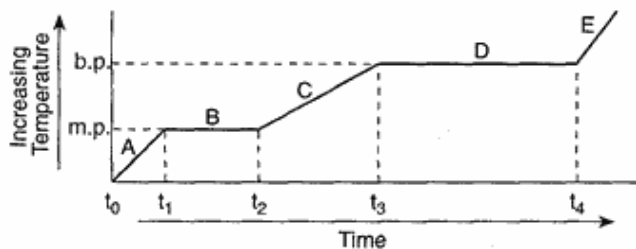


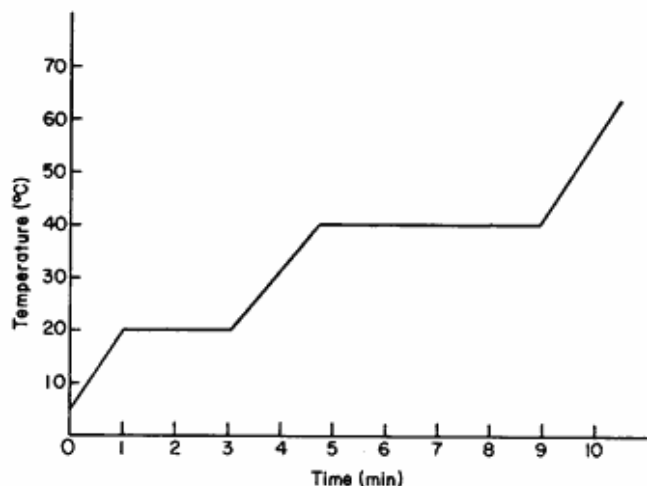
- At constant pressure, what temperature must be reached to increase a 100.-milliliter sample of a gas initially at 300. K to a volume of 200. milliliters?
A) **600. K** B) 200. K
C) 150. K D) 300. K
- How many Joules of heat energy are released when 50. grams of water are cooled from 70.°C to 60.°C?
A) 42 J B) **2100 J**
C) 210 J D) 4200 J
- According to the kinetic molecular theory, the particles of an ideal gas
A) **are separated by great distances, compared to their size**
B) have strong intermolecular forces
C) have no potential energy
D) are arranged in a regular, repeated geometric pattern
- Which process is exothermic?
A) boiling of water
B) sublimation of iodine
C) **condensation of ethanol vapor**
D) melting of copper
- Under which conditions of temperature and pressure does a real gas behave most like an ideal gas?
A) low temperature and high pressure
B) high temperature and high pressure
C) low temperature and low pressure
D) **high temperature and low pressure**
- When a 500. gram sample of water at 19.0°C absorbs 8.40 kilojoules of heat, the temperature of the water will change to
A) 19.0°C B) 15.0°C
C) **23.0°C** D) 4.00°C
- A rigid cylinder contains a sample of gas at STP. What is the pressure of this gas after the sample is heated to 410 K?
A) 0.67 atm B) 0.50 atm
C) **1.5 atm** D) 1.0 atm
- Under which conditions of temperature and pressure does a sample of neon behave most like an ideal gas?
A) **400 K and 0.25 atm**
B) 400 K and 25 atm
C) 100 K and 25 atm
D) 100 K and 0.25 atm
- A 220.0-mL sample of helium gas is in a cylinder with a movable piston at 105 kPa and 275 K. The piston is pushed in until the sample has a volume of 95.0 mL. The new temperature of the gas is 310. K. What is the new pressure of the sample?
A) 51.1 kPa B) 216 kPa
C) 243 kPa D) **274 kPa**
- What is the minimum amount of heat required to completely melt 20.0 grams of ice at its melting point?
A) 45,200 J B) 83.6 J
C) 20.0 J D) **6,680 J**
- As the pressure on a sample of a gas increases at constant temperature, the volume of the gas
A) **decreases** B) increases
C) remains the same
- A 100.-milliliter sample of helium gas is placed in a sealed container of fixed volume. As the temperature of the confined gas increases from 10.°C to 30.°C, the internal pressure
A) decreases B) **increases**
C) remains the same

13. 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 heat is absorbed and potential energy increases while kinetic energy remains constant?

- A) *A* and *C* B) *A* and *B*
 C) *C* and *D* D) ***B* and *D***
14. The graph below represents changes of state for an unknown substance.



What is the boiling temperature of the substance?

