Answer on Question #51929-Physics-Field Theory

The specific heat of a substance at its boiling point or melting point

0

infinity

negative

between 0 and 1

Solution

The specific heat of a substance at its boiling point or melting point is infinity, because $\Delta T = 0$ but $\Delta Q \neq 0$ at these points in the formula for specific heat:

$$C = \frac{\Delta Q}{m\Delta T} \sim \frac{1}{\Delta T} \to \infty.$$

Answer: infinity.

10 Mass of gas is $m = 300\ g = 0.3\ kg$ and its specific heat at constant volume is 750 J/kg K. if gas is heated through 75°C at constant pressure of 105 N/{m^2}, it expands by volume $\Delta V = 0.08 \cdot 10^6 cm^3 = 0.08\ m^3$. Find CP/CV.

1.4

1.374

1.474

1.5

Solution

$$mC_P\Delta t = mC_V\Delta t + p\Delta V.$$

Thus

$$\frac{C_P}{C_V} = 1 + \frac{p\Delta V}{mC_V\Delta t} = 1 + \frac{10^5 \cdot 0.08}{0.3 \cdot 750 \cdot 75} = 1.474.$$

Answer: $\mathbf{1.474}$.

11 A solid ball with a mass m = 0.53 kg floats in a tank of water. The ball is made of material with a density of 400 kg/m3. The density of water is 1000kg/m3. What fraction of the volume of the ball is below the waterline?

0.1

0.2

0.3

0.4

Solution

The fraction of the volume of a floating object that is below the fluid surface is equal to the ratio of the density of the object to that of the fluid.

So,

$$\frac{V_{\text{below}}}{V} = \frac{400\,\frac{\text{kg}}{\text{m}^3}}{1000\,\frac{\text{kg}}{\text{m}^3}} = 0.4.$$

Answer: $\mathbf{0.4}$.

12 A slab of wood with mass m = 1.7 kg floats 78% submerged. The density of water is 1000 kg/m3. What is the density of the wood?

720 kg/m3

780 kg/m3

850 kg/m3

900 kg/m3

Solution

The fraction of the volume of a floating object that is below the fluid surface is equal to the ratio of the density of the object to that of the fluid.

So,

$$\frac{V_{\text{below}}}{V} = 0.78 = \frac{\rho_{wood}}{\rho_{water}}.$$

Thus,

$$\rho_{wood} = 0.78 \cdot 1000\,\frac{\text{kg}}{\text{m}^3} = 780\,\frac{\text{kg}}{\text{m}^3}.$$

Answer: $\mathbf{780\,\frac{kg}{m^3}}$.