New Chapter 10 Blackboard Homework Questions
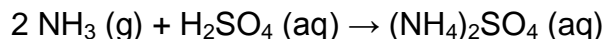
1. The fertilizer ammonium sulfate, $(NH_4)_2SO_4$, is prepared by the reaction of ammonia, NH_3, with sulfuric acid:

   $2 NH_3$ (g) + H_2SO_4 (aq) → $(NH_4)_2SO_4$ (aq)

   How many moles of ammonium sulfate are produced if 1.50 moles of ammonia gas react completely at STP?

2. Use the chemical equation in problem #1 to determine how many moles of ammonia are required to react with 2.50 moles of sulfuric acid.

3. Use the chemical equation in problem #1 to determine the mass of ammonium sulfate produced if 50.0 L of ammonia gas react completely at STP.

4. Use the chemical equation in problem #1 to determine the volume (in L) of ammonia gas required to produce 150.0 g of ammonium sulfate at STP.

5. Propane, C_3H_8 (g), burns in oxygen to produce carbon dioxide gas and steam:

   C_3H_8 (g) + $5 O_2$ (g) → $3 CO_2$ (g) + $4 H_2O$ (g)

   How many moles of oxygen gas are required to react with 5.00 moles of propane?

6. Use the chemical equation in problem #5 to determine how many moles of steam are produced when 10.0 moles of oxygen react completely.

7. Use the chemical equation in problem #5 to determine what volume (in L) of carbon dioxide gas is produced when 5.00 g of propane is burned at STP.

8. Use the chemical equation in problem #5 to determine what mass of propane must have burned to produce 75.0 L of steam at STP.

9. Use the chemical equation in problem #5 to determine what mass of steam is produced when 11.5 g of oxyen react completely.

10. Fermentation is a complex chemical process of making wine by converting glucose into ethanol and carbon dioxide:

$C_6H_{12}O_6$ (s) → 2 C_2H_5OH (l) + 2 CO_2 (g)
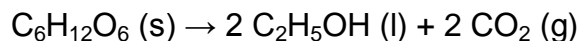
Calculate the mass of ethanol produced if 5.00 g of glucose decomposes completely.

11. Use the chemical equation in problem #10 to calculate the volume of carbon dioxide gas produced at STP when 100.0 g of glucose reacts.

12. Nitric oxide, NO (g), reacts with oxygen according to the following equation:

2 NO (g) + O_2 (g) → 2 NO_2 (g)
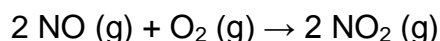
How many moles of NO_2 are produced from 30.0 moles of oxygen?

13. Use the chemical equation in question #12 to calculate the mass of O_2 that must have reacted to produce 85.0 g of NO_2.

14. Consider the reaction between lead (II) nitrate and potassium iodide:

$Pb(NO_3)_2$ (aq) + 2 KI (aq) → PbI_2 (s) + 2 KNO_3 (aq)
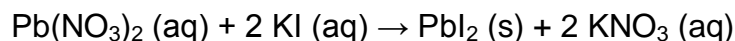
What is the precipitate produced in this reaction?

15. Use the chemical equation in question #14 to calculate the moles of KNO_3 produced from 15.0 moles of lead(II) nitrate.

16. Use the chemical equation in question #14 to calculate the mass of PbI_2 produced from 75.00 g of potassium iodide.

17. Calculate the number of moles of Al that will react with 5.0 moles of HCl. Balance first!
___ Al(s) + ___ HCl(aq) ⟶ ___ $AlCl_3$(aq) +   ___ H_2(g)
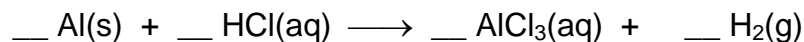
18. Use the chemical equation in question #17 to calculate the mass of $AlCl_3$ produced from 25.0 g of hydrochloric acid.

19. Use the chemical equation in question #17 to calculate the liters of of hydrogen gas produced from 15.00 g of aluminum.

20. Use the chemical equation in question #17 to calculate the mass of aluminum that must have reacted to produce 18.0 grams of hydrogen gas.