
Concise
English

HEAT AND THERMODYNAMICS

351. At room temperature, the rms speed of the molecules of a certain diatomic gas is found to be 1930 m/s. The gas is:

(a) H_2 (b) F_2 (c) O_2 (d) Cl_2

352. 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) $\frac{2}{5}$ (b) $\frac{3}{5}$ (c) $\frac{3}{7}$ (d) $\frac{5}{7}$

353. Three closed vessels A, B and C are at the same temperature T and contain gases which obey the Maxwellian distribution of velocities. Vessel A contains only O_2, B only N_3 and C a mixture of equal quantities of O_2 and N_2. If the average speed of the O_2 molecules in vessel A is v_1, that of the N_2 molecules in vessel B is v_2, the average speed of the O_2 molecules in vessel C is

(a) $(v_1 + v_2)/2$

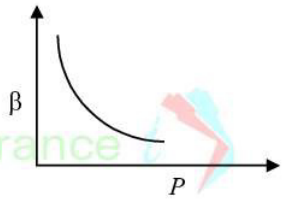
(b) v_1

(c) $(v_1 v_2)^{1/2}$

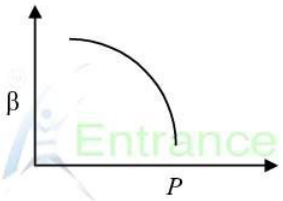
(d) $\sqrt{\frac{3kT}{M}}$, where M is the mass of an oxygen molecule.

354. Which of the following graphs correctly represents the variation of $\beta = -(dV/dP)/V$ with P for an ideal gas at constant temperature?

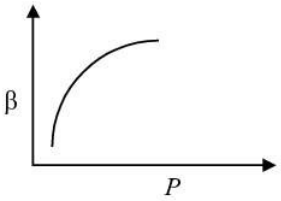
(a)



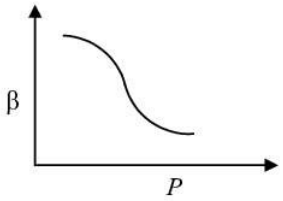
(b)



(c)



(d)



355. An ideal black-body at room temperature is thrown into a furnace. It is observed that

(a) initially it is the darkest body and at later times the brightest

(b) it is the darkest body at all times

(c) it cannot be distinguished at all times

(d) initially it is the darkest body and at later times it cannot be distinguished

356. Three discs A, B, and C having radii 2 m, 4 m and 6 m respectively are coated with carbon black on their outer surfaces. The wavelengths corresponding to maximum intensity are 300 nm, 400 nm and 500 nm respectively. The power radiated by them are Q_A, Q_B and Q_C respectively.

(a) Q_A is maximum (b) Q_B is maximum (c) Q_C is maximum (d) $Q_A = Q_B = Q_C$

357. In which of the following process, convection does not take place primarily

(a) sea and land breeze (b) boiling of water

(c) warming of glass of bulb due to filament (d) heating air around a furnace

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360. The Wien's displacement law express relation between

(a) Frequency and temperature

(b) Temperature and amplitude

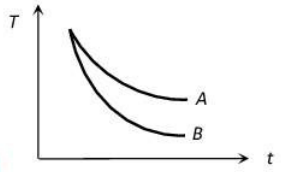
(c) Wavelength and radiating power of black body

(d) Wavelength corresponding to maximum energy and temperature

361. A black body is heated from $27^{o}C$ to $127^{o}C$. The ratio of their energies of radiations emitted will be

(a) 3: 4 (b) 9 : 16 (c) 27 : 64 (d) 81: 256

362. Water and turpentine oil (specific heat less than that of water) are both heated to same temperature. Equal amounts of these placed in identical calorimeters are then left in air



(a) Their cooling curves will be identical

(b) A and B will represent cooling curves of water and oil respectively

(c) B and A will represent cooling curves of water and oil respectively

(d) None of the above

363. A certain mass of gas at 273 K is expanded to 81 times its volume under adiabatic condition. If $\gamma = 1.25$ for the gas, then its final temperature is

