97/100

Exp. 10 - HEAT AND TEMPERATURE

Data and Results

Name Zack Mcgrace Date 29 Oct 2008

Lab Section 8 Lab Partner(s) Haley, Denys

PART I. SPECIFIC HEAT OF A METAL:

Mass of empty cup = 21.8g Mass of water = 102.78g

Mass of cup & water = 104.96g Mass of metal = 492.24g

Initial temperature of water T_C = 19.858°C

Initial temperature of metal T_H = 100°C

Maximum temperature of water T_F = 28.61°C

Set up your calculation for the specific heat of the metal using your data (using calories in your units).

$M_M C_M (T_H - T_F) = M_W C_W (T_F - T_C)$

(492.24g) C_M (100°C - 28.61°C) = (102.78g)(1 cal/g°C)(28.61°C - 19.858°C)

C_M = .026 cal/g°C

Experimental Result: Specific heat of the metal = .026 cal/g°C

Question 1: What is the likely material of your metal block? Lead

Accepted value of the specific heat of this metal = .031 cal/g°C

Percent Error = 16.25%

PART II. SPECIFIC HEAT OF A METAL:

Mass of empty cup = 41.00g Mass of water = 100.71g

Mass of cup & water = 141.71g Mass of metal = 328.08g

Specific heat of the cup = .22 cal/g°C

Initial temperature of water T_C = 26.172°C

Initial temperature of metal T_H = 100°C

Maximum temperature of water T_F = 42.15°C

Set up your calculation for the specific heat of the metal using your data (using calories in your units).

$M_M C_M (T_H - T_F) = M_W C_W (T_F - T_C)$

(328.08g) C_M (100 - 42.15) = (100.71g)(1 cal/g°C)(42.15°C - 26.172°C)

C_M = .0848 cal/g°C

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Experimental Result: Specific heat of the metal = .0848 cal/g°C

Question 2: What is the most likely metal for your block? Copper

Accepted value of the specific heat of this metal = .0920 cal/g°C

Percent Error = 8.15%

PART III. LATENT HEAT OF FUSION OF WATER:

Mass of empty cup = 2.18 g

Mass of cup & water = 104.96 g   Mass of water = 102.78 g

Mass of cup, water & ice = 120.9 g   Mass of ice = 22.79 g

Initial temperature of water T_H = 37.684 °C   Initial temperature of ice = 0°C

Minimum temperature of water T_F = 12.808 °C

Show how to calculate the latent heat of fusion of water from your data (using calories in yo calculation).

$M_w c_w (T_H - T_F) = M_i L_i + M_i c_w (T_F - 0)$

(102.78g)(1 cal/g°C)(37.684 - 12.808°C) = 22.79 g L_i + 22.79 g (1 cal/g°C)(12.808)

L_i = 99.38 cal/g°C

Latent heat of fusion of water: Experimental = 99.38 cal/g

Accepted value = 79.72 cal/g

Percent error = 21.97%

Convert your experimental results to SI units (J, kg, K).

Part I. Specific heat = 108.94 J/kgK   .026 cal/g°C · (4190 J/kgK)/(1.00 cal/g°C) = 108.94 J/kgK

Part II. Specific heat = 921.80 J/kgK   .220 cal/g°C

Part III. Latent heat = 416382.2 J/kg   99.38 cal/g   99.38 cal/g · 1000g/1kg · 4.19J/1cal = 416...

Question 3: Why did you use the maximum value of the temperature for T_F in parts I and II?

To determine the ... temp at ... gained & ...

Question 4: What are the major sources of error in this experiment? How might these errors be reduced?

Not letting ... max temperature, misreading the thermometer ... errors ... more ... experiments.

