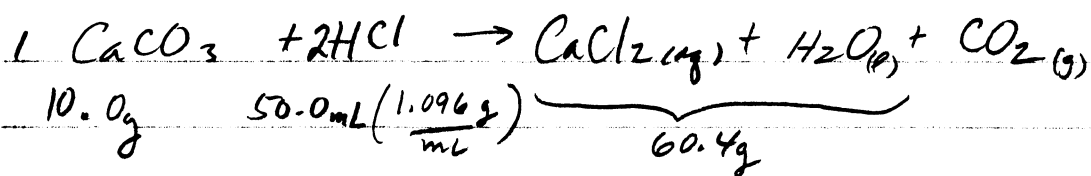


AP Chemistry Semester 1 Review



$$10.0\text{g} + 54.8\text{g} - 60.4\text{g} = 4.4\text{g CO}_2 \quad 4.4\text{g CO}_2 \left(\frac{1\text{L}}{1.798\text{g}} \right) = \boxed{2.4\text{L}}$$

$$2. \quad 22.3\text{g} / 15.0\text{mL} = 1.489 \approx 1.49$$

[Chloroform]

$$3. \quad \frac{(12.011\text{amu} + 13.00335\text{amu})}{2} = \boxed{12.507\text{amu}}$$

$$4. \quad p + n = 62 \quad n = 1.21p$$

$$1.21p + p = 62 \quad 2.21p = 62 \quad p = 28$$

$$n = 62 - 28 = 34$$

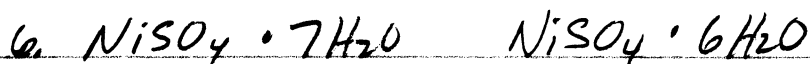
[#electrons = 26 ; Nickel]

$$5. \quad \text{mass O}_2 = 0.6015\text{L} (1.330\text{g/L}) = .7999 = \boxed{.8000\text{g O}_2}$$

$$(.8000\text{g O}_2 / 32.00\text{g/mol}) \times \left(\frac{2\text{mol O}}{1\text{mol O}_2} \right) = .0500\text{mol O}$$

$$.0500\text{mol O} = .0500\text{mol X}$$

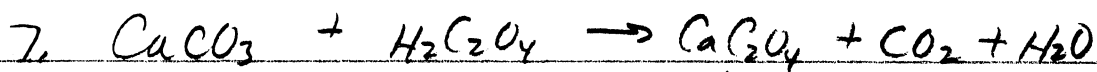
$$\text{molar mass of X} = 3.177\text{g} / .0500\text{mol O} = \boxed{63.54\text{g/mol, Cu}}$$



$$8.753\text{g} - 8.192\text{g} = .561\text{g water lost}$$

$$.561\text{g water} \times 6 = 3.366\text{g H}_2\text{O in } 8.192\text{g NiSO}_4$$

$$8.192\text{g} - 3.366\text{g} = \boxed{4.826\text{g NiSO}_4 \text{ Anhydrous}}$$



$$472 \text{ mg} = .472 \text{ g}$$

$$.472 \text{ g CaC}_2\text{O}_4 / 128.10 \text{ g/mol} = .00368 \text{ mol CaC}_2\text{O}_4$$

$$.00368 \text{ mol CaC}_2\text{O}_4 (1 \text{ mol CaCO}_3 / 1 \text{ mol CaC}_2\text{O}_4) = .00368 \text{ mol CaCO}_3$$

$$.00368 \text{ mol CaCO}_3 (100.091 \text{ g/mol}) = .3688 \text{ g CaCO}_3$$

$$.3688 \text{ g CaCO}_3 / .438 \text{ g limestone} = .842 = 84.2\%$$

$$8. 195 \text{ g O}_2 / 32.0 \text{ g/mol} = 6.09375 \text{ mol O}_2 (4 \text{ mol KO}_2 / 3 \text{ mol O}_2)$$

$$= 8.125 \text{ mol KO}_2 (71.10 \text{ g/mol}) = 577.69 \text{ g KO}_2$$

Not all Consumed

$$750. \text{ g} - 578 \text{ g} = (172 \text{ g KO}_2 / 71.10 \text{ g/mol}) \left(\frac{3 \text{ mol O}_2}{4 \text{ mol KO}_2} \right) \left(\frac{32.0 \text{ g}}{\text{mol}} \right)$$

