

Sep 25-4:31 PM

$$10 \text{ g ice} \times \frac{1 \text{ mol}}{18.0 \text{ g}} \times \frac{6.01 \text{ kJ}}{1 \text{ mol}}$$

$$3.335 \text{ kJ} \quad 3335 \text{ J}$$

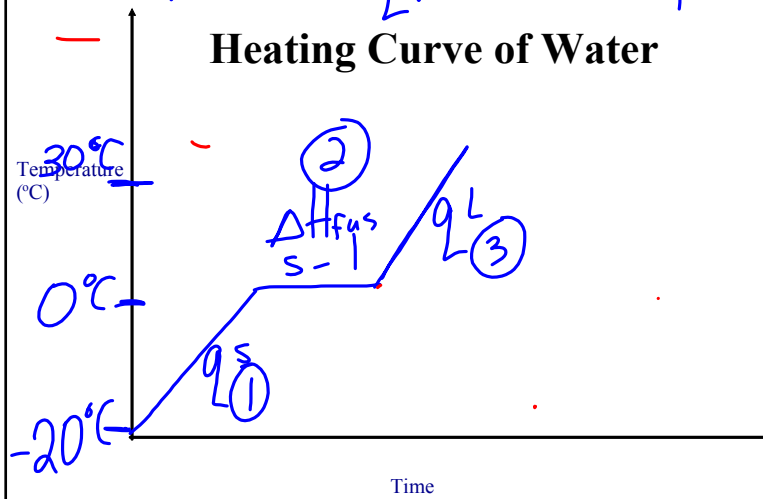
Oct 10-2:38 PM

What we've looked at so far...

- Energy changes when the temperature changes (heating water from 20 °C to 50°C)
- Energy changes when the temperature remains the same. (melting of ice at 0°C)

What if you heat 10. g of ice at -20. °C until it is water at 30.°C?

$$\Delta E_{\text{Total}} = q_s + \Delta H_{\text{fus}} + q_L$$



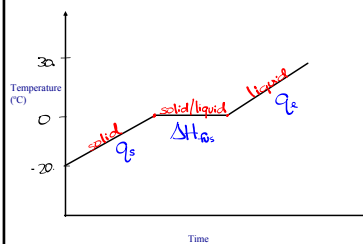
Oct 21-1:13 PM

What we've looked at so far...

- Energy changes when the temperature changes (heating water from 20 °C to 50°C)
- Energy changes when the temperature remains the same. (melting of ice at 0°C)

What if you heat 10.0g of ice at -20.°C until it is water at 30.°C?

Heating Curve of Water



$$\Delta E_{\text{total}} (\Delta E_{\text{total}}) = q_{\text{(solid, liquid, gas)}} + \Delta H_{\text{(solid, liq, cond, vsp)}}$$

$$\Delta E_{\text{total}} = q_s + \Delta H_{\text{fus}} + q_L$$

solid *liq*

$$q_s = mC\Delta T$$

$$q_s =$$

$$q_s =$$

$$q_L = mC\Delta T$$

$$q_L =$$

$$q_L =$$

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Heat 10.0g of ice at -20°C until water at 30°C

$$\Delta E_{\text{Total}} = q_{\text{solid}} + \Delta H_{\text{fus}} + q_{\text{liquid}}$$

$$= 0.420 \text{ kJ} + 3.34 \text{ kJ} + 1.25 \text{ kJ}$$

$$= 5.01 \text{ kJ}$$

$$q_{\text{solid}} = m \cdot c \cdot \Delta T$$

$$10.0 \text{ g} \times 2.10 \text{ J/g}^{\circ}\text{C} \times 20^{\circ}\text{C}$$

$$= 420 \text{ J} \quad 0.420 \text{ kJ}$$

$$q_{\text{liquid}} = m \cdot c \cdot \Delta T$$

$$10.0 \text{ g} \times 4.18 \text{ J/g}^{\circ}\text{C} \times 30^{\circ}\text{C}$$

