Answer on Question #52082, Physics, Field Theory

Calculate the change in internal energy of 2kg of water at 90 degree celcius when it is changed to 330m3 of steam at 100oC. The whole process occurs at atmospheric pressure. The latent heat of vaporization of water is 226106 J/kg.
4.27 MJ
3.43 kJ
45.72 mJ
543.63 J

Solution

$$Q_w = m_{water} c \cdot \Delta T = 2kg \cdot 4187 J/kg \cdot K \cdot 10K = 83740 J$$

where $m_{water} = 10kg$ is the mass of the water; $\Delta T = 10K$ is the change of temperature; $c = 4187 J/kg \cdot K$ is the specific heat capacity

$$Q_g = \rho_g \cdot V \cdot L = 330 m^3 \cdot 0.6 kg/m^3 \cdot 226106 J/kg = 4.47 \cdot 10^6 J$$

Then $Q = Q_W + Q_g = 4.48 \cdot 10^7 J$

Answer: $Q = 4.48 \cdot 10^7 J$

18 Tensile strain is mathematically expressed as:
Force/Area
initial length/extension
extension/initial lenght
Stress + initial length

Answer: extension/initial lenght

19 A certain resistance thermometer at triple point of water has resistance of 152.0Ω. What is the temperature of the system in degrees celcius when the resistance of the thermometer is 230.51Ω?
414.2^{o}C
141.0^{o}C
253.2^{o}C
80.4^{o}C

Solution

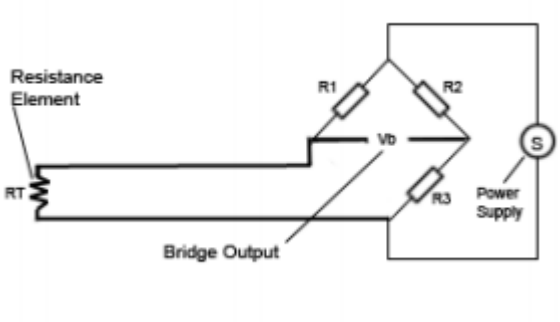

Fig.1

The temperature is

$$T(R) = (273.15K) \cdot \frac{R}{R_3} = (273.15K) \cdot \frac{230.51}{152.0} = 414.2K$$

Answer: $T(R) = (273.15K) \cdot \frac{R}{R_3} = 414.2K$