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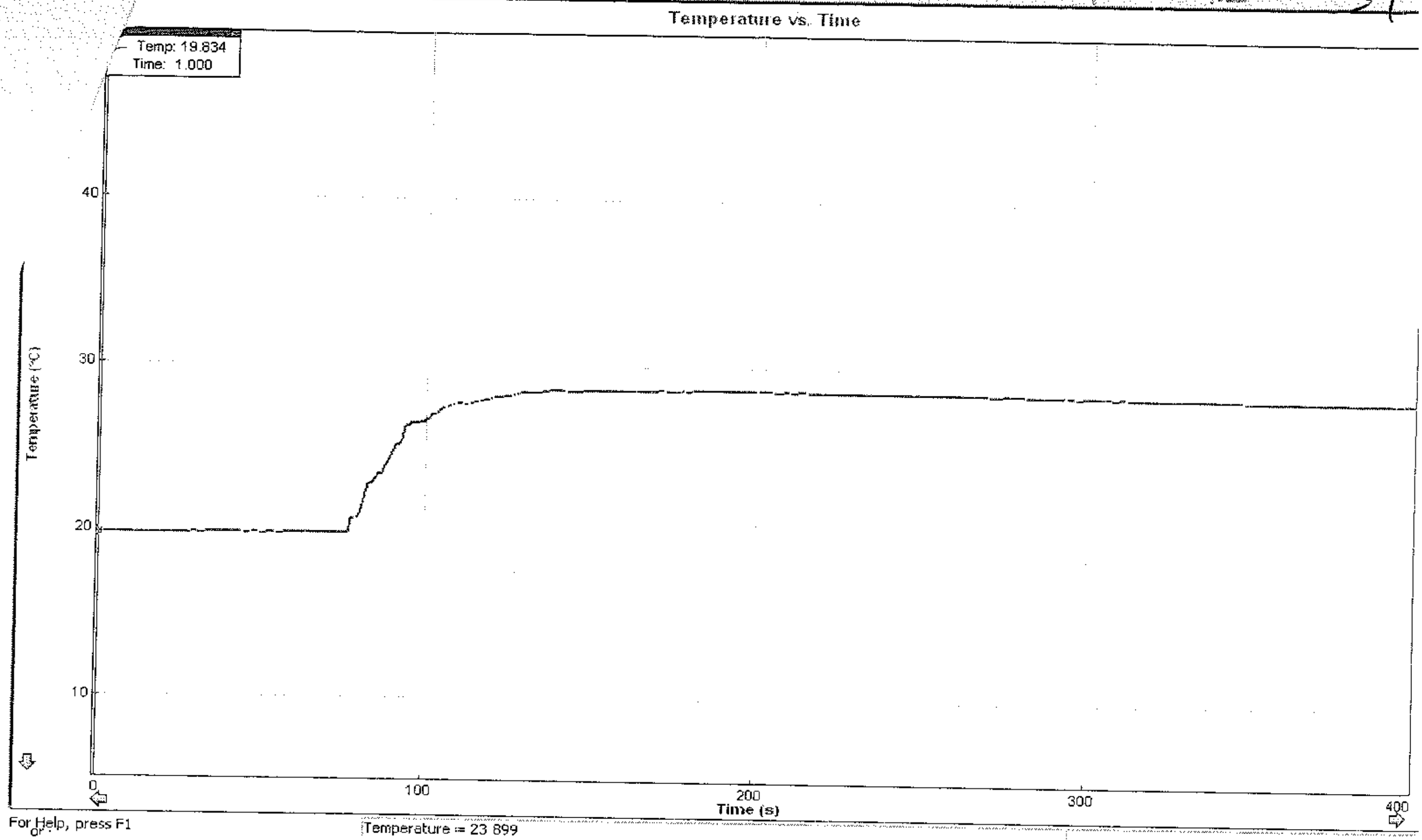
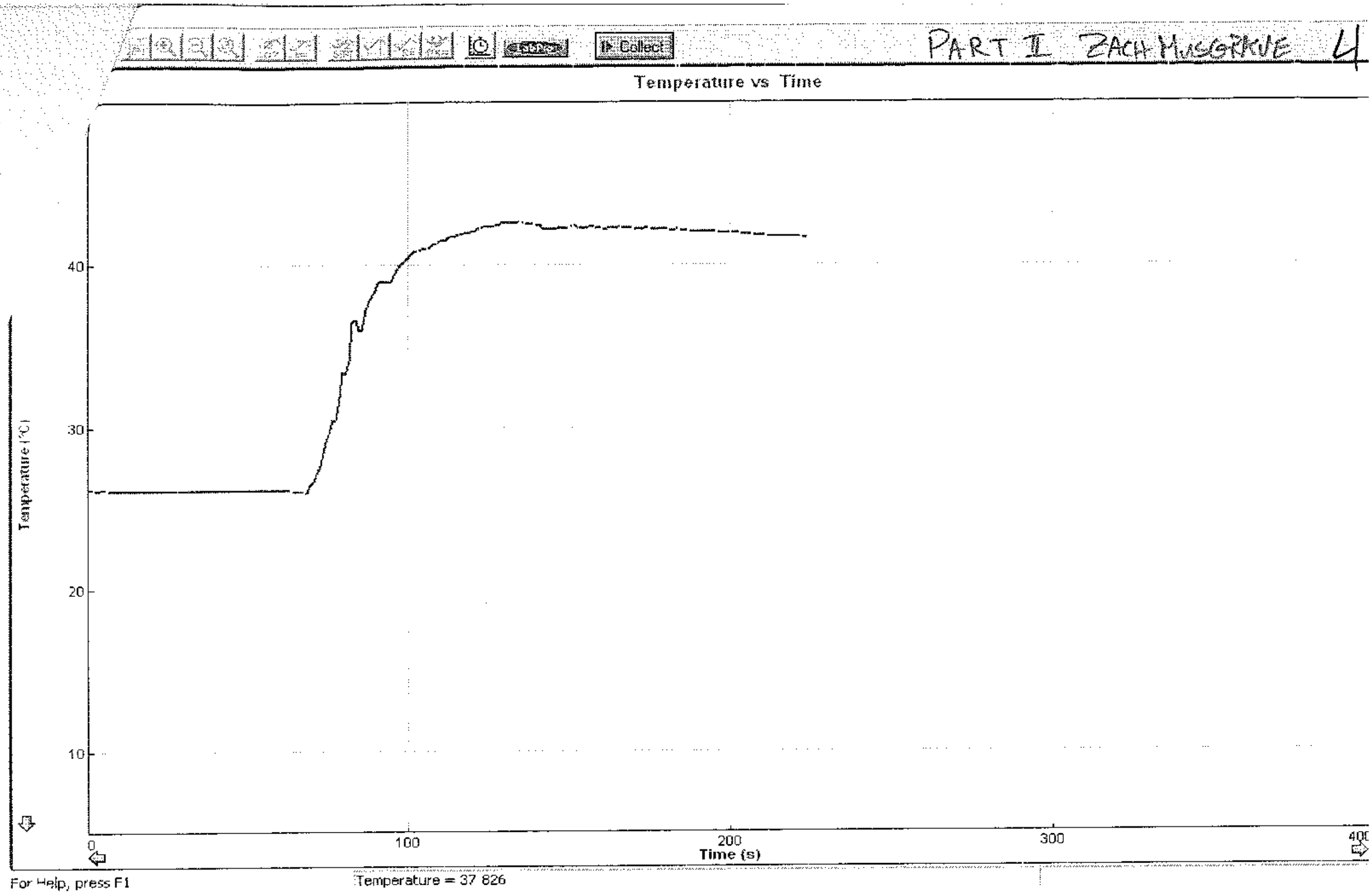
PART I ZACH MUSGRAVE 39