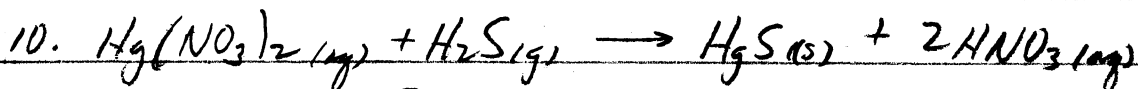
$$= 58.059 \approx [58.1 \text{ g O}_2]$$

$$9. M_1 V_1 = M_2 V_2 (3.47 \times 100 \text{ mL}) = (1.78 \text{ M})(V) = 194.94 \text{ mL}$$

$$194.94 \text{ mL} - 100. \text{ mL} = \text{add } 94.94 \text{ mL H}_2\text{O}$$

$$94.94 \text{ mL} (1.00 \text{ g/mL}) = 94.94 \text{ g water}$$

$$94.94 = \frac{1}{3} X \quad X = 284.8 \text{ g [Add 285 g Ice]}$$



$$81.15 \text{ g}$$

$$8.52 \text{ g}$$

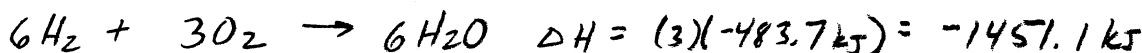
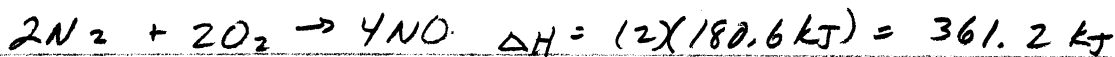
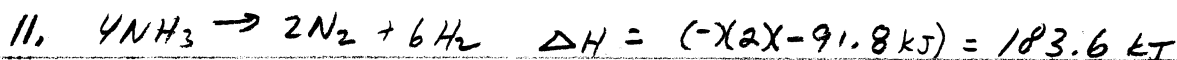
Mercuric sulfide nitric acid

$$550.0 \text{ g H}_2\text{O}$$

$$58.16 \text{ g precip}$$

$$\text{mass of nitric acid} = 81.15 \text{ g} + 8.52 \text{ g} - 58.16 \text{ g} = 31.51 \text{ g HNO}_3$$

$$550.0 \text{ g H}_2\text{O} + 31.51 \text{ g HNO}_3 = [581.5 \text{ g solution}]$$



$$\boxed{-906.3 \text{ kJ}}$$

$$12. \quad 15.3 \text{ g NaNO}_3 \left(\frac{1 \text{ mole}}{84.99 \text{ g}} \right) = .180 \text{ mole NaNO}_3$$

$$\Delta T = -3.44^\circ \text{C} \quad q = C \Delta T = 1071 \text{ J/}^\circ \text{C} (3.44^\circ \text{C})$$

$$3684.24 \text{ J} / .180 \text{ mole NaNO}_3 = 20,468 \text{ J} = \boxed{20.5 \text{ kJ}}$$

$$13. \quad \lambda = \frac{h}{mv} \quad v = \frac{h}{\lambda m}$$

$$v = \frac{(6.626 \times 10^{-34} \text{ Js})}{(10.0 \times 10^{-12} \text{ m})(9.11 \times 10^{-31} \text{ kg})} = 7.273 \times 10^7 \text{ m/s}$$

$$KE = \frac{1}{2} m v^2 = \frac{1}{2} (9.11 \times 10^{-31} \text{ kg})(7.273 \times 10^7 \text{ m/s})^2$$

$$= 2.41 \times 10^{-15} \text{ J} \left(\frac{1 \text{ eV}}{1.602 \times 10^{-19} \text{ J}} \right) = 15,041.5$$

$$= \boxed{1.50 \times 10^4 \text{ eV}}$$

$$14. \quad E = h\nu = \frac{hc}{\lambda} = \frac{(6.626 \times 10^{-34} \text{ Js})(3.00 \times 10^8 \text{ m/s})}{4.227 \times 10^{-7} \text{ m}}$$

$$= \boxed{4.70 \times 10^{-19} \text{ J}}$$

15. a. atomic number = 2 b. Total s-electrons = 8
 c. Total p-electrons = 12 d. Total d-electrons = 0
 e. Element is Ca, Calcium, a metal

16. a. Cobalt b. Paramagnetic c. 4 unpaired electrons

$$17. \quad 165.4 \text{ g/mole} (.1452) / 12.011 \text{ g/mole} = 1.999 = 2 \text{ mol C}$$

$$165.4 \text{ g/mole} (.0183) / 1.008 \text{ g/mole} = 3.00 = 3 \text{ mol H}$$

$$165.4 \text{ g/mole} (.6430) / 35.45 \text{ g/mole} = 3.00 = 3 \text{ mol Cl}$$

$$165.4 \text{ g/mole} (.1935) / 16.00 \text{ g/mole} = 2.00 = 2 \text{ mol O}$$

