These problems are intended to ***supplement*** the problems in the textbook, not ***replace*** them.

Questions – Stoichiometry Only

I. 1.562 M barium hydroxide is used to neutralize a nitric acid solution.

1. Write a balanced chemical equation for the reaction that occurs.
2. What mass of water will be produced if 15.00 mL of barium hydroxide solution is used ?
3. What mass of the salt is produced when 15.00 mL of barium hydroxide solution is used ?
4. Calculate the concentration of the nitric acid solution if 15.00 mL of barium hydroxide solution just neutralizes 25.00 mL of the nitric acid solution.

II. 10.00 mL of a sodium hydroxide solution is titrated with 0.2364 M phosphoric acid

5. Write a balanced chemical equation for the reaction that occurs.
6. What is the concentration of the base solution if 45.62 mL of the acid solution is required ?
7. What volume of phosphoric acid solution is needed if the sodium hydroxide solution is 2.00 M ?

III. Hydrogen gas is bubbled through 5.0 L of 6.00 M gold(III) iodide.

8. Write a balanced chemical equation for the reaction that occurs.
9. What mass of gold (in pounds) is produced if all of the gold(III) iodide reacts ?
10. What is the concentration of acid produced (assuming the volume does not change) ?

Questions – Stoichiometry and Limiting Reactant

IV. 50.0 grams each of potassium phosphate and strontium bromide are mixed into a solution whose total volume is 12.50 liters.

11. Write a balanced chemical equation for the reaction that occurs.
12. Which reactant is limiting and which is in excess ?
13. How many grams of the excess reactant will be left over ?
14. What is the final molarity of potassium bromide (assuming the volume does not change)?

V. 100.0 mL of 2.64 M aluminum chloride and 75.0 mL of 6.25 M calcium hydroxide are combined.

15. Write a balanced chemical equation for the reaction that occurs.
16. What is the final concentration of calcium chloride (assuming volumes are additive)?
17. How much (grams) of each reactant is left over ?
18. What is the theoretical yield (grams) of aluminum hydroxide ?
19. What is the percent yield of aluminum hydroxide if 14.4 g are actually produced ?

VI. 1.753 g of zinc is added to 90.00 mL of 0.634 M silver acetate.

20. Write a balanced chemical equation for the reaction that occurs.
21. Which reactant is limiting ?
22. How many grams of each product will be formed ?
23. How many grams of each reactant will be left over ?
24. What is the final concentration of all soluble reactants and products ?

VII. The mass percent of chloride ion in a 25.00 mL sample of seawater was determined by titrating the sample with silver nitrate, causing precipitation of silver chloride. It requires 42.58 mL of 0.2997 M silver nitrate solution to reach the equivalence point.

25. Write a balanced chemical equation for the reaction that occurs.
26. What is the mass % of chloride ion in the water (density of the solution is 1.025 g/mL) ?

Answers

If you cannot figure out how to get the correct answer, go to your instructor, Science Tutoring Center, SI, etc.

NOTE: if your answer is different only in the last decimal place, then you probably rounded off at different points during the calculations. Don't be concerned about this.

NOTE: molar mass values were taken from the CHE 111 Lab Manual and used without rounding

1. $Ba(OH)_2(aq) + 2\ HNO_3(aq) \rightarrow Ba(NO_3)_2(aq) + 2\ H_2O(l)$
2. 0.8444 g H_2O
3. 6.123 g $Ba(NO_3)_2$
4. 1.874 M HNO_3
5. $3\ NaOH(aq) + H_3PO_4(aq) \rightarrow Na_3PO_4(aq) + 3\ H_2O(l)$
6. 3.235 M NaOH
7. 28.2 mL H_3PO_4 solution
8. $3\ H_2(g) + 2\ AuI_3(aq) \rightarrow 2\ Au(s) + 6\ HI(aq)$
9. 13 lb. Au
10. 18 M HI
11. $2\ K_3PO_4(aq) + 3\ SrBr_2(aq) \rightarrow 6\ KBr(aq) + Sr_3(PO_4)_2(s)$
12. $SrBr_2$ is limiting and K_3PO_4 is in excess
13. 21.4 g K_3PO_4
14. 0.0323 M KBr
15. $2\ AlCl_3(aq) + 3\ Ca(OH)_2(aq) \rightarrow 2\ Al(OH)_3(s) + 3\ CaCl_2(aq)$
16. 2.26 M $CaCl_2$
17. 0 g $AlCl_3$ and 5.4 g $Ca(OH)_2$
18. 20.6 g $Al(OH)_3$
19. 69.9%
20. $Zn(s) + 2\ AgC_2H_3O_2(aq) \rightarrow Zn(C_2H_3O_2)_2(aq) + 2\ Ag(s)$
21. zinc
22. 4.919 g $Zn(C_2H_3O_2)_2$ and 5.784 g Ag
23. 0 g Zn and 0.57 g $AgC_2H_3O_2$
24. 0.039 M $AgC_2H_3O_2$ and 0.2979 M $Zn(C_2H_3O_2)_2$
25. $Cl^{1-}(aq) + AgNO_3(aq) \rightarrow AgCl(s) + NO_3^{1-}(aq)$
26. 1.765%