

9. What is the mass of  $3.04 \times 10^{-4}$  mol of baking soda,  $\text{NaHCO}_3$ ?  $2.55 \times 10^{-2}$  g
10. How many moles of iron(III) acetate have a mass of  $1.36 \times 10^3$  g?  $5.84$  mol
11. How many moles of chlorine atoms are present in a  $9.2 \times 10^{-2}$  g sample of zirconium(IV) chloride,  $\text{ZrCl}_4$ ?  $1.6 \times 10^{-3}$  mol
12. What mass of sodium carbonate decahydrate contains  $5.47 \times 10^{23}$  atoms of oxygen?  $20.0$  g
13. A 5.00 g sample is 88.4% zinc hydroxide. How many atoms of zinc are in this sample?  $(2.68 \times 10^{22}$  atoms)
14. What mass of carbon is found in  $8.25 \times 10^{-6}$  mol of  $\text{CaC}_2$ ?  $1.98 \times 10^{-4}$  g
15. Sample A is 90.2%  $\text{Fe}_3\text{O}_4$  and has a mass of 4.82 g. Sample B is 100.0% ferric hydroxide and has a mass of 6.0 g. Show, by calculation, which sample contains more atoms of iron.  
A:  $3.39 \times 10^{22}$  atoms  
B:  $3.38 \times 10^{22}$  atoms
16. A sample of coal is 2.81% sulfur by mass. How many moles of sulfur are present in 5.00 t of the sample?  $4.38 \times 10^3$  mol

17. A salt solution has a concentration of 1.00 mol/L. What volume of this solution is needed to prepare 2.00 L of a solution that has a concentration of 0.655 mol/L?  $1.31$  L  
 $C_1V_1 = C_2V_2$
18. A 10.00 g sample of  $\text{CaCl}_2$  is added to water to make 100.0 mL of solution. Then a 400.0 mL sample of water is added to this solution. Determine the concentration of  $\text{Cl}^-$  ions in the diluted solution.  $C = \frac{n}{V} = 0.360 \frac{\text{mol}}{\text{L}}$
19. A 50.0 mL sample of 0.85 mol/L  $\text{NaHCO}_3$  is diluted to a volume of 250.0 mL. Then a 50.0 mL sample of this dilute solution is evaporated to dryness. What mass of  $\text{NaHCO}_3$  remains?  $C = \frac{n}{V} = 0.719$
20. What volume of 0.502 mol/L KOH solution must be diluted to prepare 1.500 L of 0.100 mol/L KOH?  $C_1V_1 = C_2V_2 = 0.299$  L
21. A 500.0 mL sample of a  $1.02 \times 10^{-4}$  mol/L lead(II) acetate solution evaporates to dryness. What mass of  $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$  remains?  $C = \frac{n}{V} = 1.66 \times 10^{-2}$  g

omit 22. A 13.6 g sample of NaCl and a 7.34 g sample of  $\text{CaCl}_2$  are dissolved in water to make 200.0 mL of solution. What is the concentration of  $\text{Cl}^-$  in this solution?  $(1.82 \text{ mol/L})$

23. A 50.0 g sample of  $\text{Al}(\text{NO}_3)_3$  is dissolved in water to prepare 1500.0 mL of solution. What is the concentration, in mol/L, of  $\text{NO}_3^-$  ions in the solution?  $0.470 \text{ mol/L}$
24. What condition must exist for the concentration of a solution expressed as m/m percent to be the same as its concentration expressed as m/v percent?  $\text{volume} = \text{mass}$  or both same
25. A sample of lead nitrate, with a mass of 0.00372 g, is completely dissolved in 250.0 mL of water. Assume that no change in volume occurs. Calculate the following concentrations.  
(a) the concentration of the solution, expressed in mol/L  $4.49 \times 10^{-5} \text{ mol/L}$   
(b) the concentration of  $\text{Pb}^{2+}$ , expressed in ppm  $\text{m/m} \% = 1.49 \times 10^{-3} \text{ m/m} \%$   
(c) the concentration of the solution, expressed as m/m percent

26. In the smelting process, iron(II) sulfide is converted to iron(III) oxide. The balanced chemical equation is given below.  
 $4\text{FeS}_{(s)} + 7\text{O}_{2(g)} \rightarrow 2\text{Fe}_2\text{O}_{3(s)} + 4\text{SO}_{2(g)}$   
Calculate the mass of  $\text{Fe}_2\text{O}_{3(s)}$  that is produced when 37.62 g of FeS and 22.56 g of  $\text{O}_2$  are allowed to react.  $32.17$  g

L.R. mass

L.R. Solutions

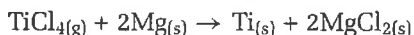
27. 40.00 mL of 0.0256 mol/L gold(III) chloride is treated with 85.00 mL of 0.105 mol/L potassium iodide.



