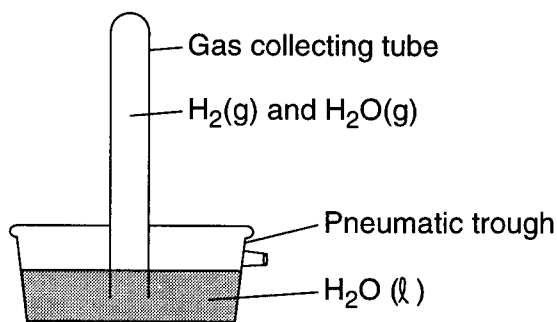


1. The diagram below shows the collection of  $H_2$  gas over water at  $25^\circ C$ . The total pressure in the tube is 760.0 torr. The vapor pressure of water vapor is 23.8 torr at  $25^\circ C$ .



What is the pressure exerted by the hydrogen gas alone?

- 1) 23.8 torr                      3) 760.0 torr  
 2) 736.2 torr                    4) 793.8 torr
2. A student observing the behavior of paradichlorobenzene first heats 10 grams of the substance in a hot water bath until it is completely liquefied. The following data are recorded as paradichlorobenzene cools.

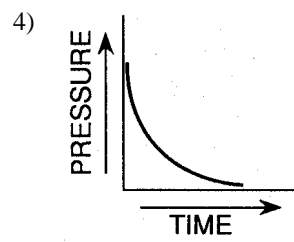
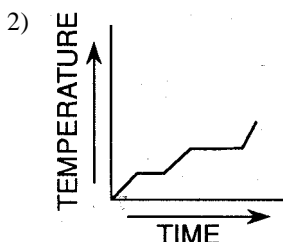
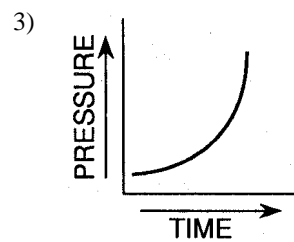
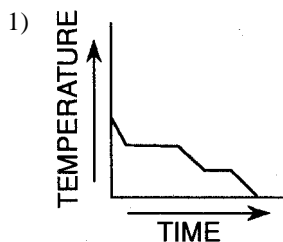
DATA TABLE

Time (minutes)	Temperature ( $^\circ C$ )
0	65
1	58
2	52
3	53
4	53
5	53
6	53
7	53
8	51
9	47
10	42

What is the freezing point of paradichlorobenzene?

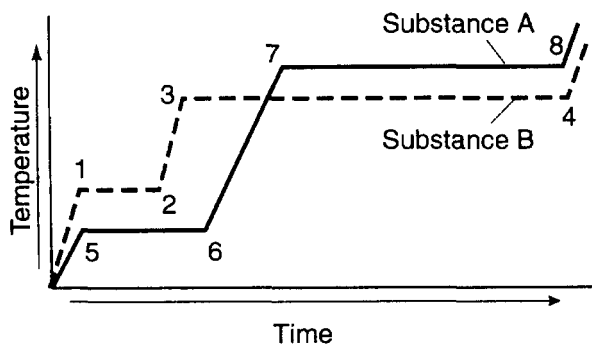
- 1)  $42^\circ C$                       3)  $58^\circ C$   
 2)  $53^\circ C$                       4)  $65^\circ C$

