

QAD Series

Thermodynamics

- The specific heat of same substance is expressed in two units, i.e. C_1 cal/g $^{\circ}\text{C}$ and C_2 cal/g $^{\circ}\text{F}$. Which of the following is true?
 - $C_1 > C_2$
 - $C_1 < C_2$
 - $C_1 = C_2$
 - Insufficient information
- A centigrade and Fahrenheit thermometer are dipped in boiling water. The water temperature is lowered until the Fahrenheit thermometer registers 140°F . What is the fall in temperature registered by centigrade thermometer?
 - 30°C
 - 40°C
 - 50°C
 - 60°C
- For a constant volume gas thermometer, one should fill the gas at:
 - high temperature & high pressure
 - high temperature and low pressure
 - low temperature & low pressure
 - low temperature & high pressure
- The coefficient of cubical expansion of brass and iron are $54 \times 10^{-6} \text{ }^{\circ}\text{C}^{-1}$ and $36 \times 10^{-6} \text{ }^{\circ}\text{C}^{-1}$ respectively. If brass and iron rods show the same difference of length at all temperatures, their lengths are in the ratio of:
 - 3 : 2
 - 2 : 3
 - 9 : 4
 - 4 : 9
- A liquid is placed in a graduated glass cylinder. The coefficient of real expansion of the liquid is thrice that of linear expansion of the glass. On heating the level of liquid will:
 - first decreases then increase
 - decrease
 - increase
 - approximately remains the same
- The thermometer reads 1° ice is melt and 99°C in boiling water then what is correct temperature when it reads 25°C ?
 - 24.4°C
 - 25.34°C
 - 26.3°C
 - 22.3°C
- What is the value of -40° Fahrenheit in Celsius scale?
 - -104°C
 - 8°C
 - -40°C
 - 20°C
- The pendulum of clock is made of brass. If the clock keeps correct time at 20°C , how many seconds per day will it lose at 35°C ($\alpha_{\text{brass}} = 2 \times 10^{-5} \text{ }^{\circ}\text{C}^{-1}$):
 - 12.3 secs
 - 36.9 secs
 - 24.6 secs
 - 49.2 secs
- The length of metal is 100 cm and the linear expansivity of the metal is 0.00002 K^{-1} . By how many cms will it contract when cooled through 50°K ?
 - 1.001 cm
 - 0.150 cm
 - 0.100 cm
 - 0.50 cm
- Two glass thermometer A and B are kept in the sunlight. A is blackened and B is transparent. Then:
 - thermometer A will be heated faster than B and final temperature of both is same
 - thermometer B will be heated faster than A and final temperature of both is same
 - Both will be heated at the same rate and final temperature of A is more
 - Both will be heated at the same rate and final temperature if B is more
- Instrument used to measure temperature by radiation method is:
 - Pyrometer
 - Radiomicrometer
 - Thermometer
 - Barometer
- Which of the following has highest specific heat capacity?
 - Aluminum
 - Water
 - Oxygen
 - Hydrogen
- When a bimetallic strip is heated, the stripe:
 - bends towards the metal with high linear coefficient of expansion
 - bends forwards the metal with low linear coefficient of expansion
 - bends equally on both sides
 - does not bend at all
- A metallic piece is being weighed in a liquid whose temperature is being raised continuously. Then the apparent weight of the metallic piece:
 - decreases
 - increases
 - remains unchanged
 - changes erratically
- For a perfect gas, the ratio of volume coefficient of expansion and pressure coefficient of expansion is:
 - 1
 - less than 1
 - more than 1
 - an imaginary quantity
- On a particular day the relative humidity is 100% and the room temperature is 30°C , then the dew point is:
 - 0°C
 - 30°C
 - 70°C
 - 100°C
- On four different days, the temperature is same. A man feels hottest when the relative humidity is:
 - 99%
 - 50%
 - 30%
 - 10%
- The temperature of dew formation was 4.6°C and the temperature of dew was 5.4°C . The atmospheric temperature is 20°C . The relative humidity is nearly (given SVP of water at $5^{\circ}\text{C} = 6.5 \text{ mmHg}$ and at $20^{\circ}\text{C} = 17.5 \text{ mmHg}$):
 - 37%
 - 100%
 - 69%
 - 70%
- Water is boiling in a flask over a burner. To reduce its boiling temperature, one must:
 - reduce the surrounding temperature
 - connect the mouth of the flask to an evacuating system
 - supply heat from a very intense heat source
 - close the container with an airtight cork
- 20g of ice at 0°C is mixed with 20g of hot water at 60°C . Then resulting temperature will be:
 - -10°C
 - 0°C
 - 5°C
 - 10°C
- In the above question, the amount of water in mixture in equilibrium condition will be:
 - 30g
 - 32g
 - 35g
 - 25g
- Density of ice is density of water.
 - is lesser than
 - is greater than
 - is higher than
 - is equal to
- A piece of ice is floating in a beaker containing water. When the ice melts then the level of water:
 - rises
 - falls
 - remains same
 - first increases then decrease
- When two blocks of ice are pressed together they join to form one block because:
 - of heat production
 - of increase in specific gravity
 - of decrease in melting point of ice (due to pressure)
 - of increase in melting point of ice (due to pressure)
- The amount of heat required to melt 1 gm ice without change in temperature is:
 - 80 cal
 - 80 k. cal
 - 740 cal
 - 740 k. cal
- If relative humidity is 100%, it means, the temperature of the room is equal to:
 - 4°C
 - 0°C
 - dew point
 - 20°C

