by the reaction of chlorine with 0.046 mol of lithium bromide in the following reaction?

$$2\ LiBr\ (aq) + Cl_2\ (g) \rightarrow 2\ LiCl\ (aq.) + Br_2\ (g)$$

5. Aluminum will react with sulfuric acid in the following reaction.

$$2\ Al\ (s) + 3\ H_2SO_4\ (aq) \rightarrow Al_2(SO_4)_3 + 3\ H_2\ (g)$$

How many moles of H_2SO_4 will react with 18 mol of Al?

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Answers

1. How many moles of sodium will react with water to produce 4.0 mol of hydrogen in the following reaction?

$$2\ Na\ (s) + 2\ H_2O\ (l) \rightarrow 2\ NaOH\ (aq) + H_2\ (g)$$

4 mol H_2 x (2 mol Na/1 mol H_2) = 8 mol Na

2. Ammonia is made industrially by reacting nitrogen and hydrogen under high pressure and temperature and in the presence of a catalyst. The equation is:

$$3\ H_2\ (g) + N_2\ (g) \rightarrow 2\ NH_3\ (g)$$

If 4.0 mol of H_2 react, how many moles of NH_3 will be produced?

4.0 mol H_2 x (2 mol NH_3/3 mol H_2) = 2.67 mol NH_3

3. Phosphorous burns in oxygen to produce phosphorous oxide in the following reaction:

$$4\ P\ (s) + 5\ O_2\ (g) \rightarrow P_4O_{10}\ (s)$$

a. What amount (in moles) of phosphorous will be needed to produce 3.25 mol of P_4O_{10}?

3.25 mol P_4O_{10} x (4 mol P/1 mol P_4O_{10}) = 13 mol P

b. How many moles of P_4O_{10} are produced from 2.74 moles of phosphorous?

2.74 mol P x (1 mol P_4O_{10} /4 mol P) = 0.685 mol P_4O_{10}

4. How many moles of lithium chloride will be formed by the reaction of chlorine with 0.046 mol of lithium bromide in the following reaction?

$$2\ LiBr\ (aq) + Cl_2\ (g) \rightarrow 2\ LiCl\ (aq.) + Br_2\ (g)$$

0.046 mol LiBr x (2 mol LiCl/2 mol LiBr) = 0.046 mol LiCl

5. Aluminum will react with sulfuric acid in the following reaction.

$$2\ Al\ (s) + 3\ H_2SO_4\ (aq) \rightarrow Al_2(SO_4)_3 + 3\ H_2\ (g)$$

How many moles of H_2SO_4 will react with 18 mol of Al?

18 mol Al x (3 mol H_2SO_4/2 mol Al) = 27 mol of H_2SO_4

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