

1. Nitrogen and hydrogen react to form ammonia gas according to the following equation.



- a. If 56.0 grams of nitrogen are used up by the reaction, how many grams of ammonia will be produced?

$$\frac{17.04 \text{ g NH}_3}{1 \text{ mol NH}_3} \left| \frac{2 \text{ mol NH}_3}{1 \text{ mol N}_2} \right| \frac{1 \text{ mol N}_2}{28.02 \text{ g N}_2} \left| 56.0 \text{ g N}_2 \right| = \boxed{68.1 \text{ g NH}_3}$$

- b. How many grams of hydrogen must react if the reaction needs to produce 63.5 grams of ammonia?

$$\frac{2.02 \text{ g H}_2}{1 \text{ mol H}_2} \left| \frac{3 \text{ mol H}_2}{2 \text{ mol NH}_3} \right| \frac{1 \text{ mol NH}_3}{17.04 \text{ g NH}_3} \left| 63.5 \text{ g NH}_3 \right| = \boxed{11.3 \text{ g H}_2}$$

2. Aluminum metal reacts with zinc chloride to produce zinc metal and aluminum chloride.



- a. A mass of 45.0 grams of aluminum will react with how many grams of zinc chloride?

$$\frac{136.29 \text{ g ZnCl}_2}{1 \text{ mol ZnCl}_2} \left| \frac{3 \text{ mol ZnCl}_2}{2 \text{ mol Al}} \right| \frac{1 \text{ mol Al}}{26.98 \text{ g Al}} \left| 45.0 \text{ g Al} \right| = \boxed{341 \text{ g ZnCl}_2}$$

- b. What mass of aluminum chloride will be produced if 22.6 grams of zinc chloride are used up in the reaction?

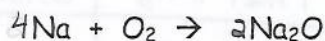
$$\frac{133.33 \text{ g AlCl}_3}{1 \text{ mol AlCl}_3} \left| \frac{2 \text{ mol AlCl}_3}{3 \text{ mol ZnCl}_2} \right| \frac{1 \text{ mol ZnCl}_2}{136.29 \text{ g ZnCl}_2} \left| 22.6 \text{ g ZnCl}_2 \right| = \boxed{14.7 \text{ g AlCl}_3}$$

3. For the reaction whose ^{WR} balanced equation is as follows, find the number of grams of I₂ that will be formed when 300.0 g of bromine react.



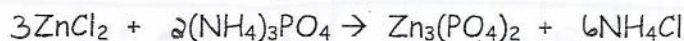
253.80 g I ₂	1 mol I ₂	1 mol Br ₂	300.0 g Br ₂	
1 mol I ₂	1 mol Br ₂	159.80 g		= 476.5 g I ₂

4. For the reaction whose ^{WR} balanced equation is as follows, find the number of grams of sodium that must react to produce 42.0 grams of sodium oxide.



22.99 g Na	4 mol Na	1 mol Na ₂ O	42.0 g Na ₂ O	
1 mol Na	2 mol Na ₂ O	61.98 g Na ₂ O		= 31.2 g Na

5. For the reaction whose ^{WR} balanced equation is as follows, find how many grams of zinc phosphate will be produced by the reaction of 5.00 grams of ammonium phosphate.



386.11 g Zn ₃ (PO ₄) ₂	1 mol Zn ₃ (PO ₄) ₂	1 mol (NH ₄) ₃ PO ₄	5.00 g (NH ₄) ₃ PO ₄	
1 mol Zn ₃ (PO ₄) ₂	2 mol (NH ₄) ₃ PO ₄	149.12 g (NH ₄) ₃ PO ₄		= 6.47 g Zn ₃ (PO ₄) ₂