Summer Quiz Answers

1. A 2) B 3) B 4) C 5) D 6) A 7) B 8) D 9) B 10) B 11) D 12) C 13) B 14) C 15) E 16) D 17) A 18) C 19) B 20) D 21) D 22) D 23) A 24) E 25) C 26) D 27) C 28) B 29) B 30) B 31) E 32) C 33) D 34) C 35) D

AP #1

1. i) moles before dilution = moles after dilution Mi Vi = Mf Vf (16 M)(Vi ) = (6 M)(50. mL) Vi = **19 mL or 20 mL** (to one significant figure)

ii) Wear safety goggles and rubber gloves. Then measure 19 mL of 16 M HNO3 using a 100 mL graduated cylinder. Measure 31 mL of distilled H2O using a 100 mL graduated cylinder. Transfer the water to a 100 mL beaker. Add the acid to the water with stirring.

iii) The graduated cylinders provide sufficient precision in volume measurement to provide two significant figures, making the use of the volumetric flask unnecessary

iv) NaHCO3(aq) should be used. The HCO3 − ion will react as a base to neutralize the HNO3.

1. mass of AgCl collected = (29.2598 – 28.7210) g = 0.5388 g

0.5388 g /((107.87 + 35.45) g mol−1) = **3.759 × 10−3 mol AgCl**

1. 3.759 × 10−3 mol Ag × 107.87 g Ag/ 1 mol Ag = 0.4055 g Ag

0.4055 g/ 0.6489 g × 100% = **62.49% Ag**

AP#2

1. i) Cl2 is the limiting reactant because, in order to react with the given amount of CH4 , more moles of Cl2 are required than the 2.58 moles of Cl2 that are present.

25.0 g CH4 × 1 mol CH4/16.04 g CH4× 2 mol Cl2/1 mol CH4= **3.12 mol Cl2**

ii) 2.58 mol Cl2 × 1 mol CH2 Cl2 /2 mol Cl2 = **1.29 mol** CH2Cl2

1. 242/mol× 1,000 J/1 kJ x 1 mol/6.02 x 1023 = **4.02 × 10**−**19 J**

AP #3

1. i) 2.241g CO2 x 1mole CO2/44.01g CO2 x 1mol C/ 1 mole CO2 x 12.011g C/1mol C = **0.6116gC**

ii) 1.2359g sample x 0.2884 = **0.3564g N**

iii) Because the compound contains only C, H, N, and O, mass of O = g sample – (g H + g C + g N) = 1.2359 – (0.0648 + 0.6116 + 0.3564) = **0.2031g O**

iv) Converting all to moles, 0.6116gC x 1mole C/ 12.011gC =0.05092 mol C /0.01269mol=4.013

0.0648gH x 1mole H/1.0079gH = 0.06429molH/0.01269mol=5.066

0.3564gN x 1moleN/14.007gN = 0.02544mole N/0.01269mol=2.005

0.2031gO x 1moleO/16.00gO = 0.01269mole O/0.01269mol=1.000

Empirical formula = **C4H5N2O**

1. i) PV=nRT = (0.983atm)(1.00L) = n (0.0821Latm/molK)(375K) n = 0.0319mol 6.00g/0.0319mol = **188g/mol**

ii) CH2Br has an empirical mass of 93.9g so 188g/93.9g = 2.00 so the formula is **C2H4Br2**

Non AP questions

1. Since there is no measuring device that goes to an infinite number of zeros, there is no measurement that isn’t estimated at some point adding error. In addition there are always situations where the interaction with the surroundings effects your data.
2. Shot alpha particles at a piece of gold foil. Most passed straight through proving the atom was mostly empty space, while a few were deflected back showing that there was a small, dense, positively charged nucleus.
3. 4x63.55= 254.2 g Cu/mole / .00390 = **6.52x103g**
4. 49.9461 (0.0431) + 51.9405 (x) + 52.9407 (0.9331-x) + 53.9389 (0.0238) = 51.996

Cr-50 = 4.31**% Cr-52 = 83.77% Cr-53 = 9.54%** Cr-54 = 2.38%

1. 0.755g CuSO4 **.** xH2O -0.483gCuSO4 = 0.272g H2O 0.483 g CuSO4 /159.61g/mol CuSO4 = 0.003026mol CuSO4

0.272g H2O / 18.02g H2O/mol H2O = 0.01509mol H2O

Divide both by 0.003026 = CuSO4 =1 and H2O = 4.99 or 5 so **x = 5**