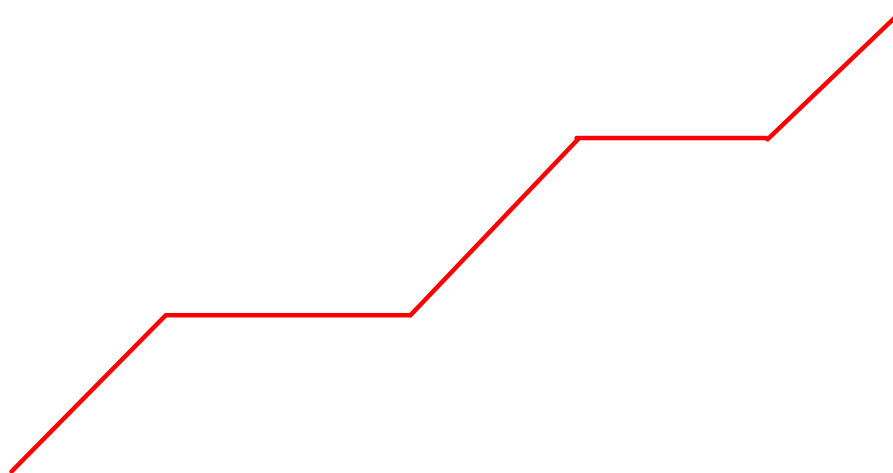
$$= 1254 \text{ J} \quad 1.254 \text{ kJ}$$

$$\Delta H_{\text{fus}} = 10.0 \text{ g} \times \frac{1 \text{ mol}}{18.0 \text{ g}} \times \frac{6.01 \text{ kJ}}{\text{mol}}$$

$$= 3.34 \text{ kJ}$$

Mar 13-3:35 PM

What could this represent for a heating curve of water?



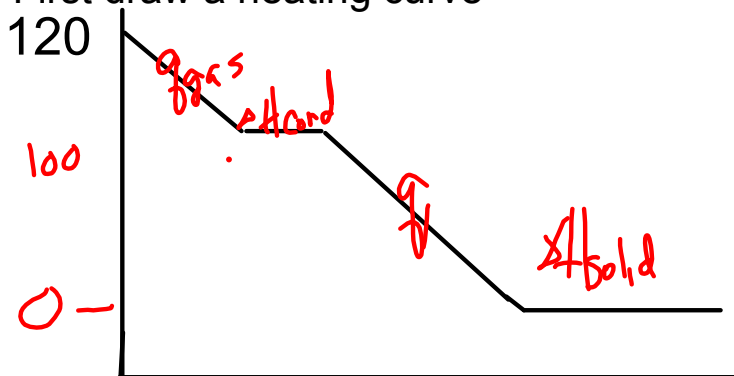
Mar 26-12:15 PM

Total Energy Changes

Ex. Calculate the total energy change if 2.50 g of steam at 120.0°C is completely converted to ice at 0.00 °C.

$$\Delta E_{\text{total}} = q_{\text{gas}} + \Delta H_{\text{cond}} + q_{\text{l}} + \Delta H_{\text{solid}}$$

First draw a heating curve



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Ex #1

Calculate total Energy if 2.50g of steam at 120.0°C is completely converted to ice at 0.0°C

$$\Delta E_{\text{Total}} = q_{\text{gas}} + \Delta H_{\text{cond}} + q_{\text{liquid}} + \Delta H_{\text{solid}}$$

$$= -85\text{J} + -5650\text{J} + -1045\text{J} + -834\text{J}$$

$$= -7614\text{J} = -7.61\text{KJ}$$

$$q_{\text{gas}} = 2.50\text{g} \times 1.7\text{J/g}\cdot\text{C} \times -20\text{C} = -85\text{J}$$

$$\Delta H_{\text{cond}} = 2.50\text{g} \times \frac{1\text{mol}}{18.02\text{g}} \times \frac{-40.7\text{KJ}}{1\text{mol}} = -5.65\text{KJ}$$

$$q_{\text{liquid}} = 2.50\text{g} \times 4.18\text{J/g}\cdot\text{C} \times (-100\text{C}) = -1045\text{J}$$

$$\Delta H_{\text{solid}} = 2.50\text{g} \times \frac{1\text{mol}}{18.02\text{g}} \times \frac{-6.01\text{KJ}}{1\text{mol}} = -0.834\text{KJ}$$

