

Unit 2

NAME

Class Work

10/20/13

2.12 Heating for Temperature Change

SPARK

1. The amount of energy required to change a unit mass of a solid to a liquid at constant temperature is called the heat of _____.
2. The heat of fusion of a compound is 333.6 J/g . What is the total number of J of heat that must be absorbed by a 15 gram sample to change the compound from S to L at its melting point.

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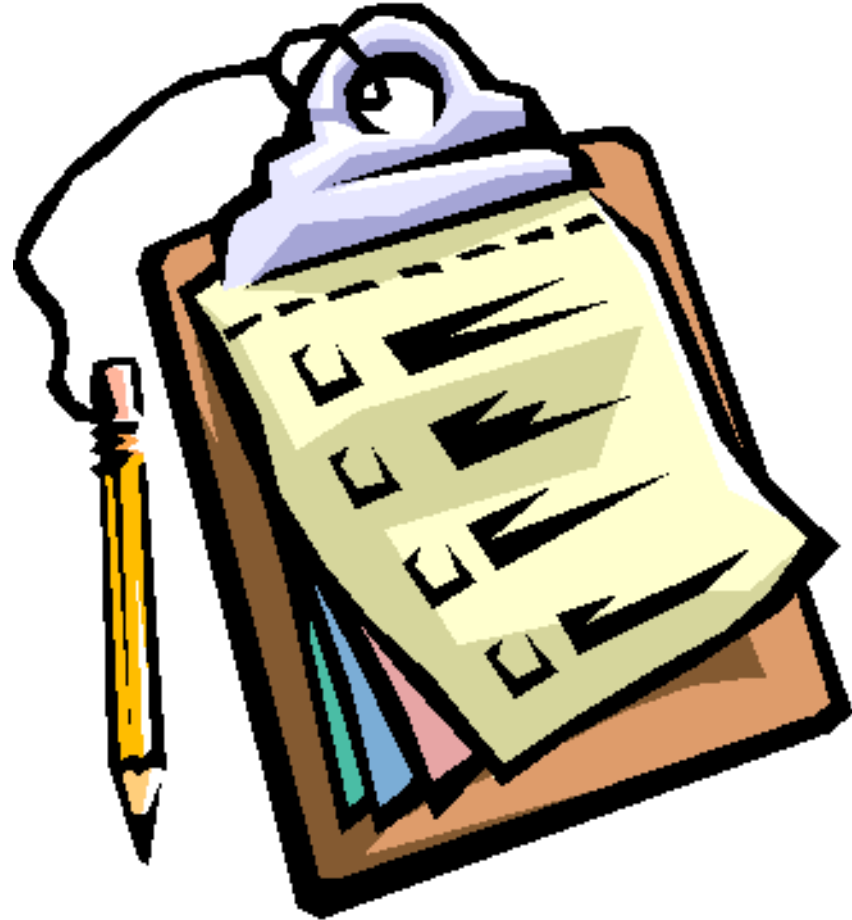
Objective

Misconceptions:

- the process is not a heating curve - a heating curve is used to represent the process of heating!
- It's not flat molecules! When the line is flat, the molecules are going through a phase change!
- Releasing energy = releasing heat = getting COLDER!

Agenda:

- Objective
- Notes
- Practice
- Homework



Specific Heat Capacity (C)

is the amount of heat required to raise the temperature of 1 gram of a substance by 1°C

Specific Heat Capacity units

$$\frac{\text{J}}{\text{g} \cdot ^\circ\text{C}}$$

Calculating Heat Energy

$$q = m C \Delta T$$

REFERENCE TABLE T

required to raise the temperature of 1g of the substance by 1°C.

$$\Delta T = T_{\text{final}} - T_{\text{initial}}$$

Examples of Specific Heat Capacity

Aluminum: $0.90 \text{ J/g}\cdot^{\circ}\text{C}$

Ethanol: $2.44 \text{ J/g}\cdot^{\circ}\text{C}$

Bone: $0.440 \text{ J/g}\cdot^{\circ}\text{C}$

Wood: $1.70 \text{ J/g}\cdot^{\circ}\text{C}$

Asphalt: $0.920 \text{ J/g}\cdot^{\circ}\text{C}$

Why does the pavement get so hot so

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Heat Absorbed and Released

$-q$ = heat released

$+q$ = heat absorbed

Example

1. How many joules of heat energy are absorbed when 30.0 grams of water are heated from 15.5°C to a final temperature of 72.8°C?

Your Turn!

2. How many joules of heat energy are released when 75.3 grams of water are cooled from an initial temperature of 50.0°C to a final temperature of 25.0°C ?

Keep it up!

3. If a cup of water was heated from 25°C to 60.0°C by absorbing 17,543 J of heat, what is the mass of the water being heated, what is the mass of the water being heated?

CHALLENGE

- An ice cube at $-25\text{ }^{\circ}\text{C}$ is heated to steam at $135\text{ }^{\circ}\text{C}$. How much heat is required to make this change?

Practice

- Continue working on 2.12 WS

The specific heat capacity of ethanol is $2.44 \text{ J/(g}^\circ\text{C)}$. Why is more heat required to raise the temperature of a given mass of water a given number of degrees than is needed to raise the same mass of ethanol (a liquid) by the same number of degrees?

- If the temperature of 34.4 g of ethanol increases from 25.0°C to 78.8°C, how much heat has been absorbed by the ethanol?

- A 4.50-g nugget of pure gold absorbed 276 J of heat. What was the final temperature of the gold if the initial temperature was 25.0°C? The specific heat capacity of gold is 0.129 J/(g*°C)

- A 155-g sample of an unknown substance was heated from 25.0°C to 40.0°C . In the process, the substance absorbed 5696 J of energy. What is the specific heat of the substance?

HOMEWORK

Complete WS