Heat of fusion lab

Calorimeter	calorimeter + water	T$_1$ (tap H$_2$O)	T$_2$ after ice melts	water + melted ice
72.7	273.4	66.1	43.7	316.3

1. Calculate mass of water in calorimeter   273.4 - 72.7 = 200.7

2. calculate mass of melted ice   316.3 - 200.7 = 115.6

3. find joules of heat needed to melt entire ice cube

Mass of melted ice x change in temp x specific heat of water

115.6 x   22.4 x   4.184 = 10,834.2 joules

4. find joules per grams $\dfrac{10,834.2 \text{ J}}{115.6 \text{ g}}$ 93.72 J/g

5. find joules per mole   93.72 J/g x 18 g/mole = 1687

Assume the accepted value is 1854 J/mole

Find the % error $\dfrac{\text{accepted value} - \text{your lab value}}{\text{Accepted value}}$ x 100

$\dfrac{1854 - 1687}{1854}$ x 100 = 9%

An unknown metal bar weighing 25 grams is placed into boiling water at 100 C for several minutes and then placed into 50 grams of water at 26 C; the water temperature rose to 29 C. What is the specific heat of the metal? (For water, the sp. heat is 4.184)

Joules = mass x temperature change x specific heat

Heat gained by the water   =   Heat lost by the metal
59 g   x 3 C x 4.184   =   25 g x (100-29) X

X = 0.3536

A solution was made by dissolving 8.56 grams of an unknown molecular solid in 95 grams of benzene, C_6H_6. The solution froze at 9.34 C. the freezing point constant for benzene. 5.07 C/m and the normal freezing point of benzene is 5.45 C. Calculate the molar mass of the unknown.

Answer 117g/mole

For the following data, find:

a) order of reaction with respect to each of the reactants

b) write the rate law expression

c) calculate the value of the rate constant k

Table 4. Observations on the Rate of Production of X

Trial	Initial [A] (mol/L)	Initial [B] (mol/L)	Initial [C] (mol/L)	Rate of production of X (mol/(L·s))
1	0.10	0.10	0.10	3.0×10^{-4}
2	0.20	0.10	0.10	1.2×10^{-3}
3	0.10	0.30	0.10	3.0×10^{-4}
4	0.20	0.10	0.20	2.4×10^{-3}

Answer

a) rate = k $[A]^2$ [C]

k = 0.30

for A : use trials 1 and 2

for B : use trials 1 and 3

for C : use trials 2 and 4

For the following data, plot the points on the graph provided and answer the following questions:

Vol of base	pH
0	4.0
3	4.1
10	4.3
15	4.5
20	4.7
25	4.9
30	5.5
30.5	6.0
30.8	6.6
31	7.2
40	7.5
50	7.7

From the graph, determine the Ka of the acid 2.5×10^{-5}

How many ml of base did it take to reach the equivalence point $30\ mL$

The solubility of PbCl₂ is 4.414 grams/liter. The molar mass is 278 g/mole. From this data, calculate the Ksp of lead chloride.

$$K_{sp} = 1.6 \times 10^{-5}$$

pH

mL of base added.