Mar 13-3:37 PM

Total Energy Changes

Ex. Calculate the total energy change if 2.50 g of steam at 120.0°C is completely converted to ice at 0.0°C.

$$\Delta E_{\text{total}} =$$

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Homework

Section Review 17.3

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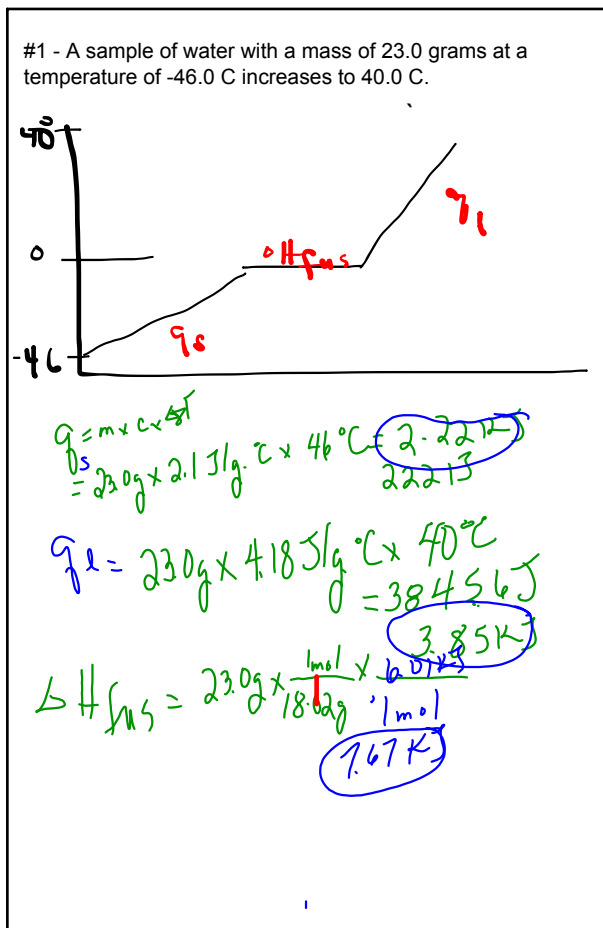
#1 - A sample of water with a mass of 23.0 grams at a temperature of -46.0 C increases to 40.0 C.

- A) sketch out a heat curve
- B) Calculate the total heat needed.

#2 - A 10.0 kg grams of steam at a temperature of 130.0 C is converted to ice at a final temperature of -15.0 C.

- A) sketch out a heat curve
- B) Calculate the total energy change.

Mar 13-9:29 AM

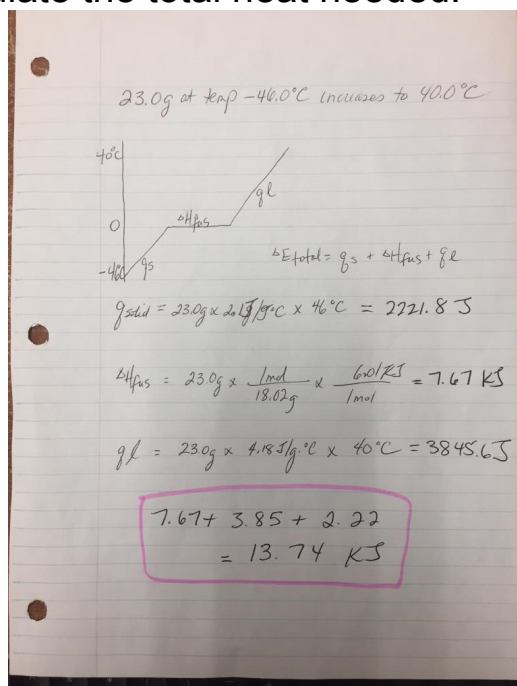


Mar 15-8:54 AM

A sample of water with a mass of 23.0 grams at a temperature of -46.0 C increases to 40.0 C .

