

25 possible

Name STURMAN key
Period _____ Date _____

THERMOCHEMISTRY QUIZ

Practice in 2012!

$C_{ice} = 2.06 \text{ J/g}^\circ\text{C}$

$C_{steam} = 2.02 \text{ J/g}^\circ\text{C}$

$H_f = 334 \text{ J/g}$

$H_v = 2260 \text{ J/g}$

+4 1. If a Twix bar has 360 Calories of energy, how much energy does it have in the following units?

a) calories

$$\boxed{360,000 \text{ cal}}$$

b) joules

$$\frac{360,000 \text{ cal}}{1} \cdot \frac{4.18 \text{ J}}{1 \text{ cal}} = \boxed{1,500,000 \text{ J}}$$

c) kilojoules

$$\boxed{1,500 \text{ kJ}}$$

d) kilocalories

$$\boxed{360 \text{ kcal}}$$

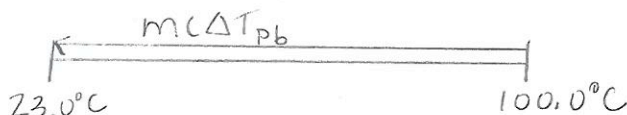
+3 2. If zinc's specific heat is $388 \text{ J/kg}^\circ\text{C}$, how much energy is needed to

a) raise 1.00 kg of zinc 1.00 Celsius degree? $\boxed{388 \text{ J}}$

b) raise 1.00 g of zinc 1.00 Celsius degree? $\boxed{.388 \text{ J}}$

c) raise 2.00 g of zinc 3.00 Celsius degrees? $2.00 \text{ g} \cdot (.388 \text{ J/g}^\circ\text{C}) \cdot (3.00^\circ\text{C}) = \boxed{2.33 \text{ J}}$

+2 3. How much energy would 467.0g of lead at 100.0°C release to its surroundings when it cooled to room temperature, 23.0°C ? ($C_{Pb} = .130 \text{ J/g}^\circ\text{C}$)



$$q = 467.0 \cdot (.130) \cdot (-77.0) = 4674.67 = \boxed{4670 \text{ J}}$$

+2 4. When 2.50kg aluminum absorbs 4589 J of energy, by how much does its temperature change? ($C_{Al} = .903 \text{ J/g}^\circ\text{C}$)

$$m = 2.50 \text{ kg} = 2500 \text{ g} \quad C_{Al} = .903 \text{ J/g}^\circ\text{C} \quad q = mC\Delta T$$
$$4589 = 2500 \cdot (.903) \Delta T$$
$$q = 4589 \text{ J} \quad \Delta T = ? \quad \boxed{\Delta T = 2.03^\circ\text{C}}$$

5. Calculate the heat evolved when 54.0kg of rocket fuel, N_2H_4 , combusts with oxygen in the following reaction:



+3 Is this reaction endothermic or exothermic?

$$\frac{54.0 \text{ kg}}{1} \cdot \frac{10^3 \text{ g}}{1 \text{ kg}} \cdot \frac{1 \text{ mol}}{32.06 \text{ g}} = 1684 \text{ mol N}_2\text{H}_4$$

$$\frac{-618 \text{ kJ}}{1 \text{ mol}} = \frac{x \text{ kJ}}{1684 \text{ mol}} \Rightarrow x = 1,040,712 \Rightarrow \boxed{-1.04 \times 10^6 \text{ J}}$$

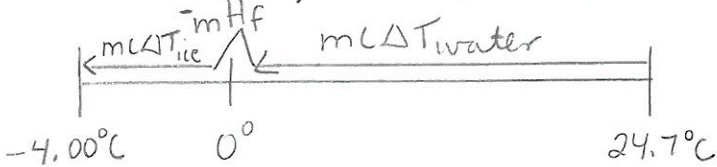
22 1/2 - 25.4
 20 - 22 1/4 B
 17 1/2 - 19 3/4 C
 15 - 17 1/4 D ≤ 14 3/4 F

+2 6. How much energy does a 2.00 kg block of ice absorb from the cooler air and the food when it melts?



$$q = m H_f = 2000g(334 \text{ J/g}) = \boxed{668,000 \text{ J}}$$

+3 7. How much energy does your freezer remove from 85.0ml of water, at 24.7°C, to make ice at -4.00°C?



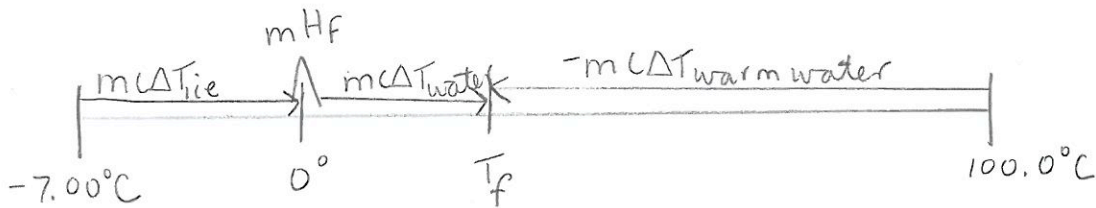
$$q = 85.0(4.18)(-24.7) + 85.0(334) + 85.0(2.06)(-4.00) = -37866.31 \Rightarrow \boxed{-37,900 \text{ J}}$$

+2 8. How much energy does your sweat absorb from your skin when the sweat evaporates? You have 4.78g of sweat, which is essentially water, on your skin.



$$q = 4.78g(2260 \text{ J/g}) = 10802.8 \Rightarrow \boxed{10,800 \text{ J}}$$

+4 9. Find the final temperature of your water when you put in 50.0g of ice, at -7.00°C into your 759g of water at 100.0°C.



$$50.0(2.06)(7.00) + 50.0(334) + 50.0(4.18)(T_f) = -759(4.18)(T_f - 100.0^\circ)$$

$$17421 + 209 T_f = -3172.62 (T_f - 100.0^\circ)$$

$$17,421 + 209 T_f = -3172.62 T_f + 317,262$$

$$-17,421 + 3172.62 \quad +3172.62 \quad -17,421$$

$$3381.62 T_f = 299841$$

$$\boxed{T_f = 88.7^\circ \text{C}}$$