More Stoichiometry Practice... Even more limiting reactants

11. Zinc fluoride and lithium react. Write the equation and balance it.

$$ZnF_2 + 2Li \rightarrow 2LiF + Zn$$

a.) Determine the limiting reagent and the theoretical yield (in grams) of the metal produced if one starts with 1.20 ounces of lithium and 2.40 L of a 3.0 M zinc fluoride solution.

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$$?\,g\,Zn = \frac{1.20\,oz\,Li}{\text{limiting reactant}} \cdot \frac{1\,lb\,Li}{16\,oz\,Li} \cdot \frac{453.59\,g\,Li}{1\,lb\,Li} \cdot \frac{1\,mol\,Li}{6.941\,g\,Li} \cdot \frac{1\,mol\,Zn}{2\,mol\,Li} \cdot \frac{65.39\,g\,Zn}{1\,mol\,Zn} = 160.\,g\,Zn$$

ZnF_2

$$?\,g\,Zn = \frac{2.40\,L}{} \cdot \frac{3.0\,mol\,ZnF_2}{1\,L\,ZnF_2} \cdot \frac{1\,mol\,Zn}{1\,mol\,ZnF_2} \cdot \frac{65.39\,g\,Zn}{1\,mol\,Zn} = 471\,g\,Zn$$

b.) Given that only 132.43 g of the metal were produced, what is the percent yield?

$$\left(\frac{\text{actual}}{\text{theoretical}}\right) \frac{132.43\,g}{160.\,g} \times 100 = 82.8\%$$

c.) How many grams ~~of the reactant in excess will remain? Use the percent yield calculated in part b.~~ of LiF will be produced? (Use % yield above).

$$?\,g\,LiF = \frac{1.20\,oz\,Li}{} \cdot \frac{453.59\,g\,Li}{16\,oz\,Li} \cdot \frac{1\,mol\,Li}{6.941\,g\,Li} \cdot \frac{2(0.828)\,mol\,LiF}{2\,mol\,Li} \cdot \frac{25.939\,g\,LiF}{1\,mol\,LiF}$$

105. g LiF