27. How much should the pressure of a gas be increased to decrease the volume of the gas by 10% at constant temperature?
a) 10% b) 9.5% c) 11.11% d) 5.11%
28. When a gas filled in a closed vessel is heated through 1°C , its pressure increases by 0.4%. The initial temperature of the gas was:
a) 250K b) 2500K c) 250 $^{\circ}\text{C}$ d) 25 $^{\circ}\text{C}$
29. The rms speed of hydrogen molecules at 300K is 1930 ms^{-1} . Then the rms speed of oxygen molecules at 900K will be:
a) 643 ms^{-1} b) 1930 $\sqrt{3}$ ms^{-1}
c) 1903/ $\sqrt{3}$ ms^{-1} d) 836 ms^{-1}
30. Two gases A and B having the same temperature T, same pressure P and same volume V are mixed. If the mixture is at the same temperature T and occupies a volume V, the pressure of the mixture is:
a) 2P b) P c) P/2 d) 4P
31. A jar has a mixture of hydrogen and oxygen gases in the ratio 1:5. The ratio of mean kinetic energies of hydrogen and oxygen molecules is:
a) 1:16 b) 1:4 c) 1:5 d) 1:1
32. 22g of CO_2 at 27°C is mixed with 16g of O_2 at 37°C . If both gases are considered as ideal, then temperature of mixture is:
a) 31°C b) 27°C c) 37°C d) 34°C
33. All gas at same temperature has same:
a) KE b) density c) RMS speed d) none
34. The specific heat capacity of an ideal gas under isothermal condition is:
a) 0 b) 8.31 c) 1.4 d) infinity
35. Average kinetic energy per molecule of a gas depends only upon:
a) pressure
b) temperature
c) volume
d) species of gas molecules
36. The ratio of rms speed of hydrogen molecules to that of oxygen molecules at a given temperature will be:
a) 1:4 b) 1:16 c) 16:1 d) 4:1
37. The temperatures of the reservoir and sink of an ideal heat engine are T_1 and T_2 respectively; its efficiency is η . Now both T_1 and T_2 are increased by 100°C . The new efficiency of the engine will be:
a) more than η b) less than η
c) equal to η d) exactly double of η
38. Two stars A and B radiate maximum energy at 3600 \AA and 4800 \AA respectively. Then the ratio of absolute temperature of A and B is:
a) 4:3 b) 3:4 c) 256:81 d) 81:256
39. A bucket full of hot water is kept in a room and it cools from 75°C to 70°C in t_1 min. from 70°C to 65°C in t_2 min and from 65°C to 60°C in t_3 min, then:
a) $t_1 = t_2 = t_3$ b) $t_1 < t_2 < t_3$ c) $t_1 > t_2 > t_3$ d) $t_1 < t_2 > t_3$
40. A body takes 10 minutes to cool from 60°C to 50°C . If the temperature of the surrounding is 25°C , then temperature of the body after next 10 minutes will be:
a) 48°C b) 46°C c) 49°C d) 42.85°C
41. A body cools down from 65°C to 60°C in 5 minutes. It will cool down 60°C to 55°C in:
a) 5 minutes b) less than 5 minutes c) more than 5 minutes
d) less than or more than 5 minutes depending on whether its mass is more than or less than 1 kg
42. The graph of Newton's law of cooling follows:
a) parabolic path
b) linear relation with time
c) rectangular hyperbolic path
d) exponential relation with time
43. The rate of loss of heat from a hot body depends on the:
a) temperature of the body
b) excess temperature of body over the surrounding
c) thermal capacity of the body
d) the temperature of the surrounding
44. As pressure increases boiling point of liquid:
a) increases
b) decreases
c) remains same
d) first increases then decreases
45. The ratio of energy emitted in the sun in between two different temperature of 27°C and 600 K is:
a) 2 b) 4 c) 8 d) 16
46. When an ideal diatomic gas is heated at constant pressure, the fraction of the heat energy supplied which increases the internal energy of the gas is:
a) $\frac{2}{7}$ b) $\frac{3}{5}$ c) $\frac{3}{7}$ d) $\frac{5}{7}$
47. During adiabatic compression of gas, its temperature:
a) rises b) falls
c) remains constant d) becomes zero
48. An ideal gas is found to obey a law $VP^2 = \text{constant}$. The gas is initially at temperature T and volume V. When it expands to a volume 2V, calculate the resulting temperature.
a) 2T b) $\sqrt{2}T$ c) $\frac{T}{\sqrt{2}}$ d) $\frac{T}{2}$
49. The efficiency of a Carnot's engine where the temperature of source is 800 K is 40%. By what amount the temperature of sink is decreased so that its efficiency becomes 50%?
a) 50 K b) 75 K c) 80 K d) 100 K
50. At 0 K which of the following properties of the gas will be zero?
a) Kinetic energy b) Potential energy
c) Mass d) Density
51. The internal energy of an ideal gas depends upon:
a) temperature
b) pressure
c) specific volume
d) temperature & volume both