A) sketch out a heat curve

B) Calculate the total heat needed.

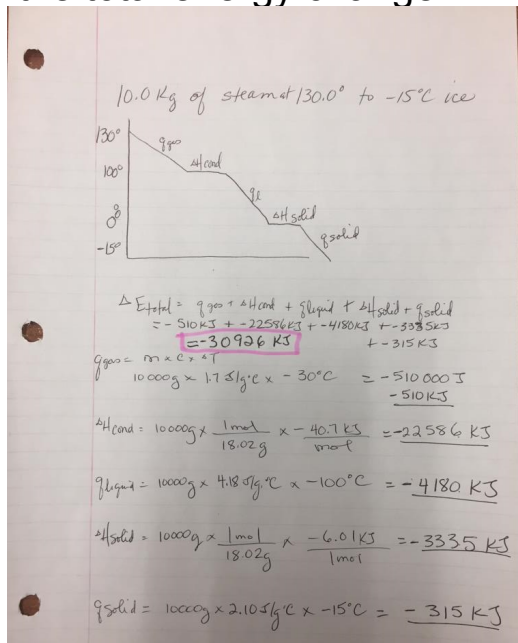


Oct 11-8:50 AM

A 10.0 kg grams of steam at a temperature of 130.0 C is converted to ice at a final temperature of -15.0 C.

A) sketch out a heat curve

B) Calculate the total energy change.



