Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Hour: \_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_

**Chemistry: *Quantitative Relationships in Chemical Equations***

When we balance a chemical equation, we are satisfying the law of conservation of mass; that is, we are making sure that there are the same number of atoms of each element on both sides of the equation. The coefficients we place in front of the substances in an equation are very important because they tell us the mole ratio of the substances in that reaction. For instance, the balanced equation…

hydrogen gas + oxygen gas 🡪 liquid water

2 H2(g) + O2(g) 🡪 2 H2O(l)

can be thought of in terms of…

2 moles H2(g) + 1 mole O2(g) 🡪 2 moles H2O(l)

***Directions:***

1. *Balance each equation.*
2. *Solve the problems, assuming that you have excess of the other reactant(s).*

1. \_\_\_\_ Ca(s) + \_\_\_\_ N2(g) 🡪 \_\_\_\_ Ca3N2(s)

a. How many moles of Ca3N2 can be made from 16.8 moles of Ca?

b. If you need to make 34.4 moles of Ca3N2, how many moles of N2 will you need?

2. \_\_\_\_ Fe(s) + \_\_\_\_ O2(g) 🡪 \_\_\_\_ Fe3O4(s)

a. How many moles of O2 will react with 42.5 moles of Fe?

b. If you need to make 1.56 moles of Fe3O4, how many moles of Fe will you need?

3. \_\_\_\_ FeCl2(aq) + \_\_\_\_ KOH(aq) 🡪 \_\_\_\_ Fe(OH)2(s) + \_\_\_\_ KCl(aq)

a. How many moles of KOH will react with 86.2 moles of FeCl2?

b. If you need to make 12.4 moles of KCl, how many moles of FeCl2 will you need?

4. \_\_\_\_ Cu(s) + \_\_\_\_ O2(g) 🡪 \_\_\_\_ Cu2O(s)

a. How many moles of Cu2O can be made from 25.6 moles of Cu?

b. How many moles of O2 does it take to produce 214 moles of Cu2O?

5. \_\_\_\_ K(s) + \_\_\_\_ Cl2(g) + \_\_\_\_ O2(g) 🡪 \_\_\_\_ KClO3(s)

a. How many moles of KClO3 can be made from 89 moles of O2?

b. If you have 24.6 moles of Cl2, how many moles of KClO3 can you produce?

6. \_\_\_\_ NH3(g) + \_\_\_\_ H2S(g) 🡪 \_\_\_\_ (NH4)2S(s)

a. How many moles of (NH4)2S can be made from 15.8 moles of NH3?

b. If you have 462 moles of NH3, how many moles of H2S do you need?

7. \_\_\_\_ Al2O3(s) + \_\_\_\_ H2SO4(aq) 🡪 \_\_\_\_ Al2(SO4)3(aq) + \_\_\_\_ H2O(l)

a. How many moles of Al2(SO4)3 can be made from 6.3 moles of H2SO4?

b. How many moles of Al2O3 does it take to make 7.2 moles of H2O?

c. If you have 588 moles of Al2O3, how many moles of Al2(SO4)3 can you produce?

Answers: 1a. 5.6 mol Ca3N2 3a. 172.4 mol KOH 5a. 59.3 mol KClO3 7a. 2.1 mol Al2(SO4)3

1b. 34.4 mol N2 3b. 6.2 mol FeCl2 5b. 49.2 mol KClO3 7b. 2.4 mol Al2O3

2a. 28.3 mol O2 4a. 12.8 mol Cu2O 6a. 7.9 mol (NH4)2S 7c. 588 mol Al2(SO4)3

2b. 4.68 mol Fe 4b. 107 mol O2 6b. 231 mol H2S

## KEY

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2. \_\_**3**\_ Fe(s) + \_\_**2**\_ O2(g) 🡪 \_\_\_\_ Fe3O4(s)

a. How many moles of O2 will react with 42.5 moles of Fe?



b. If you need to make 1.56 moles of Fe3O4, how many moles of Fe will you need?



3. \_\_\_\_ FeCl2(aq) + \_\_**2**\_ KOH(aq) 🡪 \_\_\_\_ Fe(OH)2(s) + \_\_**2**\_ KCl(aq)

1. How many moles of KOH will react with 86.2 moles of FeCl2?



1. If you need to make 12.4 moles of KCl, how many moles of FeCl2 will you need?



4. \_\_**4**\_ Cu(s) + \_\_\_\_ O2(g) 🡪 \_\_**2**\_ Cu2O(s)

a. How many moles of Cu2O can be made from 25.6 moles of Cu?



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a. How many moles of KClO3 can be made from 89 moles of O2?



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6. \_\_**2**\_ NH3(g) + \_\_\_\_ H2S(g) 🡪 \_\_\_\_ (NH4)2S(s)

a. How many moles of (NH4)2S can be made from 15.8 moles of NH3?



b. If you have 462 moles of NH3, how many moles of H2S do you need?



7. \_\_\_\_ Al2O3(s) + \_\_**3**\_ H2SO4(aq) 🡪 \_\_\_\_ Al2(SO4)3(aq) + \_\_**3**\_ H2O(l)

a. How many moles of Al2(SO4)3 can be made from 6.3 moles of H2SO4?



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