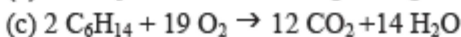
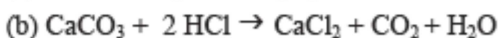
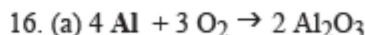
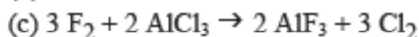
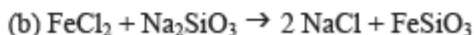
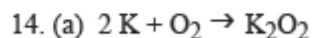


Chapter 5 Homework Key

Items boxed in purple were graded out of two points each, with two points earned for a correct answer and one point earned for a reasonable, but incorrect, attempt. Four points were awarded for submission of a completed assignment.

10, 14, 16, 24, 28, 30, 33, 38, 40, 42, 46, 54, 59, 64, 68

10. Fe: 4 C: 36 H: 36 O: 48



24. (a) $6.02 \times 10^{23} \times 3 = 1.81 \times 10^{24}$ calcium ions

(b) $6.02 \times 10^{23} \times 2 = 1.20 \times 10^{24}$ nitride ions

28. (a) $\text{Bi}_2\text{O}_3: 2(209.0 \text{ g/mol}) + 3(16.0 \text{ g/mol}) = 466.0 \text{ g/mol}$

(b) $\text{CuSO}_4: 63.6 \text{ g/mol} + 32.1 \text{ g/mol} + 4(16.0 \text{ g/mol}) = 159.7 \text{ g/mol}$

(c) $\text{Ca}(\text{CH}_3\text{COO})_2: 40.1 \text{ g/mol} + 4(12.0 \text{ g/mol}) + 6(1.0 \text{ g/mol}) + 4(16.0 \text{ g/mol}) = 158.1 \text{ g/mol}$

(d) $(\text{NH}_4)_2\text{C}_2\text{O}_4: 2(14.0 \text{ g/mol}) + 8(1.0 \text{ g/mol}) + 2(12.0 \text{ g/mol}) + 4(16.0 \text{ g/mol}) = 124.0 \text{ g/mol}$

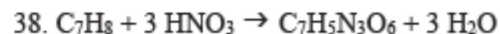
30. (a) $4.61 \text{ mol} \times 137.2 \text{ g/mol} = 633 \text{ g}$

(b) $6.15 \text{ mol} \times 152.0 \text{ g/mol} = 935 \text{ g}$

(c) $0.158 \text{ mol} \times 221.9 \text{ g/mol} = 35.1 \text{ g}$

33. (a) $\frac{28.02 \text{ g N}}{164.10 \text{ g Ca}(\text{NO}_3)_2} \times 100\% = 17.1\% \text{ N}$

(b) $\frac{14.01 \text{ g N}}{53.4 \text{ g NH}_4\text{Cl}} \times 100\% = 26.2\% \text{ N}$



(a) 3 mol of HNO_3 are required for every mol C_7H_8 consumed

$256 \text{ g C}_7\text{H}_8 / 92.0 \text{ g/mol} = 2.78 \text{ mol C}_7\text{H}_8$

$2.78 \text{ mol C}_7\text{H}_8 \times 3 \text{ mol HNO}_3 / 1 \text{ mol C}_7\text{H}_8 = 8.34 \text{ mol HNO}_3$

$8.34 \text{ mol HNO}_3 \times 63.0 \text{ g/mol} = 525 \text{ g HNO}_3$ required

(b) 1 mol of $\text{C}_7\text{H}_5\text{N}_3\text{O}_6$ is produced for every mol C_7H_8 consumed

$951 \text{ g C}_7\text{H}_8 / 92.0 \text{ g/mol} = 10.3 \text{ mol C}_7\text{H}_8$

$10.3 \text{ mol C}_7\text{H}_8 \times 1 \text{ mol C}_7\text{H}_5\text{N}_3\text{O}_6 / 1 \text{ mol C}_7\text{H}_8 = 10.3 \text{ mol C}_7\text{H}_5\text{N}_3\text{O}_6$

$10.3 \text{ mol C}_7\text{H}_5\text{N}_3\text{O}_6 \times 227.0 \text{ g/mol} = 2340 \text{ g C}_7\text{H}_5\text{N}_3\text{O}_6$ produced

40. $M = n/V$

(a) $2.82 \text{ mol} / 5.75 \text{ L} = 0.490 \text{ M}$

(b) $2.22 \text{ mol} / 0.1933 \text{ L} = 11.5 \text{ M}$

$$42. M = n/V$$

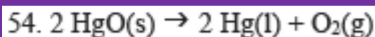
$$n = MV$$

$$(a) 0.167 M \times 0.250 L = 0.0418 \text{ mol} \times 294.2 \text{ g/mol} = 12.3 \text{ g K}_2\text{Cr}_2\text{O}_7$$

$$(b) 0.0200 M \times 0.625 L = 0.0125 \text{ mol} \times 158.0 \text{ g/mol} = 1.98 \text{ g KMnO}_4$$

$$46. (a) (35.0 \text{ mL}/700 \text{ mL}) \times 100\% = 5.00\%$$

$$(b) (85.9 \text{ mL}/1550 \text{ mL}) \times 100\% = 5.54\%$$



$$18.0 \text{ g HgO}/216.6 \text{ g/mol} = 0.0831 \text{ mol HgO}$$

$$0.0831 \text{ mol HgO} \times 1 \text{ mol O}_2/2 \text{ mol HgO} = 0.0416 \text{ mol O}_2$$

$$0.0416 \text{ mol O}_2 \times 32.00 \text{ g/mol} = 1.33 \text{ g O}_2 \text{ produced}$$

$$59. \frac{16 \text{ - fl. oz}}{1 \text{ - fl. oz}} \times 29.6 \text{ mL} = 473.6 \text{ mL} \times \frac{1.00 \text{ g}}{1 \text{ mL}} \times 0.030 = 14 \text{ g H}_2\text{O}_2$$

$$14 \text{ g H}_2\text{O}_2 \times \frac{1 \text{ mol}}{34.0 \text{ g}} = 0.41 \text{ mol H}_2\text{O}_2$$

$$64. 31.7 \text{ g H}_2\text{C}_2\text{O}_4 \times \frac{1 \text{ mol}}{90 \text{ g}} = 0.352 \text{ mol}$$

$$M = \frac{n}{V} \quad V = \frac{n}{M} = \frac{0.352 \text{ mol}}{0.859 \text{ M}} = 0.410 \text{ L}$$

$$67. 236 \text{ mL} \times \frac{1.00 \text{ g}}{1 \text{ mL}} = 236 \text{ g} \times \frac{1 \text{ mol}}{18 \text{ g}} = 13.1 \text{ mol}$$

$$13.1 \text{ mol} \times \frac{6.02 \times 10^{23} \text{ molecules}}{1 \text{ mol}} = 7.89 \times 10^{24} \text{ molecules in 1 cup}$$

$$1.47 \times 10^9 \text{ km}^3 \times \frac{1 \times 10^{15} \text{ cm}^3}{1 \text{ km}^3} = 1.47 \times 10^{24} \text{ cm}^3 \times \frac{1 \text{ cup}}{236 \text{ cm}^3} = 6.23 \times 10^{21} \text{ cup}$$

$$68. \frac{500 \text{ mL}}{1 \times 10^{24} \text{ mL}} \times 500 \text{ mL} \times 0.056 \text{ mol/mL} \times 6.02 \times 10^{23} \text{ molecules/mole} = 8430 \text{ molecules}$$