

BR: February 8th

Calculate the final temperature if you start at 30 C for 50 grams of water and it releases 798 J of energy.

$Q = mc\Delta T$

$Q = 798 \text{ J}$

$m = 50 \text{ g}$

$c = 4.184$

$\Delta T = ?^\circ\text{C} \rightarrow f$

$798 = 50(4.184)\Delta T$

$798 = 209.2 \Delta T$

$\frac{798}{209.2} = \frac{209.2 \Delta T}{209.2}$

$\Delta T = 3.81$

$\Delta T = f - i$

$3.81 = f - 30$

$+30 = f - 30 + 30$

33.81°C

Jan 21-9:04 AM

Friday, February 8th

Objective: Students will assess on heat and enthalpy.

1. Bellringer
2. Enthalpy Notes
3. Grade Reflection
4. HW worktime

DUE: Heat Lab,
WR 7.1, Color
sheet
HW: test
corrections, phase
changes

Test corrections can be done through next
Wednesday

Jan 21-8:46 AM

Enthalpy

- heat energy (ΔH) measured in Joules (J) or kilojoules (kJ)
- $+\Delta H$ = endothermic
- $-\Delta H$ = exothermic

solid \leftrightarrow liquid heat of fusion (ΔH_{fus})

liquid \leftrightarrow gas heat of vaporization (ΔH_{vap})

Feb 5-11:13 AM

Endothermic vs. Exothermic

Endothermic or exothermic?



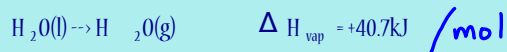
** not a chemical reaction, but it is a phase change which requires energy **

Feb 5-11:13 AM

Boiling and Condensing

- Molar Enthalpy (heat) of Vaporization (ΔH_{vap})
- heat required to vaporize 1 mole of liquid

How much energy is required to boil 25.5g of water at 100 $^\circ\text{C}$?



$$25.5 \text{ g} \times \frac{1 \text{ mol}}{18 \text{ g}} \times \frac{40.7 \text{ kJ}}{1 \text{ mol}} = 57.65 \text{ kJ}$$

$$57.65 \text{ kJ}$$

Feb 5-11:13 AM

Melting and Freezing

- Molar Enthalpy (heat) of Fusion (ΔH_{fus})
- heat required to melt 1 mole of solid

How many grams of ice can be melted by providing 2250 kJ of heat at 0 $^\circ\text{C}$?



$$2250 \text{ kJ} \times \frac{1 \text{ mol}}{6.01 \text{ kJ}} \times \frac{18 \text{ g}}{1 \text{ mol}} = 6638.7 \text{ g}$$

$$6638.7 \text{ g}$$

Feb 5-11:13 AM

Change in temp vs. Change in state

• If you want to change the state...

> Use ΔH

> look up values in textbook

• use dimensional analysis

• If you want to change the temperature...

> use $q=mc\Delta T$

Substance	Formula	$\Delta H_{\text{fus}}^\circ$ (kJ/mol)	$\Delta H_{\text{vap}}^\circ$ (kJ/mol)
Water	H ₂ O	6.01	40.7
Ethanol	C ₂ H ₅ OH	38.6	49.4
Methanol	CH ₃ OH	35.2	32.2
Acetic acid	CH ₃ COOH	23.4	11.7
Ammonia	NH ₃	23.3	5.66

Substance	Specific Heat J/g·C @ 25°C
Water (l) (liquid)	4.184
Water (s) (ice)	2.03
Water (g) (steam)	2.01

Feb 5-11:13 AM

PRACTICE

How much heat is required to melt 25.3g of ice?

Substance	Specific Heat J/g·C @ 25°C
Water (l) (liquid)	4.184
Water (s) (ice)	2.03
Water (g) (steam)	2.01

Substance	Formula	$\Delta H_{\text{vap}}^\circ$ (kJ/mol)	$\Delta H_{\text{fus}}^\circ$ (kJ/mol)
Water	H ₂ O	40.7	6.01
Ethanol	C ₂ H ₅ OH	38.6	4.94
Methanol	CH ₃ OH	35.2	3.22
Acetic acid	CH ₃ COOH	23.4	11.7
Ammonia	NH ₃	23.3	5.66

$$25.3 \text{ g} \times \frac{1 \text{ mol}}{18 \text{ g}} \times \frac{6.01 \text{ kJ}}{1 \text{ mol}} = 8.45 \text{ kJ}$$

Feb 5-11:13 AM

PRACTICE

How much heat is released when 4.8g of steam condenses into water?

Substance	Specific Heat J/g·C @ 25°C
Water (l) (liquid)	4.184
Water (s) (ice)	2.03
Water (g) (steam)	2.01

Substance	Formula	$\Delta H_{\text{vap}}^\circ$ (kJ/mol)	$\Delta H_{\text{fus}}^\circ$ (kJ/mol)
Water	H ₂ O	40.7	6.01
Ethanol	C ₂ H ₅ OH	38.6	4.94
Methanol	CH ₃ OH	35.2	3.22
Acetic acid	CH ₃ COOH	23.4	11.7
Ammonia	NH ₃	23.3	5.66

$$4.8 \text{ g} \times \frac{1 \text{ mol}}{18 \text{ g}} \times \frac{-40.7 \text{ kJ}}{1 \text{ mol}} = -10.85 \text{ kJ}$$

Feb 5-11:13 AM

Grade Reflection

1. What is your goal for this semester?
2. What is something you are doing well this semester?
3. What is something you could improve on?

Please be specific and explain your answers! Your parents will see these when/if they come to conferences.

Feb 12-7:20 AM