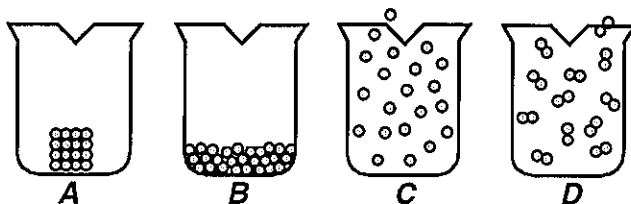


Name: _____

Questions 1 through 6 refer to the following:

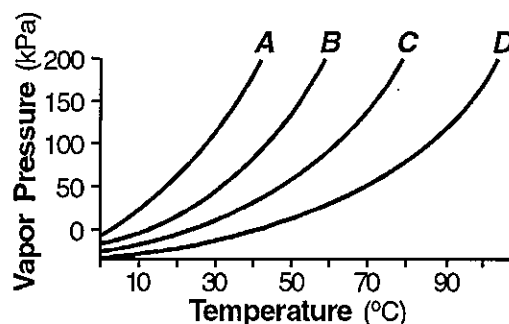
The particle diagrams below represent elements at STP.



- Which particle diagram *best* represents a substance in the solid state?
 - A
 - B
 - C
 - D
- Which particle diagram *best* represents copper?
 - A
 - B
 - C
 - D
- Which particle diagram *best* represents mercury?
 - A
 - B
 - C
 - D
- Which particle diagram *best* represents a monoatomic gas?
 - A
 - B
 - C
 - D
- Which particle diagram *best* represents a diatomic gas?
 - A
 - B
 - C
 - D
- Which particle diagram represents the sample of matter having the *lowest* entropy?
 - A
 - B
 - C
 - D
- A 1-gram sample of which substance in a sealed 1-liter container will occupy the container completely and uniformly?
 - $\text{H}_2\text{O}(\ell)$
 - $\text{Ag}(\text{s})$
 - $\text{Hg}(\ell)$
 - $\text{H}_2\text{O}(\text{g})$
- Under the same conditions of temperature and pressure, a liquid differs from a gas because the particles of the liquid
 - have stronger forces of attraction between them
 - take the shape of the container they occupy
 - are in constant straight-line motion
 - have no regular arrangement
- In which sample are the particles arranged in a regular geometric pattern?
 - $\text{HCl}(\ell)$
 - $\text{I}_2(\text{s})$
 - $\text{NaCl}(\text{aq})$
 - $\text{N}_2(\text{g})$
- The particles in a crystalline solid are arranged
 - regularly and close together
 - regularly and far apart
 - randomly and far apart
 - randomly and close together
- At what point do a liquid and a solid exist at equilibrium?
 - vaporization point
 - boiling point
 - melting point
 - sublimation point

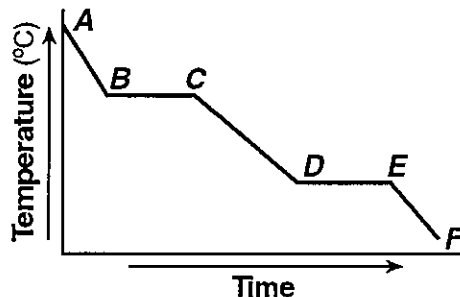
- 12) The amount of energy needed to change a given mass of ice to water at constant temperature is called the heat of
- A) condensation
B) formation
C) crystallization
D) fusion
- 13) The number of joules per gram required to melt ice at its melting point is called
- A) sublimation
B) vapor pressure
C) heat of vaporization
D) heat of fusion
- 14) What is the total number of joules of heat needed to change 150.0 grams of ice to water at 0°C ? (heat of fusion = 333.6 J/g)
- A) 2,224
B) 50,040
C) 1,394
D) 333.6
- 15) What is the total amount of heat energy (kilojoules) needed to change 200.0 grams of ice to water at 0°C ?
- A) 333.6 kJ
B) 45,180 kJ
C) 66.72 kJ
D) 451.8 kJ
- 16) A mixture of ice and water is in equilibrium at standard pressure. The temperature of the mixture must be
- A) 0°C
B) 273°C
C) 100°C
D) 212°C
- 17) At 1 atmosphere, which substance will sublime when heated?
- A) $\text{H}_2\text{O}(\ell)$
B) $\text{HCl}(\text{aq})$
C) $\text{CO}_2(\text{s})$
D) $\text{CH}_4(\text{g})$
- 18) Solid substances are *most* likely to sublime if they have
- A) low vapor pressures and weak intermolecular attractions
B) low vapor pressures and strong intermolecular attractions
C) high vapor pressures and strong intermolecular attractions
D) high vapor pressures and weak intermolecular attractions
- 19) Which phase change represents deposition?
- A) solid \rightarrow liquid
B) gas \rightarrow solid
C) liquid \rightarrow gas
D) gas \rightarrow liquid
- 20) The boiling point of water at standard pressure is
- A) 100. K
B) 373 K
C) 273 K
D) 0 K
- 21) A gas is *most* likely to change to the liquid phase when the pressure on the gas
- A) increases and its temperature decreases
B) decreases and its temperature decreases
C) increases and its temperature increases
D) decreases and its temperature increases
- 22) How many kilojoules of heat are absorbed when 70.00 grams of water is completely vaporized at its boiling point?
- A) 2.259
B) 158.1
C) 158,130
D) 2,259
- 23) As the temperature of a liquid increases, its vapor pressure
- A) decreases
B) remains the same
C) increases
- 24) As the atmospheric pressure increases, the temperature at which water in an open container will boil
- A) increases
B) decreases
C) remains the same

