

Use this handout. I have put in Sturman BHS
data for you. Also, answer ranges.

Name _____
Lab Partners _____
Period _____
Date _____

THE BIG BANG

How much energy does it take to pop a kernel of popcorn?

POPCORN FACTS:

- *A popcorn kernel is about 14% water.
- *A popcorn kernel pops at about 175°C.

TASK: Calculate how much energy it takes to pop one kernel of popcorn. Include a heat diagram with your answer.

DATA:

Popcorn's mass 12.8 g/100 kernels

Water's mass _____

Initial temperature 21.5° °C

Final temperature 175° °C

Specific Heat 4.18 J/g°C

Calculations: (50-55J)

Discussion Questions:

1. If the energy per pop was used to accelerate a stationary baseball ($m = .150$ kg), what would be its final speed? Plug Q from above in for KE . Use $KE = \frac{1}{2}mv^2$
(20-30 m/s)
2. If the same energy was used to throw a 1.00 kg object straight up, how high would it go (disregarding air resistance)? $Q = PE$ $PE = mgh$ (5-5.5 m)

PRACTICE QUIZ

Name _____

Period _____ Date _____

THERMOCHEMISTRY QUIZ

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

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

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

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

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

- a) calories b) joules c) kilojoules d) kilocalories

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?

b) raise 1.00 g of zinc 1.00 Celsius degree?

c) raise 2.00 g of zinc 3.00 Celsius degrees?

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 ? ($c_{Pb} = .130\text{J/g}^\circ\text{C}$)

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

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



Is this reaction is endothermic or exothermic?

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

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

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.

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 .