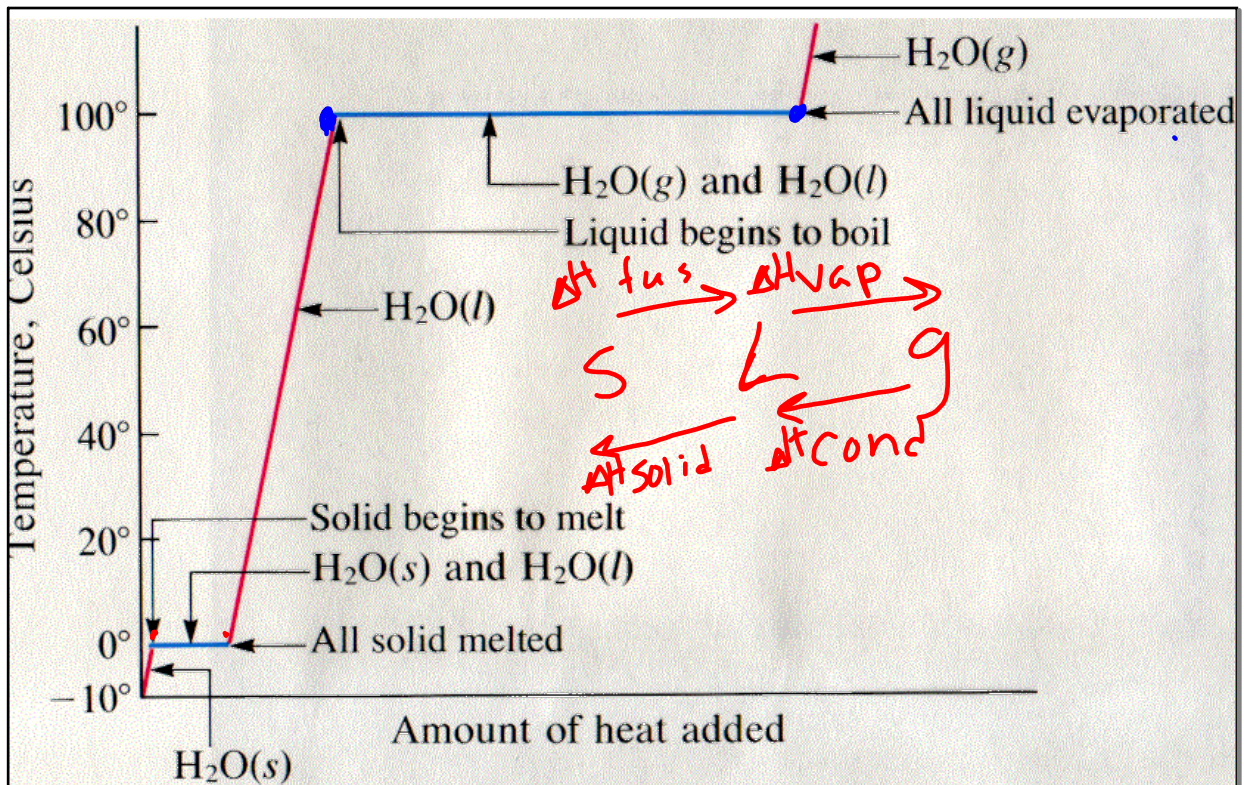
Oct 11-8:50 AM

Worksheet

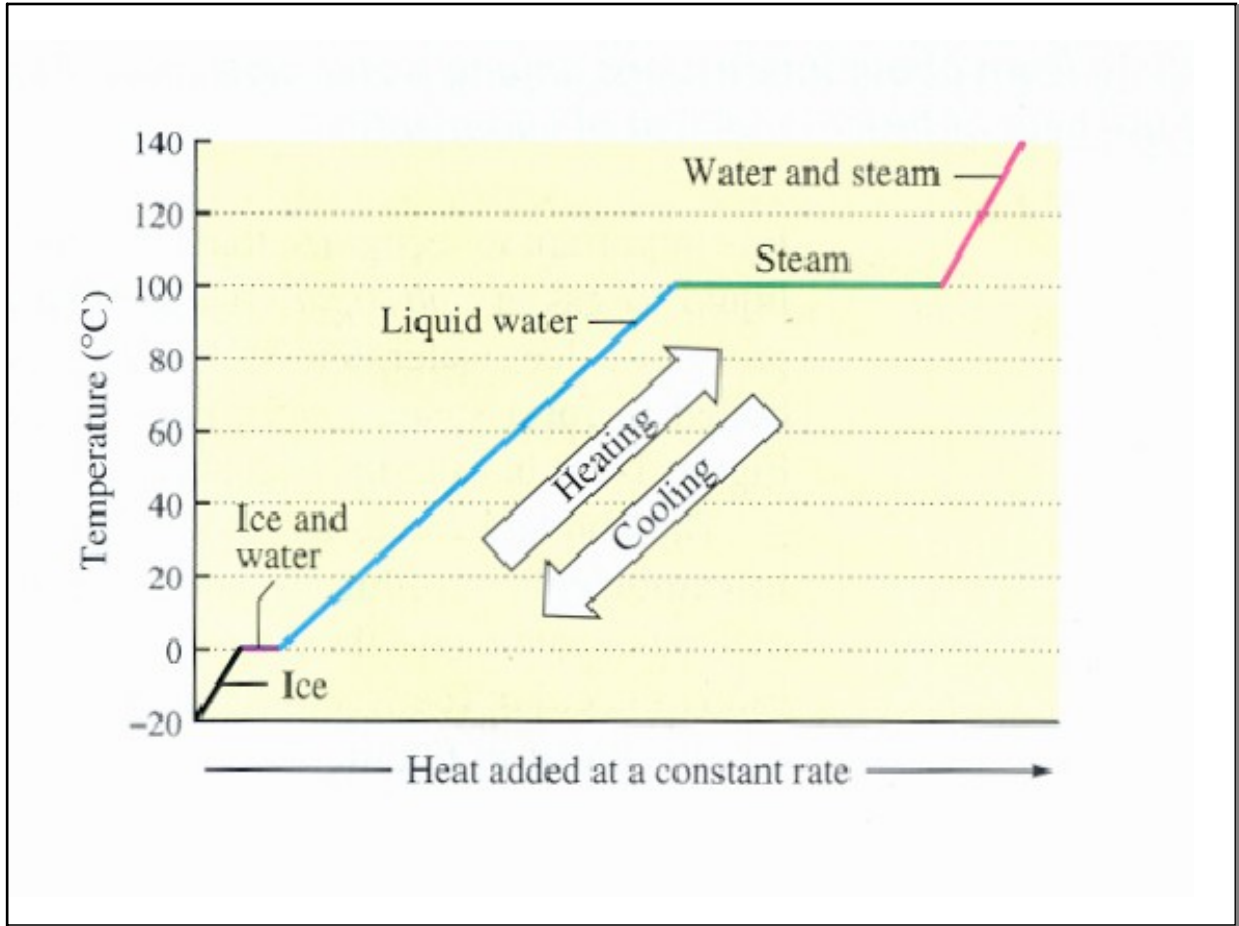
Oct 22-6:26 PM

Inert -A substance that is not chemically reactive.

