Practice for Final

Key (0 Yo) /m

Practice for 1045 Lab Final

Titration of Vinegar lab

1. Initial reading of vinegar buret	23.45
2. Final reading of vinegar buret	65.28
3. Volume of vinegar used (2-1)	41.83
4. Initial reading of NaOH buret	11.63
5. Final reading of NaOH buret	57.36
6. Volume of NaOH used (5.4)	45.73
7 Molarity of NaOH	1.23 M

1. How many moles of NaOH were used (M x L) .0562
2. How many moles of acid in the vinegar .0562 (why? see balanced equation)
3. How many grams of acid in the vinegar (.0562) (60) 3.372
   (60 is the molar mass of acetic acid)

4. Suppose you started with 45 grams of vinegar and found 3.372 grams of acid in the vinegar, what is the % of acid in the vinegar
   3.372/45 x 100 = 7.5 %

$HC_2H_3O_2 + NaOH \rightarrow NaC_2H_3O_2 + H_2O$

H_2O_2 Lab

1. grams of H_2O_2 used 2 grams → liters (not mL)

2. Moles of MnO_4 used = (M x L) Let's say .03 M x 0.045 L = .00135 moles of MnO_4

3. moles of H_2O_2 in the sample (see balanced equation)

$5\,H_2O_2 + 2\,MnO_4^{-1} + 6H^+ \rightarrow 2\,Mn^{+2} + 5O_2 + 8H_2O$

$$\frac{5\ H_2O_2}{2\ MnO_4} = \frac{x\ \text{moles}\ H_2O_2}{.00135\ \text{moles}\ MnO_4}$$

X = .003375 moles of H_2O_2

4. grams of H_2O_2 in sample = moles x molar mass (.00375 x 34) = .11475 grams

5. % of H_2O_2 in sample = .11475/2 x 100 = 5.74%

Given:

1	mass of unknown metal	56.72 g
2	temperature of metal in boiling water	102 C
3	mass of empty cup	26 g
4	mass of cup plus water	71 g
5	initial temp of water in cup	20 C
6	final temper of water after hot metal was placed in it	35 C
7	specific heat of water	4.184

Calculate:

8 Mass of water in cup — 71-26 = 45 g (4-3)

9 Initial temp of metal — 102 C

10 Final temp of metal — 35 C

11 Joules of heat gained by water — 45g x 15C x 4.184 = 2824.2 J

12 Joules of heat lost metal — same 2824.2 J

13 What was the specific heat of the metal

2824.2 = 56.72 x (102-35) x

x = specific heat of metal 0.743

Specific heat lab

What is specific heat?

Heat gained by H_2O = Heat lost by metal

Law of Hess

Given 2 or 3 reactions and the delta H's,
Find the delta H of another reaction using Law of Hess

Example:

$C + O_2$ ---------- $CO_2 + 393$ kJ (leave alone)

$H_2 + \frac{1}{2} O_2$ ---------- $H_2O + 285$ kJ (multiply by 2)

$CH_4 + 2 O_2$ ---------- $CO_2 + 2H_2O + 890$ kJ (reverse)

Find the delta H for:

$C + 2 H_2$ ---------- CH_4 $\Delta H = -73$ kJ

Atomic weight of Mg Lab (see practice data sheet handed out in lab) for a sample problem

Molar mass of an unknown liquid (see practice data sheet handed out in lab for a sample problem.

Try these to increase your understanding:
Reaction: 2 KClO3 ---------- 2 KCl + 3 O2

If you were given 0.5 moles of KClO3, how many moles of oxygen would you produce? .75
How many liters would this be? (at STP) .75 x 22.4 = 16.8 L
How many grams would this be?

.75 x 32 = 24 g

Atomic Weight of Mg via Hydrogen Production

Reaction: $Mg + 2\,HCl \text{ ---------- } MgCl_2 + H_2$

Gas Law Equation: $PV = nRT$

P = Pressure of the gas in atmospheres (mm Hg/760)
V = Volume of the gas in Liters (ml/1000)
T = Temperature in Kelvin (C + 273)
R = gas law constant = 0.082
n = moles of the gas

Data:

1. mass of the Mg — .040 grams
2. temperature of the water = temperature of the gas — 20° C
3. temperature in Kelvin (C + 273) — 293 K
4. buret reading of the volume of the gas — 39.5 ml
5. volume of gas in Liters(ml/1000) — .0395 L
6. barometric pressure of the day — 755 mmHg
7. partial pressure of just the hydrogen

   # 6 – 17.5 (pressure of water vapor at 20 C — 737.5 mmHg
8. partial pressure of hydrogen in atm (mmHg/760) — .97 atm
9. moles of hydrogen collected

   $n = PV/RT$

   $= \dfrac{\#8 \times \#5}{0.082 \times \#3}$ $\qquad \dfrac{(.97\,atm)(.0395\,L)}{(.082)(293K)}$ — .00159 moles H_2
10. moles of Mg reacted = moles of hydrogen collected — .00159
11. from: Moles = grams/atomic weight, you can get:

    atomic weight of Mg = grams of Mg (#1)/moles of Mg (#10)

    $\dfrac{.040g}{.00159} =$ 25.16 g/mole

Molecular Weight of an unknown liquid (made gaseous)

PV = nRT

P = pressure in atm (mm Hg/760)
V = volume of flask in LITERS
n = moles (wt/MW)
R = gas law constant (0.082 lit atm/ mole K
T = temperature of gas (also boiling water) in Kelvin degree (C + 273)

Data:

1. temperature of boiling water (and temperature of gas)	102	C
2. temperature in Kelvin (C + 273)	375	K
3. atmospheric pressure in atm (mm/760)	1	atm
3. mass of flask plus foil	120.0	g
4. mass of flask, foil, plus condensed vapor	154.8	g
5. mass of condensed vapor (4-3)	34.8	g
6. volume of flask	18,450	ml
7. volume of flask	18.45	L
8. moles of unknown gas		
n = PV/RT $n = \frac{(1\text{atm})(18.45\text{L})}{(.082)(375)}$	.6	moles

8. molecular weight of unknown = wt/moles

$= \frac{34.8\text{g}}{.6}$ 58 g/mole

could it be acetone ?

C_3H_6O