- 25) As water in a sealed container is cooled from 20°C to 10°C, its vapor pressure
 A) remains the same B) increases C) decreases
- 26) What is the vapor pressure of a liquid at its normal boiling temperature?
 A) 2 atm B) 273 atm C) 1 atm D) 760 atm
- 27) At 298 K, the vapor pressure of CS₂ is greater than the vapor pressure of H₂O. The *best* explanation for this is that H₂O has
 A) a larger molecular mass C) stronger ionic bonds
 B) larger molecules D) stronger intermolecular forces
- 28) The chart below shows the change in vapor pressure of four liquids with increasing temperature.



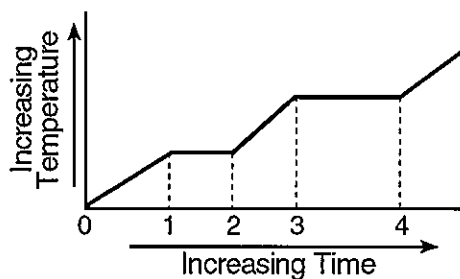
- What liquid has the *lowest* normal boiling point?
 A) A B) B C) C D) D
- 29) What is the normal boiling point of propanone?
 A) 67°C B) 100°C C) 56°C D) 78°C
- 30) According to the *Vapor Pressure of Four Liquids* chemistry reference table, what is the boiling point of ethanoic acid at standard atmospheric pressure?
 A) 100°C B) 55°C C) 79°C D) 117°C
- 31) According to the *Vapor Pressure of Four Liquids* chemistry reference table, at what temperature will ethanol boil if the atmospheric pressure is 40 kPa?
 A) 77°C B) 57°C C) 17°C D) 31°C
- 32) What is the vapor pressure of ethanol at 90°C?
 A) 150 kPa B) 40 kPa C) 55 kPa D) 101.3 kPa
- 33) Which phase change is endothermic?
 A) liquid to gas C) liquid to solid
 B) gas to solid D) gas to liquid

- 34) The graph below represents the uniform cooling of water at 1 atmosphere, starting with water as a gas above its boiling point.



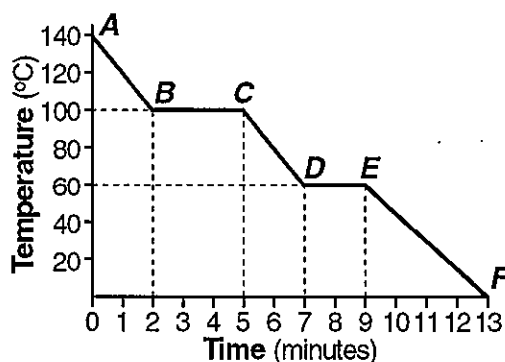
What segments of the cooling curve represent the fixed points on a thermometer?

- A) *AB* and *CD* B) *CD* and *EF* C) *BC* and *DE* D) *AB* and *EF*
- 35) The graph below represents the relationship between the temperature and time for a substance that was heated uniformly starting at t_0 . The substance was in the solid phase at t_0 .



During what time interval does the heat absorbed by the substance represent the heat of fusion of the substance?

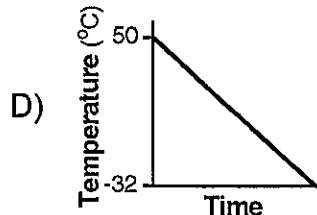
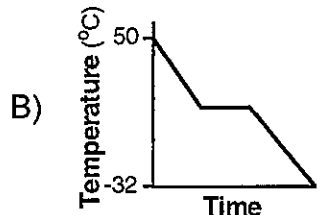
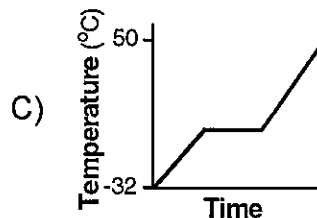
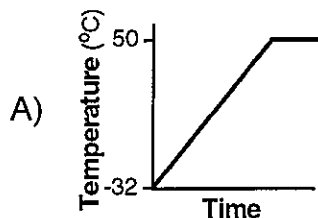
- A) t_1 to t_2 B) t_0 to t_1 C) t_3 to t_4 D) t_2 to t_3
- 36) The graph below represents the uniform cooling of a sample of a substance, starting with the substance as a gas above its boiling point.