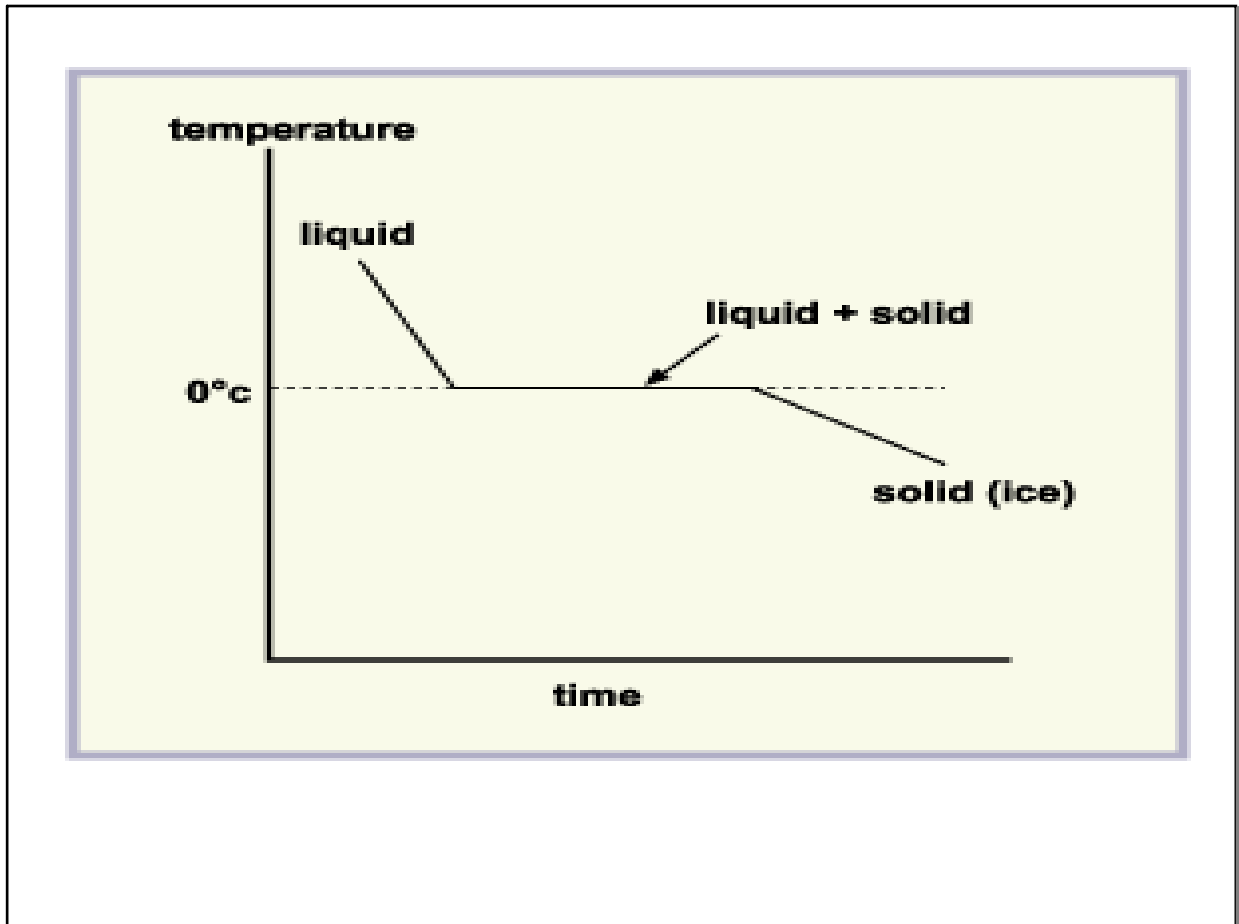
Oct 24-10:41 AM



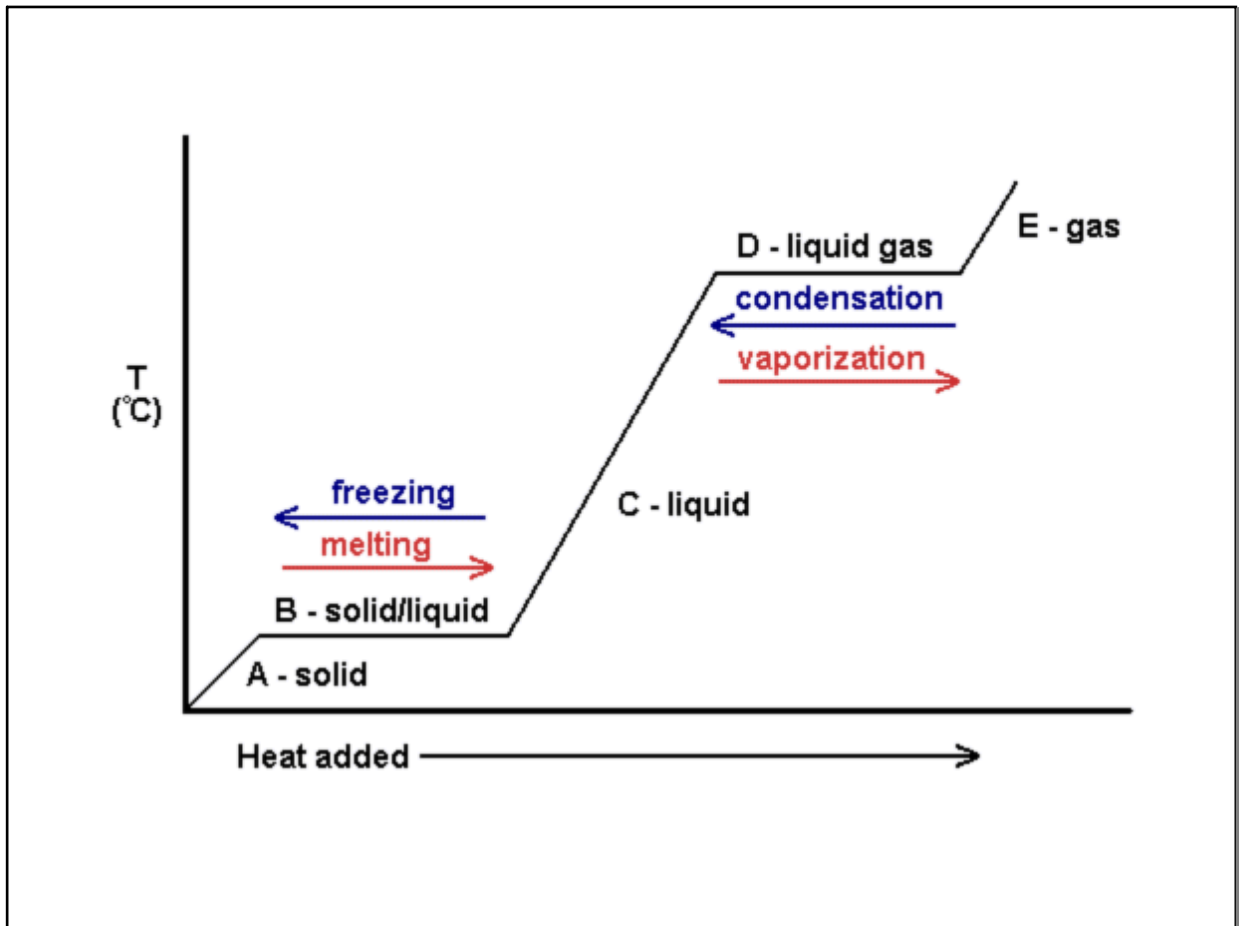
