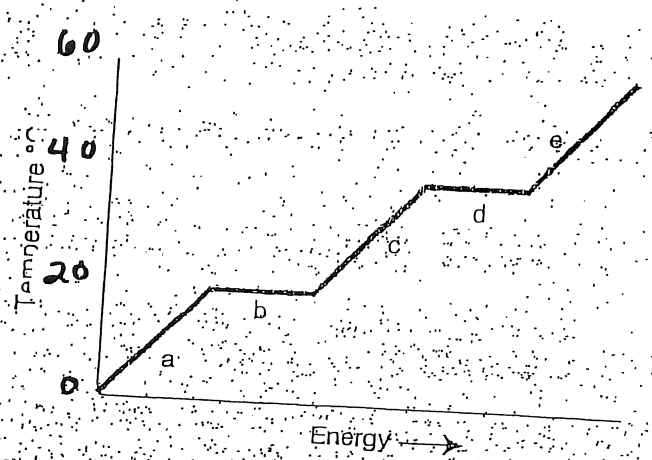
FREEZING AND BOILING POINT GRAPH

Name _____



Answer the following questions using the chart above.

1. What is the freezing point of the substance? _____
2. What is the boiling point of the substance? _____
3. What is the melting point of the substance? _____
4. What letter represents the range where the solid is being warmed? _____
5. What letter represents the range where the liquid is being warmed? _____
6. What letter represents the range where the vapor is being warmed? _____
7. What letter represents the melting of the solid? _____
8. What letter represents the vaporization of the liquid? _____
9. What letter(s) shows a change in potential energy? _____
10. What letter(s) shows a change in kinetic energy? _____
11. What letter represents condensation? _____
12. What letter represents crystallization? _____

Thermochemistry

Changes in Heat Energy

1. How much heat is lost as a 500. g cube of aluminum is cooled from 200.°C to 25.0°C? The specific heat for aluminum is 0.897 J/g·°C.

2. How much heat is gained as 200. g of ethanol are heated from 25.0°C to 37.0°C? The specific heat for ethanol is 2.438 J/g·°C.

3. A sample of walnuts is burned in a bomb calorimeter. The calorimeter contains 3.500 kg of water, and its temperature increases from 22.0°C to 72.0°C. What is the energy content of the walnut sample?

4. What mass of hydrogen must be reacted with excess nitrogen to produce 5000. J of energy?

$$3H_2(g) + N_2(g) \longrightarrow 2NH_3(g) + 2709\ J$$

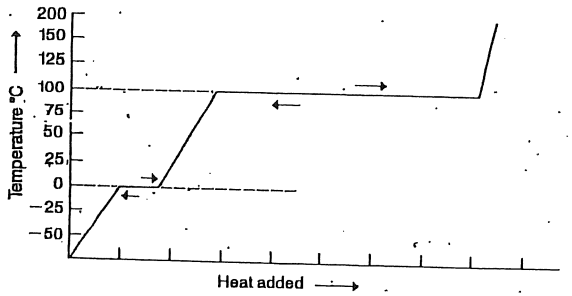
5. What mass of iron must be reacted with excess oxygen to produce 300.0 kJ of heat energy?

$$4Fe(s) + 3O_2(g) \longrightarrow 2Fe_2O_3(s) + 1644\ kJ$$

6. What mass of sodium must be reacted with excess water to produce 1000. kJ of heat energy?

$$2Na(s) + 2H_2O(l) \longrightarrow 2NaOH(aq) + H_2(g) + 282\ kJ$$

Heating – Cooling Curves

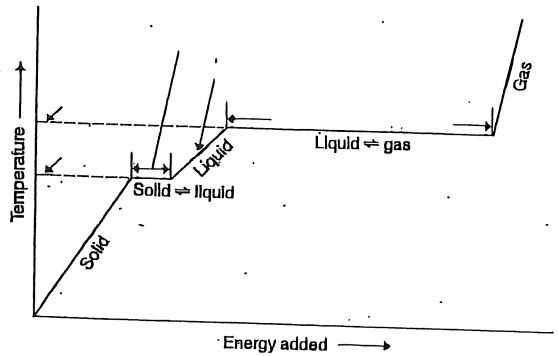


1. Use these terms to label the curve.

solid
liquid
gas

boiling
condensing
melting

freezing
boiling point
melting point



2. Use these terms to label the curve.

boiling point
freezing point

heat of fusion
heat of vaporization

specific heat of solid
specific heat of liquid
specific heat of gas

Thermochemical Equations

Name _____

If a compound is mixed with water and the compound dissolves raising the temperature of the mixture, what word describes this process? _____

$2\,NaHCO_3 + 129\ kJ \rightarrow Na_2CO_3 + H_2O + CO_2$

Is this reaction endothermic or exothermic? _____

If this reaction were written without the energy on the reactant side and written as a ΔH, what would the sign of the ΔH be? _____

If 3.6 grams of water are produced, how much energy would be involved?

$CH_4 + O_2 \rightarrow CO_2 + H_2O \quad \Delta H = -890.4\ kJ$

How much energy is produced when 0.32 moles of methane burn?