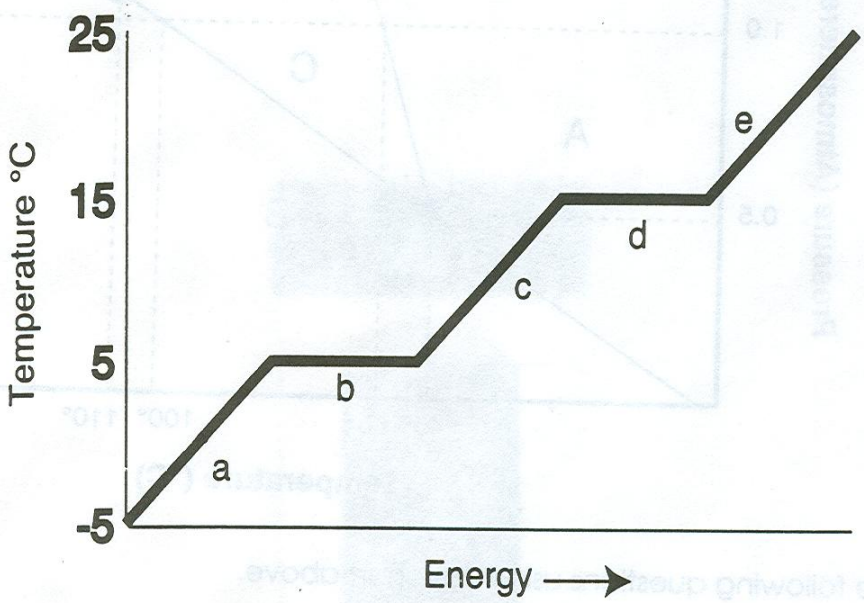
FREEZING AND BOILING POINT GRAPH

Name _____

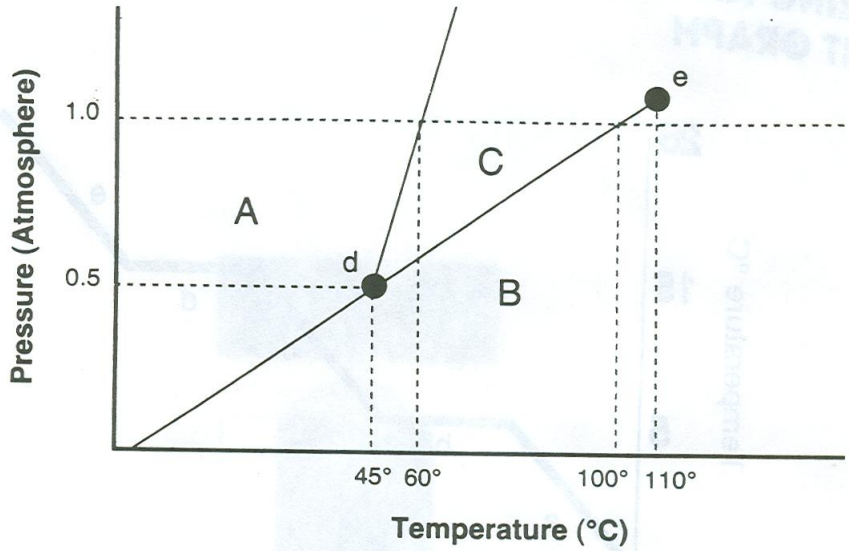


Answer the following questions using the chart above.

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? _____

PHASE DIAGRAM

Name _____



Answer the following questions using the chart above.

1. What section represents the solid phase? _____
2. What section represents the liquid phase? _____
3. What section represents the gas phase? _____
4. What letter represents the triple point? _____
5. What letter represents the critical point? _____
6. What is this substance's normal melting point? _____
7. What is this substance's normal boiling point? _____
8. Above what temperature is it impossible to liquify this substance no matter what the pressure? _____
9. At what temperature and pressure do all three phases coexist? _____
10. Is the density of the solid greater than or less than the density of the liquid? _____
11. Would an increase in pressure cause this substance to freeze or melt? _____

HEAT AND ITS MEASUREMENT

Name _____

Heat (or energy) can be measured in units of calories or joules. When there is a temperature change (ΔT), heat (Q) can be calculated using this formula:

Q = mass x ΔT x specific heat capacity
(ΔT = Final Temp - Initial Temp)

During a phase change, we use this formula:

Q = mass x heat of fusion (or heat of vaporization)

Solve the following problems.