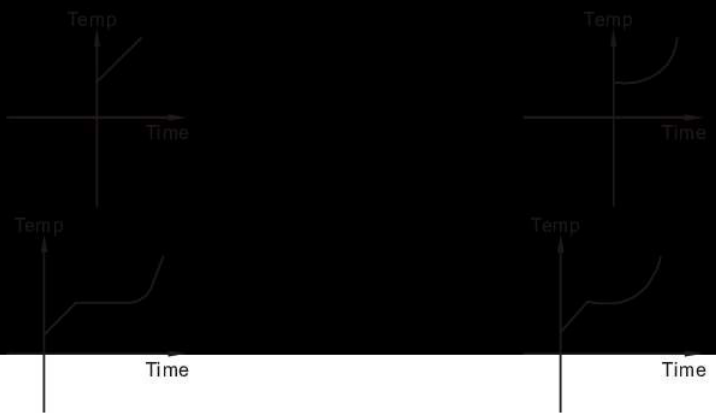
(a) $-235°C$ (b) $-182°C$ (c) $-91°C$ (d) $0°C$

364. In an adiabatic process $90J$ of work is done on the gas. The change in internal energy of the gas is

(a) $-90\,J$ (b) $+90\,J$

(c) $0\,J$ (d) Depends on initial temperature

365. A gas expands adiabatically at constant pressure such that its temperature $T \propto \frac{1}{\sqrt{V}}$, the value of C_p / C_v of gas is



367. Three discs, A, B and C having radii 2 m, 4 m and 6 m respectively are coated with carbon black on their outer surfaces. The wavelengths corresponding to maximum intensity are 300 nm, 400 nm and 5 nm respectively. The power radiated by them are Q_A, Q_B and Q_C respectively :

(a) Q_A is maximum (b) Q_B is maximum (c) Q_C is maximum (d) $Q_A = Q_B = Q_C$

368. In which of the following process, convection does not take place primarily ?

(a) Sea and land breeze (b) Boiling of water

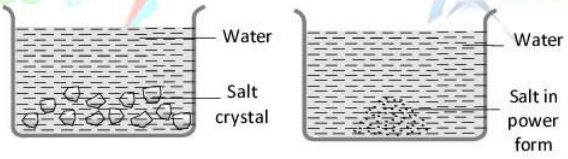
(c) Warming of glass of bulb due to filament (d) heating air around a furnace

369. Calorie is defined as the amount of heat required to raise temperature of 1 g of water by 1 °C and it is defined under which of the following conditions?

(a) From 14.5 °C to 15.5 °C at 760 mm of Hg (b) From 98.5 °C to 99.5 °C at 760 mm of Hg

(a) From 13.5 °C to 14.5 °C at 76 mm of Hg (a) From 3.5 °C to 4.5 °C at 76 mm of Hg

370. Out of the following, in which vessel will the temperature of the solution be higher after the salt is completely dissolved.



(a) A (b) B

(c) Equal in both (d) Information is not sufficient

371. A steel meter scale is to be ruled so that millimeter intervals are accurate within about 5×10^{-5} mm at a certain temperature. The maximum temperature variation allowable during the ruling is (Coefficient of linear expansion of steel $= 10 \times 10^{-6} K^{-1}$)

(a) $2°C$ (b) $5°C$ (c) $7°C$ (d) $10°C$

372. During illness an 80 kg man ran a fever of $102.2°F$ instead of normal body temperature of $98.6°F$. Assuming that human body is mostly water, how much heat is required to raise his temperature by that amount

of heat is released by the gas. The work done by the gas in the second process is

(a) $60\,J$ (b) $40\,J$ (c) $80\,J$ (d) $20\,J$

379. In a thermodynamic process pressure of a fixed mass of a gas is changed in such a manner that the gas releases 30 *joules* of heat and 10 joules of work was done on the gas. If the initial internal energy of the gas was 30 *joules*, then the final internal energy will be

(a) $2\,J$ (b) $-18\,J$ (c) $10\,J$ (d) $58\,J$

380. The internal energy of an ideal gas increases during an isothermal process when the gas is

(a) Expanded by adding more molecules to it (b) Expanded by adding more heat to it

(c) Expanded against zero pressure (d) Compressed by doing work on it

351.	(a)	352.	(d)	353.	(b)	354.	(a)	355.	(a)
356.	(b)	357.	(c)	358.	(d)	359.	(c)	360.	(d)
361.	(d)	362.	(b)	363.	(b)	364.	(b)	365.	(b)
366.	(c)	367.	(b)	368.	(c)	369.	(a)	370.	(b)
371.	(b)	372.	(b)	373.	(c)	374.	(c)	375.	(c)
376.	(b)	377.	(c)	378.	(a)	379.	(c)	380.	(a)