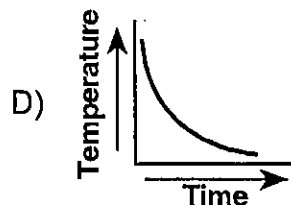
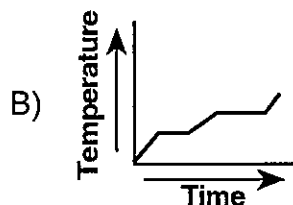
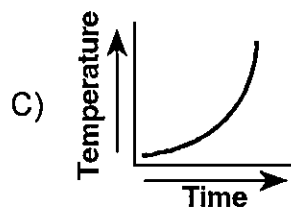
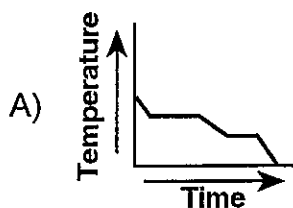
What segment of the curve represents a time when *both* the liquid and the solid phases are present?

- A) *CD* B) *BC* C) *EF* D) *DE*

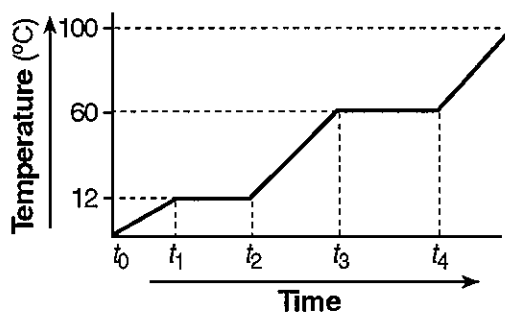
- 37) A student collected data in an experiment in which the uniform cooling of a water sample was observed from 50°C to -32°C . Which graph *most* likely represents the results obtained by the student?



- 38) Which graph *best* represents a change of phase from a gas to a solid?



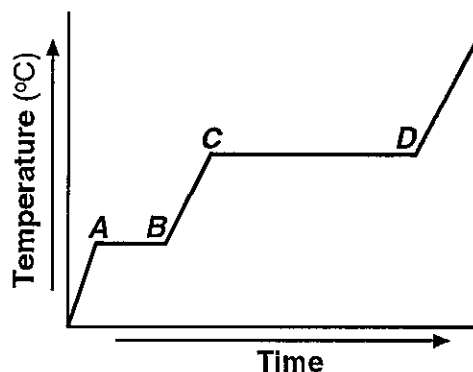
- 39) The diagram below represents the uniform heating of a substance that is a solid at t_0 .



What is the freezing point of the substance?

- A) 1°C B) 100°C C) 12°C D) 60°C
- 40) As a 1-gram sample of $\text{H}_2\text{O}(\ell)$ changes to $\text{H}_2\text{O}(\text{g})$ at 100°C , the potential energy of the molecules
- A) decreases B) increases C) remains the same

- 41) In the heating curve shown below, heat is applied to a solid substance at a constant rate.



What accounts for the fact that segment *CD* is longer than segment *AB*?

- A) Boiling occurs at a higher temperature than melting.
 B) Average kinetic energy increases at a greater rate during boiling than during melting.
 C) Potential energy is being released during boiling.
 D) The heat of vaporization is greater than the heat of fusion.
- 42) An example of a binary compound is
 A) ammonium chlorate
 B) potassium chlorate
 C) potassium chloride
 D) ammonium chloride
- 43) Which element forms more than one binary compound with chlorine?
 A) Ca
 B) Fe
 C) Li
 D) Zn
- 44) What is the chemical formula for nitrogen (I) oxide?
 A) NO
 B) N₂O₄
 C) N₂O
 D) NO₂
- 45) What is the correct chemical formula for iron (III) oxide?
 A) Fe₃O
 B) Fe₂O₃
 C) FeO₃
 D) Fe₃O₂
- 46) What is the correct formula for sodium oxide?
 A) SO₂
 B) S₂O
 C) NaO₂
 D) Na₂O
- 47) What is the formula for chromium (III) oxide?
 A) CrO₃
 B) Cr₃O₂
 C) Cr₃O
 D) Cr₂O₃
- 48) What is the formula for potassium hydride?
 A) K(OH)₂
 B) KH
 C) KH₂
 D) KOH
- 49) What is the correct formula for iron (II) sulfide?
 A) FeS
 B) FeSO₃
 C) Fe₂S₃
 D) Fe₂(SO₄)₃
- 50) What is the formula for titanium (III) oxide?
 A) TiO
 B) Ti₂O₃
 C) Ti₂O₄
 D) Ti₃O₂