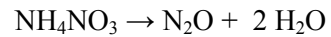
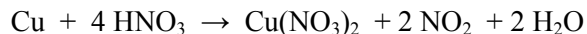




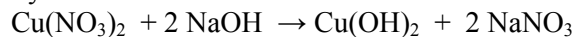
3. Laughing gas,  $\text{N}_2\text{O}$ , can be made by the thermal decomposition of ammonium nitrate according to the below equation. How many grams of laughing gas can be obtained from 18.5 g of ammonium nitrate?



4. A copper wire weighed 3.25 g is dissolved in nitric acid according to the reaction equation:



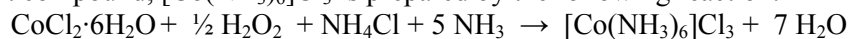
Sodium hydroxide is added to the above solution containing copper(II) nitrate and  $\text{Cu}(\text{OH})_2$  is formed.



The solution is then heated and  $\text{Cu}(\text{OH})_2$  decomposes to  $\text{CuO}$ .  $\text{Cu}(\text{OH})_2 \rightarrow \text{CuO} + \text{H}_2\text{O}$

How many grams of  $\text{CuO}$  can be produced by this process?

5. A cobalt compound,  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$  is prepared by the following reaction:



How many grams of  $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$  can be produced from 0.123 mole of  $\text{NH}_3$  if the quantity of the other reactants are more than sufficient and the reaction goes to completeness?

6. Glucose can be converted into ethanol and carbon dioxide by fermentation. If the reaction goes to completion, how many liters of ethanol can be produced from 500. g of glucose? Density of ethanol is 0.789 g/mL.



7. The molecular formula of the iron core in ferritin is  $[\text{FeO}(\text{OH})]_8\text{FeO}(\text{H}_2\text{PO}_4)$ . What is the molarity of  $\text{Fe}^{3+}$  ions if 1.00 mg of the iron core dissolves in acid to make 500. mL of solution?
8. A solution containing  $\text{NaCl}$ ,  $\text{MgCl}_2$ , and  $\text{AlCl}_3$ . Given that the molarity of chloride ions in the solution is 1.00 M, the molarity of  $\text{Na}^+$  and  $\text{Mg}^{2+}$  is 0.200 M and 0.300 M respectively. What is the molarity of  $\text{Al}^{3+}$  in the solution?
9. 40.00 mL of 0.300 M sodium sulfate,  $\text{Na}_2\text{SO}_4$ , solution is added to 70.00 mL of 0.200 M aluminum sulfate,  $\text{Al}_2(\text{SO}_4)_3$ , solution. (No reaction occurs.)
- Calculate the molarity of the sulfate ions in the resultant solution.
  - Calculate the number of moles of barium ions needed in order to precipitate all the sulfate ions from the above solution.
  - If the source of barium ions is a 0.150M barium chloride solution, calculate the volume of the barium chloride solution needed in order to precipitate all the sulfate ions from the solution.

10. 255 mL of 0.100 M nitric acid is added to 745 mL of 0.200 M nitric acid. What is the molarity of nitric acid in the resultant solution?

11. The concentrated hydrochloric acid in the stockroom is 36.0% HCl by mass. Given that the density of this acid is 1.18 g/mL.

a) How many gram of HCl in 800. mL of this acid?

b) What is the molarity of this acid?

12. If 70.0 mL of the hydrochloric acid in Question 10 is diluted to 100. mL, what is the molarity of HCl in the diluted solution?