

Practice for Final

Key (0% / mm)

Practice for 1045 Lab Final

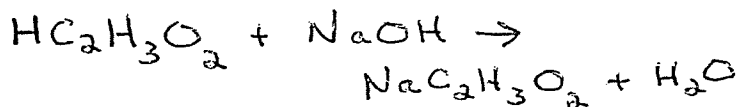
Titration of Vinegar lab

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

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

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

$$3.372/45 \times 100 = (7.5\%)$$

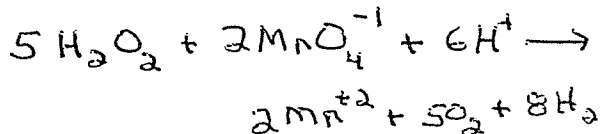


H₂O₂ Lab

1. grams of H₂O₂ used 2 grams \rightarrow liters (not mL)

2. Moles of MnO₄ used = (M x L) Let's say .03 M x 0.045 L = $(.00135 \text{ moles of MnO}_4)$

3. moles of H₂O₂ in the sample (see balanced equation)



$$\frac{5 \text{H}_2\text{O}_2}{2 \text{MnO}_4} = \frac{x \text{ moles H}_2\text{O}_2}{.00135 \text{ moles MnO}_4}$$

$$X = (.003375 \text{ moles of H}_2\text{O}_2)$$

4. grams of H₂O₂ in sample = moles x molar mass $(.00375 \times 34) = (.11475 \text{ grams})$

5. % of H₂O₂ in sample = $.11475/2 \times 100 = (5.74\%)$

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 $71 - 26 = 45 \text{ g}$ (4-3) Specific heat lab

9 Initial temp of metal 102 C

10 Final temp of metal 35 C

11 Joules of heat gained by water $45 \text{ g} \times 15 \text{ C} \times 4.184 = 2824.2 \text{ J}$

12 Joules of heat lost metal same 2824.2 J

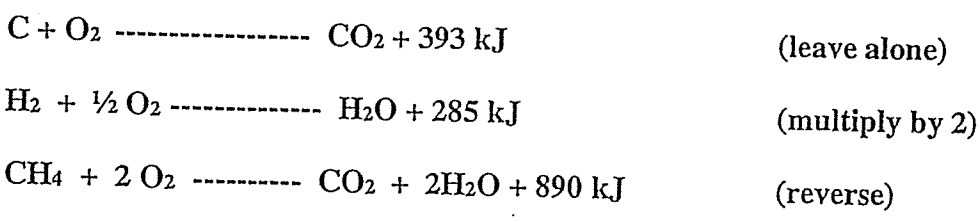
13 What was the specific heat of the metal
 $2824.2 = 56.72 \times (102 - 35) \times x$
 $x = \text{specific heat of metal}$ 0.743

What is specific heat?
Heat gained by H₂O = 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:



Find the delta H for:



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).

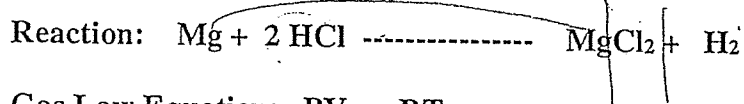
Try these to increase your understanding:
 Reaction: $2 \text{KClO}_3 \text{ ----- } 2 \text{KCl} + 3 \text{O}_2$

If you were given 0.5 moles of KClO_3 , how many moles of oxygen would you produce? 0.75

How many liters would this be? (at STP) $0.75 \times 22.4 = 16.8 \text{ L}$

How many grams would this be? $0.75 \times 32 = 24 \text{ g}$

Atomic Weight of Mg via Hydrogen Production



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 | 0.040 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) | 0.0395 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) | 0.97 atm |
| 9. moles of hydrogen collected | |

$$n = PV/RT$$

$$= \frac{\#8 \times \#5}{0.082 \times \#3} = \frac{(0.97 \text{ atm})(0.0395 \text{ L})}{(0.082)(293 \text{ K})} = 0.00159 \text{ moles } H_2$$

10. moles of Mg reacted = moles of hydrogen collected 0.00159

11. from: Moles = grams/atomic weight, you can get:

$$\text{atomic weight of Mg} = \text{grams of Mg (\#1)} / \text{moles of Mg (\#10)}$$

$$\frac{0.040 \text{ g}}{0.00159} = 25.16 \text{ g/mole}$$

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		
$n = PV/RT$	$n = \frac{(1 \text{ atm})(18.45 \text{ L})}{(0.082)(375)}$	0.6 moles

8. molecular weight of unknown = wt/moles

$$= \frac{34.8 \text{ g}}{0.6} = 58 \text{ g/mole}$$

could it be acetone?