Oct 16-1:35 PM



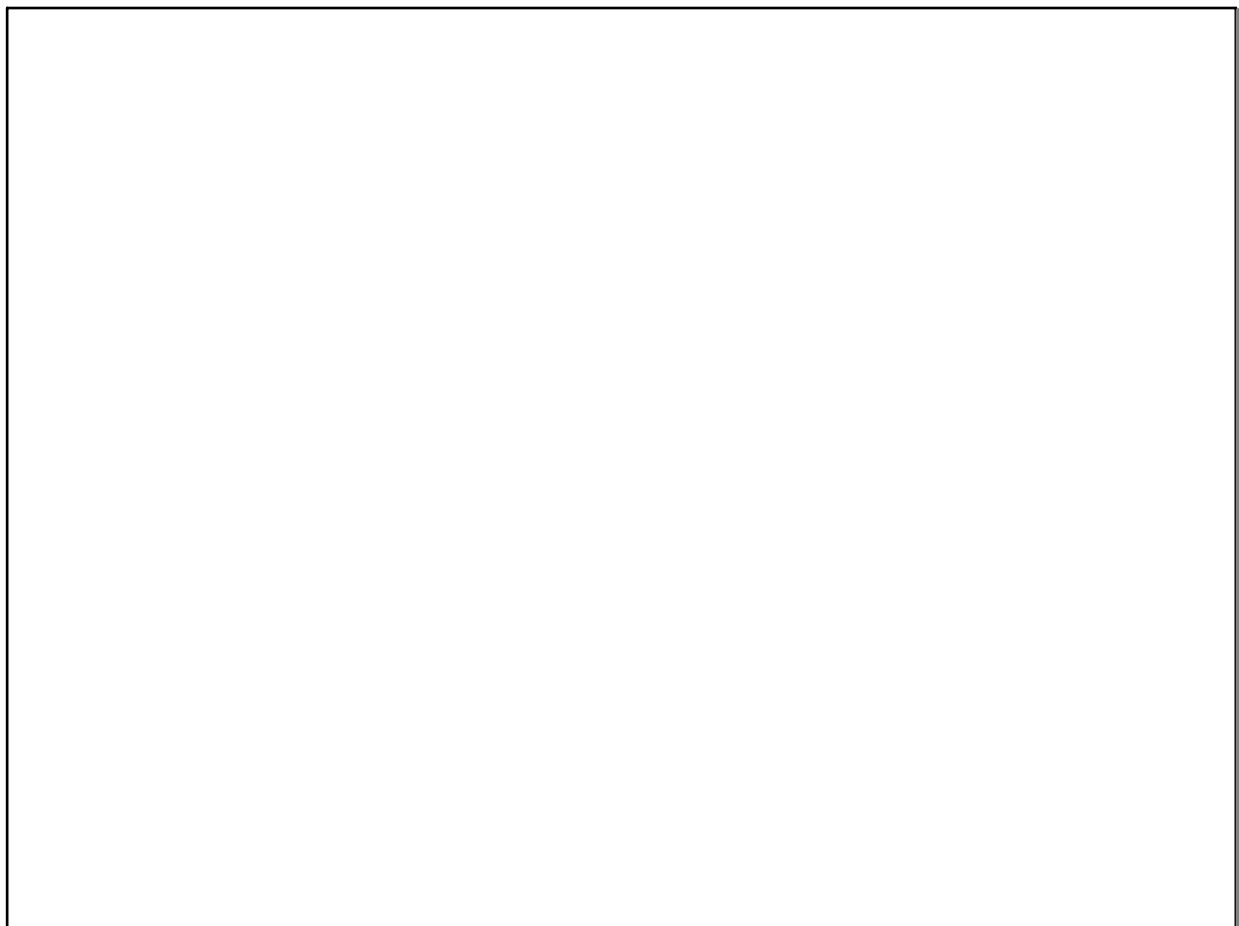
Oct 16-1:41 PM



Oct 16-1:42 PM



Mar 16-10:40 PM



Sep 25-4:21 PM

Attachments

Heat in Changes of State.pptx