1. How many joules of heat are given off when 5.0 g of water cool from 75° C to 25° C? (Specific heat of water = 4.18 j/g° C)

_____

2. How many calories are given off by the water in Problem 1? (Specific heat of water = 1.0 cal/g° C)

_____

3. How many joules does it take to melt 35 g of ice at 0° C? (heat of fusion = 333 j/g)

_____

4. How many calories are given off when 85 g of steam condense to liquid water? (heat of vaporization = 539.4 cal/g)

_____

5. How many joules of heat are necessary to raise the temperature of 25 g of water from 10° C to 60° C?

_____

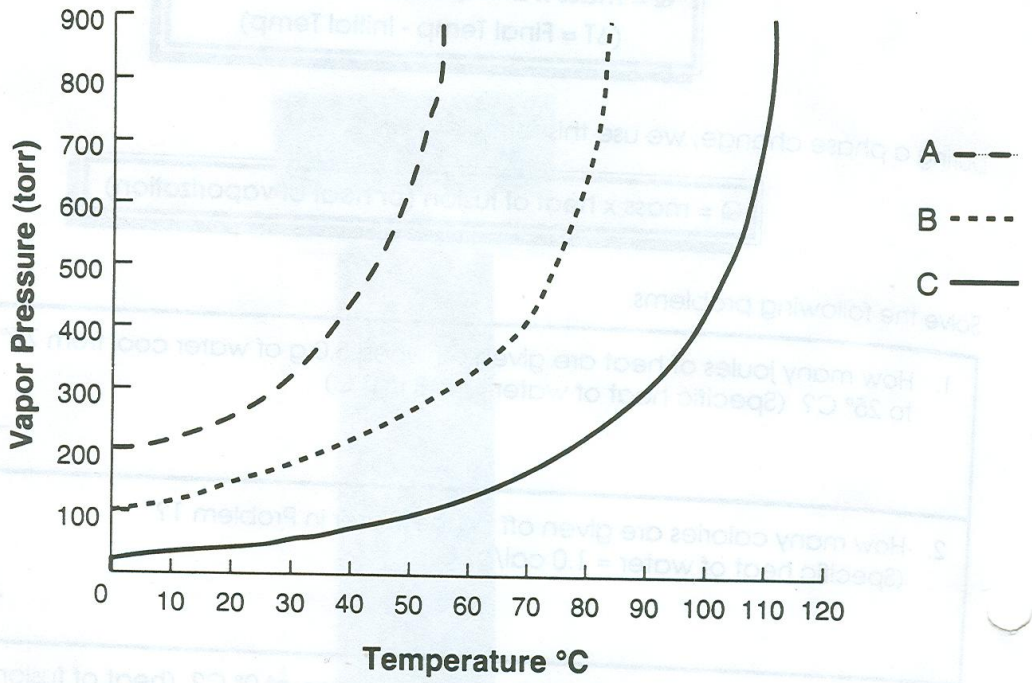
6. How many calories are given off when 50 g of water at 0° freezes? (heat of fusion = 79.72 cal/g)

_____

VAPOR PRESSURE AND BOILING

Name _____

A liquid will boil when its vapor pressure equals atmospheric pressure. Answer the questions following the graph.