What is the theoretical yield of Au(s) produced?

0.332g

28. When 300.0 mL of  $\text{TiCl}_4(g)$ , at 48.0°C and a pressure of 105.3 kPa, is reacted with 0.4320 g of magnesium, 0.4016 g of titanium is produced.



Calculate the percentage yield for this reaction.

Done already (94.43%)

29. When a sample of solid potassium chlorate is heated strongly, a decomposition reaction occurs. Solid potassium chloride and oxygen gas are produced.

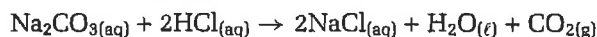
(a) Write the balanced equation for this reaction.



(b) When this reaction was carried out, a mass of 3.78 g of potassium chloride remained after 7.62 g of potassium chlorate decomposed. Calculate the percentage yield of potassium chloride.

81.5%

30. Sodium carbonate reacts with dilute hydrochloric acid, as shown by the following equation.



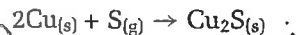
(a) A chemist dissolves an impure sample of  $\text{Na}_2\text{CO}_3$ , with a mass of 0.250 g, in water. The chemist determines that 30.4 mL of 0.151 M HCl reacts with the  $\text{Na}_2\text{CO}_3$  sample. Calculate the percentage purity of the sample.

97.6%

(b) What volume of  $\text{CO}_2$  is produced, at 21.5°C and a pressure of 104.0 kPa, in the reaction described in part (a)?

$$PV = nRT \quad 54.2 \text{ mL}$$

31. When 15.0 g of copper and 4.83 g of sulfur are heated, a 13.7 g mass of copper(I) sulfide is produced.



What is the percentage yield of  $\text{Cu}_2\text{S}$ ?

72.9%

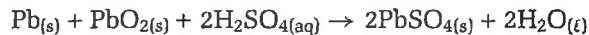
32. 130.4 mL of 0.459 mol/L  $\text{AgNO}_3$  and 85.23 mL of 0.251 mol/L  $\text{AlCl}_3$  are mixed.



What mass of  $\text{AgCl}_{(s)}$  precipitates?

8.57g

33. The following reaction occurs when a lead storage battery in a car is discharging.



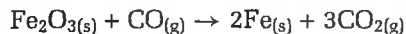
(a) A 3.850 g sample of  $\text{PbO}_2$  reacts completely with 2.710 mL of  $\text{H}_2\text{SO}_4$ . Calculate the concentration of  $\text{H}_2\text{SO}_4$ .

11.88 mol/L

(b) What mass of  $\text{PbSO}_4$  is produced when 30.00 g of  $\text{H}_2\text{SO}_4$  and 13.6 g of Pb react?

39.89

34. A sample of iron(III) oxide, with a mass of 325.0 g reacts with 90.75 L of carbon monoxide at 500.0°C and 1.216 atm.



(a) If a 185.0 g mass of iron is produced, what is the percentage yield for the reaction?

95.26%

(b) What mass of reactant remains after the reaction stops?

47.3g  $\text{Fe}_2\text{O}_3$

35. The following reaction gives a 45.0% yield of manganese.



What mass of  $\text{Mn}_{(s)}$  is produced when a 200.0 g sample of  $\text{Al}_{(s)}$  reacts with 300.0 g of  $\text{MnO}_{(s)}$ ?

105g

36. What volume of 0.472 mol/L  $\text{AgNO}_3$  will precipitate the chloride ion in 40.0 mL of 0.183 mol/L  $\text{AlCl}_3$ ?

46.6 mL

L.R. (mass)

L.R. (sol'n)