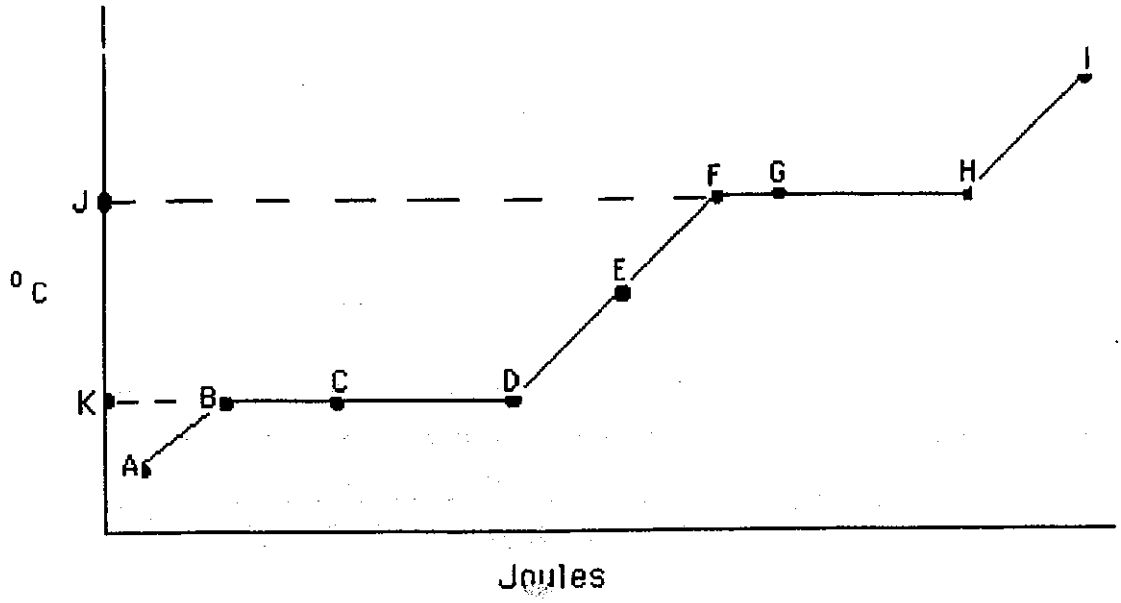
WORKSHEET 18

Name_____
last first



1 From the figure above answer the following questions:

a. Identify by letter the freezing point (_K_) and the boiling point (__J_)

b. Circle the following points where the substance is entirely a liquid A C (E) G

c. Circle the following points where the substance is partly gas and partially liquid B C E (G) I

d. What type of bond (forces) are being broken between points C-->D if the substance is water

Intermolecular forces = hydrogen bond

2. How many kilojoles are required to warm 65 kilograms of water from 20°C to 35°C?

$$6.5 \times 10^4 \text{ g} \times \frac{4.184 \text{ J}}{\text{g} \cdot {}^\circ\text{C}} \times (35 - 20)^\circ\text{C} = 4.1 \times 10^3 \text{ KJ}$$

Answer _____

3. How many joules are needed to change 7.25 g of ice at 0.0°Cto liquid water at 50.0°C

$$7.25 \text{ g} \times \frac{335 \text{ J}}{\text{g}} = 2.43 \times 10^3 \text{ J}$$

$$7.25 \text{ g} \times \frac{4.184 \text{ J}}{\text{g} \cdot {}^\circ\text{C}} \times (50.0 - 0.0)^\circ\text{C} = 1.52 \times 10^3 \text{ J}$$

$$J_{total} = 1.52 \times 10^3 \text{ J} + 2.43 \times 10^3 \text{ J} = 3.95 \times 10^3 \text{ J}$$

Answer _____

4. 5.00 grams of ice at 0.0°C are heated to 90.0 °C. How many joules must be added to cause this change?

$$5.00 \text{ g} \times \frac{335 \text{ J}}{\text{g}} = 1.68 \times 10^3 \text{ J}$$

$$5.00 \text{ g} \times \frac{4.184 \text{ J}}{\text{g} \cdot {}^\circ\text{C}} \times (90.0 - 0.0)^\circ\text{C} = 1.88 \times 10^3 \text{ J}$$

$$J_{total} = 1.68 \times 10^3 \text{ J} + 1.88 \times 10^3 \text{ J} = 3.56 \times 10^3 \text{ J}$$

Answer _____

5. How many joules must be added to 50.0 grams of ice at -10°C to melt and raise the temperature to 99°C

$$50.0\ g \times \frac{2.059\ J}{g\ \cdot °C} \times (0 - (-10))°C = 1.03 \times 10^3\ J$$

$$50.0\ g \times \frac{335\ J}{g} = 1.68 \times 10^4\ J$$

$$50.0\ g \times \frac{4.184\ J}{g\ \cdot °C} \times (99 - 0)°C = 2.07 \times 10^4\ J$$

$J_{total} = 1.03 \times 10^3\ J + 1.68 \times 10^4\ J + 2.07 \times 10^4\ J = 3.85 \times 10^4\ J$

Answer _____

6. How many joules are released when 5.55 g of steam at 100°C is condensed and cooled to 10.0°C

$$5.55\ g \times \frac{2260\ J}{g} = -1.25 \times 10^4\ J \text{ released}$$

$$5.55\ g \times \frac{4.184\ J}{g\ \cdot °C} \times (10.0 - 100.0)°C = -2.09 \times 10^3\ J \text{ released}$$

$J_{total} = (-1.25 \times 10^4\ J) + (-2.09 \times 10^3\ J) = -1.46 \times 10^4\ J$ {The neg. sign indicates heat is released}

Answer _____

7. To what temperature will liquid be raised when 2050 joules are added to 4.00 grams of ice at 0.0°C?

$$4.00\ g \times \frac{335\ J}{g} = 1340\ J \text{ ---> used to melt the ice}$$

$2050\ J - 1340\ J = 710\ J$ remaining

$$\text{Heat} = 710\ J = 4.00\ g \times \frac{4.184\ J}{g\ \cdot °C} \times (T_{final} - 0.0)°C$$

$T_{final} = 42.4\ °C$

Answer _____