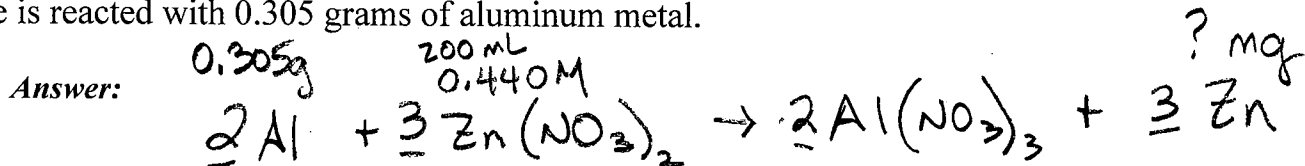


# STOICHIOMETRY - LECTURE NOTES

## Homework Answers (solutions to the homework) (the 4's) - Craig

### EXAMPLE #7:

In a single replacement reaction, aluminum metal replaces zinc in a zinc nitrate solution. Calculate the mass (in mg) of zinc metal produced in this reaction when 200 mL of a 0.440 M solution of zinc nitrate is reacted with 0.305 grams of aluminum metal.

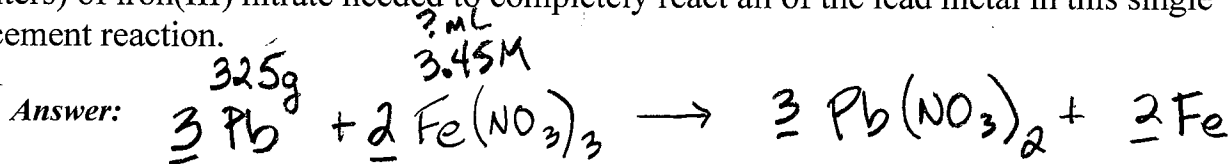


L.R. STEP: 
$$\frac{200 \text{ mL}}{1000 \text{ mL}} \times \frac{1 \text{ L}}{0.440 \text{ mol}} \times \frac{2 \text{ mol Al}}{3 \text{ mol Zn}(\text{NO}_3)_2} \times \frac{26.98 \text{ g}}{1 \text{ mol Al}} = 1.58 \text{ g Al}$$

Al is L.R.! IF ALL 200 mL OF THE 0.440 M  $\text{Zn}(\text{NO}_3)_2$  WERE REACTED, ONE WOULD NEED AT LEAST 1.58g OF Al. We DO NOT HAVE ENOUGH Al.  $\text{Zn}(\text{NO}_3)_2$  IS IN EXCESS.

EXAMPLE #8: 
$$\frac{0.305 \text{ g Al}}{26.98 \text{ g}} \times \frac{1 \text{ mol Al}}{2 \text{ mol Al}} \times \frac{3 \text{ mol Zn}}{1 \text{ mol Zn}} \times \frac{65.39 \text{ g}}{1 \text{ g}} \times \frac{1000 \text{ mg}}{1 \text{ g}} = 1.11 \times 10^3 \text{ mg}$$

325 grams of lead metal is mixed with a 3.45 M solution of iron(III) nitrate. Calculate the volume (in milliliters) of iron(III) nitrate needed to completely react all of the lead metal in this single replacement reaction.



- NOT A L.R. PROBLEM!
- START WITH THE "SET" THAT IS COMPLETE!

$$\frac{325 \text{ g}}{207.2 \text{ g}} \times \frac{1 \text{ mol Pb}}{3 \text{ mol Pb}} \times \frac{2 \text{ mol Fe}(\text{NO}_3)_3}{1 \text{ mol Fe}(\text{NO}_3)_3} \times \frac{L}{3.45 \text{ mol Fe}(\text{NO}_3)_3} \times \frac{1000 \text{ mL}}{1 \text{ L}} = 303 \text{ mL Fe}(\text{NO}_3)_3$$

3.45 M