- A) 0°C B) 70°C C) **40°C** D) 20°C
15. A sample of gas is held at constant pressure. Increasing the kelvin temperature of this gas sample causes the average kinetic energy of its molecules to
- A) decrease and the volume of the gas sample to decrease
 B) increase and the volume of the gas sample to decrease
 C) **increase and the volume of the gas sample to increase**
 D) decrease and the volume of the gas sample to increase

16. Which Kelvin temperature is equal to -73°C ?

A) 173 K B) 100 K
 C) 346 K D) **200 K**

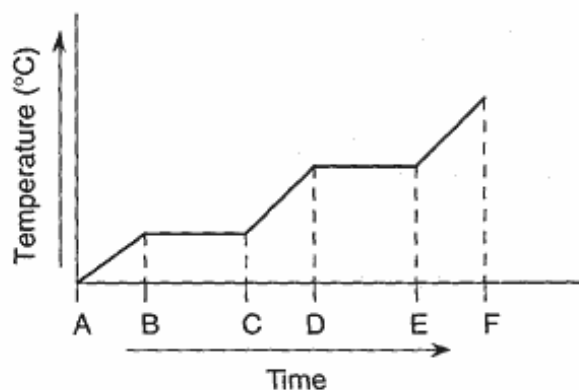
17. What is the total amount of heat required to vaporize 1.00 gram of $\text{H}_2\text{O}(\ell)$ at $100.^{\circ}\text{C}$ and 1 atmosphere?

A) 4.18 J B) **2260 J**
 C) 373 J D) 334 J

18. According to the kinetic molecular theory, which statement describes an ideal gas?

A) The distance between the gas particles is small, compared to their size.
 B) The gas particles are diatomic.
 C) **There are no attractive forces between the gas particles.**
 D) Energy is created when the gas particles collide.

19. The diagram below represents the uniform heating of a substance that is a solid at Time *A*.



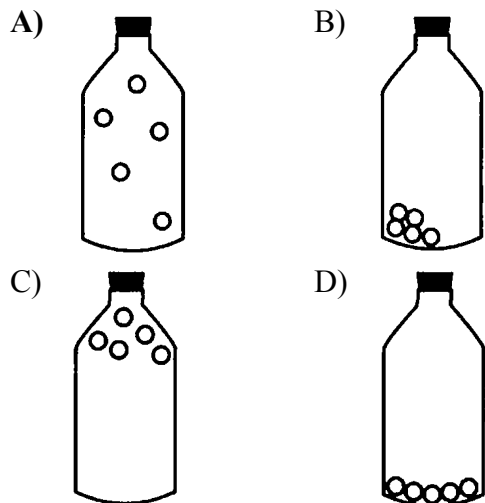
Between which times could the heat of fusion be determined?

A) *A* and *B* B) ***B* and *C***
 C) *C* and *D* D) *E* and *F*

20. A sample of water is heated from 10°C to 15°C by the addition of 30. calories of heat. What is the mass of the water?

A) 150 g B) 5.0 g
 C) **6.0 g** D) 30. g

21. Which diagram best represents a gas in a closed container?



22. When 200 grams of water cools from 50°C to 25°C , the total amount of heat energy released by the water is

- A) 10,000 calories **B) 5,000 calories**
 C) 8 calories D) 4 calories

23. The data table below gives the temperature and pressure of four different gas samples, each in a 2-liter container.

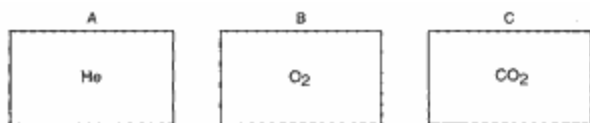
Temperature and Pressure of Gas Samples

Gas Sample	Temperature (K)	Pressure (atm)
He	300.	1.20
Ne	300.	1.00
CO ₂	200.	1.20
CH ₄	300.	1.00

Which two gas samples contain the same total number of particles?

- A) CH₄ and CO₂ B) He and Ne C) He and CO₂ **D) CH₄ and Ne**

24. The diagrams below represent three 1-liter containers of gas, *A*, *B*, and *C*. Each container is at STP.



Which statement correctly compares the number of molecules in the containers?

- A) Container *A* has the greatest number of molecules.
- B) Container *B* has the greatest number of molecules.
- C) Container *C* has the greatest number of molecules.
- D) All three containers have the same number of molecules.**
25. A sample of water is heated from 10.0°C to 15.0°C by the addition of 126 Joules of heat. What is the mass of the water?

- A) 30.0 g **B) 6.00 g**
- C) 5.00 g D) 150.0 g

Answer Key
AAAQ1CUMUL

1. **A**
2. **B**
3. **A**
4. **C**
5. **D**
6. **C**
7. **C**
8. **A**
9. **D**
10. **D**
11. **A**
12. **B**
13. **D**
14. **C**
15. **C**
16. **D**
17. **B**
18. **C**
19. **B**
20. **C**
21. **A**
22. **B**
23. **D**
24. **D**
25. **B**