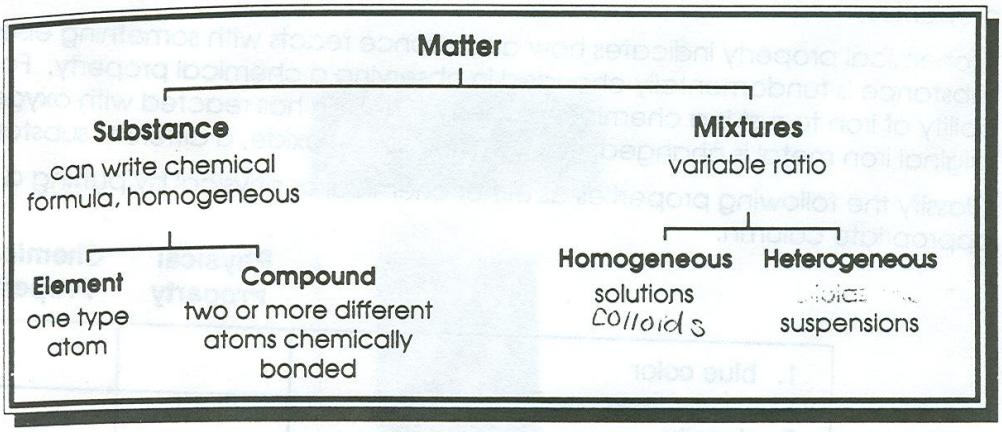


1. At what temperature would Liquid A boil at an atmospheric pressure of 400 torr? _____
2. Liquid B? _____
3. Liquid C? _____
4. How low must the atmospheric pressure be for Liquid A to boil at 35° C? _____
5. Liquid B? _____
6. Liquid C? _____
7. What is the normal boiling point of Liquid A? _____
8. Liquid B? _____
9. Liquid C? _____
10. Which liquid has the strongest intermolecular forces? _____

MATTER—SUBSTANCES VS. MIXTURES

Name _____

All matter can be classified as either a substance (element or compound) or a mixture (heterogeneous or homogeneous).



Classify each of the following as to whether it is a substance or a mixture. If it is a substance, write Element or Compound in the substance column. If it is a mixture, write Heterogeneous or Homogeneous in the mixture column.

Type of Matter	Substance	Mixture
1. chlorine		
2. water		
3. soil		
4. sugar water		
5. oxygen		
6. carbon dioxide		
7. rocky road ice cream		
8. alcohol		
9. pure air		
10. iron		

PHYSICAL VS. CHEMICAL PROPERTIES

Name _____

A physical property is observed with the senses and can be determined without destroying the object. For example, color, shape, mass, length and odor are all examples of physical properties.

A chemical property indicates how a substance reacts with something else. The original substance is fundamentally changed in observing a chemical property. For example, the ability of iron to rust is a chemical property. The iron has reacted with oxygen, and the original iron metal is changed. It now exists as iron oxide, a different substance.

Classify the following properties as either chemical or physical by putting a check in the appropriate column.

	Physical Property	Chemical Property
1. blue color		
2. density		
3. flammability		
4. solubility		
5. reacts with acid to form H_2		
6. supports combustion		
7. sour taste		
8. melting point		
9. reacts with water to form a gas		
10. reacts with a base to form water		
11. hardness		
12. boiling point		
13. can neutralize a base		
14. luster		
15. odor		

Name _____

PHYSICAL VS. CHEMICAL CHANGES

In a physical change, the original substance still exists, it has only changed in form. In a chemical change, a new substance is produced. Energy changes always accompany chemical changes.

Classify the following as being a physical or chemical change.

1. Sodium hydroxide dissolves in water. _____
2. Hydrochloric acid reacts with potassium hydroxide to produce a salt, water and heat. _____
3. A pellet of sodium is sliced in two. _____
4. Water is heated and changed to steam. _____
5. Potassium chlorate decomposes to potassium chloride and oxygen gas. _____
6. Iron rusts. _____
7. When placed in H_2O, a sodium pellet catches on fire as hydrogen gas is liberated and sodium hydroxide forms. _____
8. Evaporation _____
9. Ice melting _____
10. Milk sours. _____
11. Sugar dissolves in water. _____
12. Wood rotting _____
13. Pancakes cooking on a griddle _____
14. Grass growing in a lawn _____
15. A tire is inflated with air. _____
16. Food is digested in the stomach. _____
17. Water is absorbed by a paper towel. _____