3. Which graph best represents a change of phase from a gas to a solid?



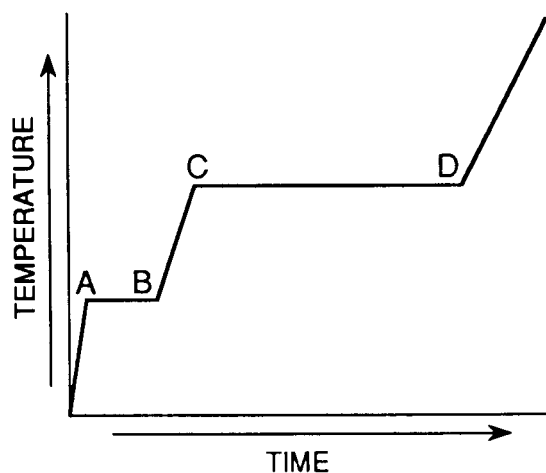
4. An 80.0-gram sample of water at  $10.0^\circ C$  absorbs 1680 Joules of heat energy. What is the final temperature of the water?
- 1)  $50.0^\circ C$                       3)  $5.00^\circ C$   
 2)  $15.0^\circ C$                       4)  $4.00^\circ C$
5. How many Joules of heat energy are released when 50. grams of water are cooled from  $70.^\circ C$  to  $60.^\circ C$ ?
- 1) 42 J                              3) 2100 J  
 2) 210 J                            4) 4200 J
6. The temperature of 100. grams of water changes from  $16.0^\circ C$  to  $20.0^\circ C$ . What is the total number of Joules of heat energy absorbed by the water?
- 1) 105                              3) 420.  
 2) 168                              4) 1680
7. What amount of heat is required to completely melt a 29.95-gram sample of  $H_2O(s)$  at  $0^\circ C$ ?
- 1) 334 J                            3)  $1.00 \times 10^3$  J  
 2) 2260 J                         4)  $1.00 \times 10^4$  J
8. At 1 atmosphere of pressure, water and ice can exist in equilibrium at a temperature of
- 1)  $212^\circ C$                         3)  $32^\circ C$   
 2)  $100^\circ C$                         4)  $0^\circ C$
9. Approximately how many Joules of heat are needed to completely change 10.0 grams of ice to water at the melting point temperature?
- 1) 1.00 J                            3) 334 J  
 2) 33.4 J                            4) 3,340 J

Base your answers to questions 10 and 11 on the graph below. The graph shows heat being added at a constant rate to substance A and to substance B, which begin as solids below their melting point temperatures.



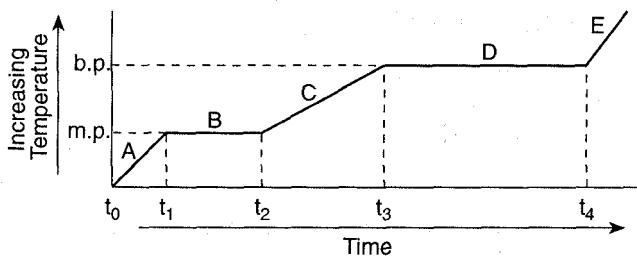
10. Compared to substance B, substance A has a
- 1) lower melting point and a lower boiling point
  - 2) lower melting point and a higher boiling point
  - 3) higher melting point and a lower boiling point
  - 4) higher melting point and a higher boiling point
11. During which interval is the greatest amount of energy absorbed?
- 1) 1-2
  - 2) 2-3
  - 3) 3-4
  - 4) 7-8
- 
12. The heat required to change 1 gram of a solid at its normal melting point to a liquid at the same temperature is called the heat of
- 1) vaporization
  - 2) fusion
  - 3) reaction
  - 4) formation
13. What occurs when a substance melts?
- 1) It changes from solid to liquid, and heat is absorbed.
  - 2) It changes from solid to liquid, and heat is released.
  - 3) It changes from liquid to solid, and heat is absorbed.
  - 4) It changes from liquid to solid, and heat is released.

14. 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?

- 1) Boiling occurs at a higher temperature than melting.
  - 2) The heat of vaporization is greater than the heat of fusion.
  - 3) Average kinetic energy increases at a greater rate during boiling than during melting.
  - 4) Potential energy is being released during boiling.
15. The graph below represents the relationship between temperature and time as heat is added uniformly to a substance, starting when the substance is a solid below its melting point.



Which portions of the graph represent times when a phase change is occurring?

- 1) A and B
- 2) B and D
- 3) A and C
- 4) C and D