

Name: _____ date: _____ period: _____

Ch. 10 sea level rise / heat test 50 points [5 ec] ngss chem

In problems involving calculations, show your work in an organized manner, include the appropriate formula / equation, conversion factors, units and the proper number of significant figures in your answer.

1. Based on weekly quiz questions. [10 points]

a.. How much heat is needed to boil 27.0 grams of water at 100 °C ?

2 pt
2
1

$$q = \Delta H_{vap} \cdot m$$

$$= 40,07 \frac{\text{kJ}}{\text{mol}} \cdot 27 \text{ g} \cdot \frac{1 \text{ mol}}{18 \text{ g}}$$

$$= 61 \text{ kJ}$$

b. How much heat is needed to heat 75 grams of water at 105 °C to 125 °C ?

2 pt
2
1

$$q = m c \Delta T$$

$$= 75 \text{ g} \left(\frac{4.184 \text{ J}}{\text{g} \cdot ^\circ\text{C}} \right) (125 - 105) \cdot ^\circ\text{C}$$

$$= 2760 \text{ J} \rightarrow 2.8 \cdot 10^3 \text{ kJ}$$

2. Based on a lab activity: using the below hypothetical experimental data

# g NaOH =	3.0
# g water =	75.0
T (initial; °C) =	19.0
T (final; °C) =	28.0

where solid sodium hydroxide was dissolved in water, determine ΔH for the reaction / process, where your answer is in units of kJ / mole. [10 points]

2 pt/5 ec

$$\Delta H = q = -m c \Delta T$$

$$= -75 \text{ g} \left(\frac{4.184 \text{ J}}{\text{g} \cdot ^\circ\text{C}} \right) (28 - 19) \cdot ^\circ\text{C}$$

$$= -2821.5 \text{ J}$$

$$\frac{-2821.5 \text{ J}}{3 \text{ g}} \cdot \frac{\text{kJ}}{10^3 \text{ J}} \cdot \frac{40 \text{ g}}{\text{mol}}$$

$$= -37.6 \text{ kJ/mol}$$

3. In regards to sea level rise: [10 points]

a. role of climate change? That is, what specific component in climate change?

4 p-1 global warming

b. two direct factors / causes? (which are related to climate change)

3 - melt glaciers

3 - heat ocean = thermal expansion of liquid

4. Based on homework problem: using the following information: (there might be extraneous information)

melting point = -114°C ; boiling point = 78°C

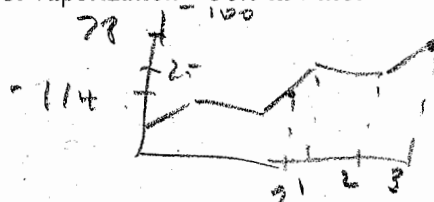
heat of fusion = 5.02 kJ/mol ; heat of vaporization = 38.6 kJ/mol

specific heat ($\text{J}/(\text{g}^{\circ}\text{C})$)

solid = 0.79

liquid = 2.3

gas = 1.4



how much heat is needed to change 23.0 grams of ethanol, $\text{C}_2\text{H}_5\text{OH}$, at 25°C to 100°C ? [20 points]

5 p-2

$$\begin{aligned} \text{i) } q_1 &= m c_{\text{liq}} \Delta T \\ &= 23\text{ g} \left(\frac{2.3\text{ J}}{\text{g}^{\circ}\text{C}} \right) (78 - 25)^{\circ}\text{C} \\ &= 2803.7\text{ J} \end{aligned}$$

$$\begin{aligned} \text{ii) } q_2 &= \Delta H_{\text{vap}} \cdot m \\ &= 38.6 \frac{\text{kJ}}{\text{mol}} \cdot 23\text{ g} \cdot \frac{\text{mol}}{46\text{ g}} \\ &= 19.3\text{ kJ} \end{aligned}$$

$$\begin{aligned} \text{iii) } q_3 &= m c_{\text{gas}} \Delta T \\ &= 23\text{ g} \left(\frac{1.4\text{ J}}{\text{g}^{\circ}\text{C}} \right) (100 - 78)^{\circ}\text{C} \\ &= 708.4\text{ J} \end{aligned}$$

$$\begin{aligned} \text{iv) } q &= \sum_{i=1}^3 q_i = (2803.7 + 19.3 + 708.4)\text{ J} \\ &= 3531.4\text{ J} \end{aligned}$$