**Quiz 8A**

# Directions: Answer each of the following questions. Be sure to use complete sentences where appropriate. For full credit be sure to show all of your work. Where appropriate answers should be boxed for clarity, written to the correct number of significant figures, and, include the proper units.

1. Consider the reaction of 10.21 g of sodium metal with 12.87 g of chlorine gas to produce sodium chloride (20 points).
	1. What is the initial moles of sodium metal?

$$10.21 g Na×\frac{1 mol Na}{22.990 g Na}=0.4441 mol Na$$

* 1. What is the initial moles of chlorine gas?

$$12.87 g Cl\_{2}×\frac{1 mol Cl\_{2}}{70.806 g Cl\_{2}}=0.1815 mol Cl\_{2}$$

* 1. Complete the following table using the unbalanced equation:

|  |  |  |  |
| --- | --- | --- | --- |
|  | 2 Na  (s) + |  Cl2 (g) → | 2 NaCl (s) |
| I | 0.4441 mol Na | 0.1815 mol Cl2 | 0 mol  |
| C | -2x | -x | +2x |
| E | 0.4441 mol – 2x =0.4441 mol – 2(0.1815 mol) =0.0811 mol  | 0.1815 mol – x =0.1815 mol – 0.1815 mol =0 mol  | 2x = 2(0.1815 mol) =* 1. mol
 |

 Determine the liming reagent by comparing the theoretical mole ratio to the actual mole ratio:

|  |  |  |
| --- | --- | --- |
| Theoretical mole ratio$$\frac{2 mol Na}{1 mol Cl\_{2}}=\frac{2 mol Na}{1 mol Cl\_{2}}$$ | Actual mole ratio$$\frac{0.4441 mol Na}{0.1815 mol Cl\_{2}}=\frac{2.447 mol Na}{1 mol Cl\_{2}}$$ | Limiting reagent isCl2 |

* 1. What does x equal?

$$0.1815 mol-x=0 mol$$

$$0.1815 mol=x$$

* 1. How many grams of sodium chloride could be produced?

$$0.3630 mol NaCl×\frac{58.443 g NaCl}{1 mol NaCl}=21.21 g NaCl$$

* 1. If 10.234 g of sodium chloride is produced, what is the percent yield?

$$\%yield=\frac{m\_{actual}}{m\_{theoretical}}×100=\frac{10.234 g}{21.21 g}×100=48.25\%$$

* 1. How many grams of the excess reagent is left over that the end of the reaction?

$$0.0811 mol Na×\frac{22.990 g Na}{1 mol Na}=1.86 g Na$$