PART II ZACH MUSGRAVE 4



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Exp. 11 - IDEAL GAS LAWS

Data and Results

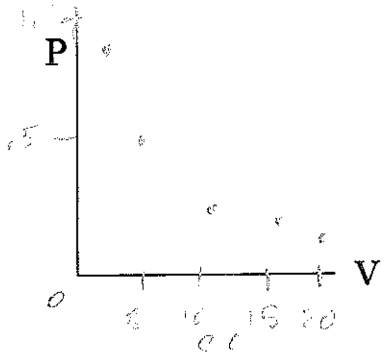
Name Zach Musgrave Date 2008-Nov-12

Lab Section 8 Lab Partner(s) Haley, Devyn

PART I. BOYLE'S LAW:

VOLUME (cc)	2	5	10	15	20
PRESSURE (atm)	.836 atm	.469 atm	.286 atm	.232 atm	.183 atm

Sketch the graph that Logger Pro displayed for **P** versus **V.**



Question 1: Does your graph of **P** versus **V** indicate that the pressure is directly proportional to the volume? Explain.

No. Boyle's law states Vgas is inversely proportional to Pgas.

Question 2: Does your graph of **1/P** versus **V** agree with equation 2? Explain.

Yes, because the graph of 1/P vs. V is linear, proving Eqn. 2 is true and that V is indirectly proportional to P.

Question 3: Why does your graph of **1/P** versus **V** not go through the origin?

because at the origin, 1/P = 0, hence it would be infinity

What is the value of the x-intercept of your graph. -3.464

What are the units of the x-intercept? cc

Question 4: What is the physical significance of the value of the x-intercept? (Hint: The units should give you a clue.)

It symbolizes the initial volume in the syringe without pressure

PART II. GAY LUSSAC'S LAW:

Question 5: Does your graph of **Pressure** versus **Temperature** verify equation 3? Explain.

$P = \text{constant}(T - T_0)$

Yes, because [illegible]

Experimental value of slope = 400.81 °C/[illegible]

Experimental value of y-intercept = -378.92 °C

Show how you can use the slope and y-intercept of your graph to find the absolute zero o temperature? (Hint: When the temperature is at absolute zero, the pressure is zero.)

$T = \frac{P - b}{m}$

$y = 400.81x - 378.92$

$P = 400.81T - 378.92$

$0 =$

$400.8T = 378.92$

$T = .945\ °C$

Calculated value of T_o = .945 °C

Accepted value of T_o = -273.15 °C

Percent difference = 201.39%

talked to [illegible] about the data [illegible]

Question 6: Do the results of both parts of your experiment agree with the Ideal Gas Law as statec in equation 5? Discuss.

Our data was incorrect for some reason(s); [illegible] got a huge percent difference. Therefore our results did not agree with the Ideal Gas Law. The [illegible] should have been positive, so the calculated [illegible] of T should also be [illegible]. Since our y-intercept was negative our calculated value of T_0 was completely wrong.

We DID verify Boyle's law but not Gay-Lussac's, because for 6-2 [illegible] we found T_0 to be -273.15 °C [illegible].

Zach Musgrave