Level 3: Sig. Figs

1. a. 3; b. 6; c. 5; d. 9; e. 2; f. 4; g. 5; h. 3; i. 4; j. 3
2. a. 90 cm; b. 72.70 m; c. 20.78 cm; d. 1.32×10^{-2} cm; e. 2.30×10^{4} m; f. 73 cm; g. 9100 m; h. 0.0224 cm; i. 2.2×10^{-2} g; j. 4.5×10^{5} km;
3. a. 12 cm^2; b. 10 cm^2; c. 3×10^{7} m^2; d. 3.3×10^{-8} m^2; e. 0.35 mm^2; f. 0.0050 mm; g. 14 km; h. 0.507 mm^2; i. 56 m; j. 7.84×10^{-3} m^2

Level 3: Dimen. Analysis

1. 92,100 cg; 2. 325 cm; 3. 0.30346 pt; 4. 16.0 m/s; 5. 849 lbs/ft^3; 6. 6.72×10^{20} atoms; 7. 1.7×10^{-4} L; 7.5×10^{-6} mol; 8. 79.5 sec; 9. 6.7×10^{8} mi/hr; 10. 1.3 mol/L; 11. 8.8 mL; 12. 1.08×10^{6} μg/person

Level 3: Expo. Not.

1. a. 7.589×10^{4}; b. 10^{0}; c. 1.89×10^{-4}; d. (no representation); e. -4.5×10^{7}; f. 8.75×10^{0}; g. -6.895×10^{-6}; h. 1.005005×10^{8}; i. 6.09866×10^{-7}; j. 1.25×10^{19}
2. a. 0.000,000,000,000,003907; b. 1,889,00; c. 0.0005778; d. 1.255; e. 0.000,000,0854; f. 387; g. 0.00552; h. 0.000,005555; i. 0.000,035882; j. 4,778,000,000
3. a. 2.1432×10^{7}; b. 1.2375×10^{5}; c. 3.9672×10^{9}; d. 4.0581×10^{6}; e. 7.317405×10^{17}; f. 4.777×10^{-7}; g. 6.528×10^{11}; h. 1.6454×10^{-7}

Level 3: Chem. Form.

1. $Pb(HCO_3)_2$; 2. $Mn(C_2H_3O_2)_2$; 3. Na_2HPO_4; 4. $HBrO_4$; 5. $CuSO_4 \cdot 5H_2O$; 6. P_2O_5; 7. $(NH_4)_2Cr_2O_7$; 8. NaCNO; 9. HClO; 10. $Au_2(SO_4)_3$; 11. $Fe_4[Fe(CN)_6]_3$; 12. KUO_4; 13. $KAl(SO_4)_2$; 14. N_2O; 15. $Sn(MnO_4)_2$; 16. H_2CrO_4; 17. NaH_2PO_4; 18. $Cd(C_2H_3O_2)_2$; 19. $(NH_4)_2SiO_4$; 20. HIO_2

Level 3: Chem. Nomen.

1. mercury (I) or mercurous chloride
2. dinitrogen pentoxide
3. cobalt (II) or cobaltous sulfate hexahydrate
4. iron (II) or ferrous selenate
5. erbium oxide
6. potassium telluride
7. lithium hydride
8. fluorous acid
9. tin (IV) or stannic iodide or tetraiodide
10. arsenic (V) or arsenic oxide or pentoxide
11. osmium tetrachloride
12. sodium dihydrogen phosphate
13. lead (II) or plumbous acetate
14. chromium (III) or chromous sulfite
15. aluminum permanganate
16. mercury (II) or mercuric nitride
17. potassium aluminum sulfate
18. silicon tetrafluoride
19. gold (II) or auric phosphide
20. iron (III) or ferric ferricyanide

Level 2:

1. SR; yes; $Sn + CuSO_4 \rightarrow Cu + SnSO_4$
2. DR; yes; $2\ Fe(NO_3)_3 + 3\ Na_2CrO_4 \rightarrow Fe_2(CrO_4)_3\downarrow + 6NaNO_3$
3. S; yes; $Ca + I_2 \rightarrow CaI_2$
4. SR; yes; $Mg + 2\ HCl \rightarrow MgCl_2 + H_2\uparrow$

Rx. Predict

5. D; yes; $2\ CaO \xrightarrow{\Delta} 2\ Ca + O_2$
6. S; yes; $C + O_2 \xrightarrow{\Delta} CO_2\uparrow$
7. DR; ~~yes~~ no; $Na_2CO_3 + H_2SO_4 \rightarrow Na_2SO_4 + H_2CO_3 (= H_2O + CO_2\uparrow)$
8. D; yes; $FeS \rightsquigarrow Fe + S$
9. SR; no; $Pt + Pb(NO_3)_2$
10. S; yes; $Li_2O + H_2O \rightarrow 2\ LiOH$

Level 3:

1. $N_2 + 3\ H_2 \rightarrow 2\ NH_3\uparrow$
2. $2\ C_4H_{10} + 13\ O_2 \rightarrow 8\ CO_2\uparrow + 10\ H_2O\uparrow$
3. $2\ Al_2O_3 \rightarrow 4\ Al + 3\ O_2\uparrow$
4. $C_2H_5OH + 2\ O_2 \rightarrow 2\ CO\uparrow + 3\ H_2O\uparrow$

Equation Writing

5. $2\ N_2 + 5\ O_2 \rightarrow 2\ N_2O_5$
6. $2\ C_8H_{18} + 25\ O_2 \xrightarrow{\Delta} 16\ CO_2\uparrow + 18\ H_2O\uparrow$
7. $Al_2(SO_4)_3 + 2\ H_3PO_4 \rightarrow 2\ AlPO_4 + 3\ H_2SO_4$
8. $P_2O_5 + 3\ H_2O \rightarrow 2\ H_3PO_4$
9. $4\ NH_3 + 6\ NO \rightarrow 5\ N_2\uparrow + 6\ H_2O\uparrow$
10. $Fe_2O_3 + 3\ CO \rightarrow 3\ CO_2\uparrow + 2\ Fe$
11. $3\ Cu + 8\ HNO_3 \rightarrow 3\ Cu(NO_3)_2 + 2\ NO\uparrow + 4\ H_2O$
12. $4\ FeS + 7\ O_2 \rightarrow 2\ Fe_2O_3 + 4\ SO_2\uparrow$

Level 3:

1. a. 108.016; b. 249.69; c. 186.7192; d. 232.988 e. 258.20; f. 149.095; g. 378.0846; h. 162.118; i. 252.10; j. 233.993

Mole weight & moles

2. a. 164 g; b. 123 g; c. 21.4 g; d. 472.5 g; e. 242 g; f. 384 g; g. 527 g; h. 108 g; i. 91.7 g; j. 1.45 g
3. a. 0.0155 mol; b. 0.00344 mol; c. 0.1065 mol; d. 7.36×10^{-9} mol; e. 4.46 mol; f. 0.03604 mol; g. 0.00275 mol; h. 0.1123 mol; i. 7.42×10^{4} mol; j. 5.90×10^{-7} mol

Level 2:

% Comp

1. 45.9% K; 16.5% N; 37.6% O
2. 26.2% N; 7.5% H; 66.3% Cl
3. 55.3% Sr; 44.7% Cl;
4. 24.7% K; 34.8% Mn; 40.5% O
5. 2.0% H; 32.7% S; 65.3% O
6. 55.2% K; 14.6% P; 30.2% O
7. 14.3% N; 4.1% H; 81.6% Br
8. 80.1% Ba; 18.7% O; 1.2% H
9. 79.9% Cu; 20.1% S;
10. 92.3% C; 7.7% H

Level 3:

Stoich.

1. 9.39 g; 2. 8.67 L; 3. 14.5 g; 4. 7.94 g; 5. 69.2 g P_2O_5; 26.3 g H_2O; 6. carbon in excess by 0.5 mol; 7. 43.97 g; 8. magnesium hydroxide in excess by 0.343 mol; 9. no; HCN is in excess; 10. yes; 34.6 L needed