Answer on Question #42895, Physics, Other

17. The surface tension and vapour pressure of water at 30°C are 7.2 x 10^{-2} N/m and 2.4 x 10^3 Pa, respectively. What is the radius of the smallest droplet of water which can be formed without evaporating at 30°C?

Solution:

In physics, the Young–Laplace equation describes the equilibrium pressure difference sustained across the interface between two static fluids, such as water and air, due to the phenomenon of surface tension.

$$\Delta P = \frac{2T}{r}$$

where ΔP is the internal pressure relative to the outside pressure, T is the surface tension and r is radius of droplet.

Thus,

$$r = \frac{2T}{\Delta P} = \frac{2 \cdot 7.2 \cdot 10^{-2}}{2.4 \cdot 10^3} = 6.0 \cdot 10^{-5} \text{ m}$$

Answer: $r = 6.0 \cdot 10^{-5}$ m.

18. The temperature on a Fahrenheit scale is 98.6 °F? What is the corresponding temperature on a Kelvin scale?

Solution:

Fahrenheit to Kelvin conversion formula is

$$K = 5/9 \, (° F - 32) + 273.15$$

Thus,

$$5/9 \, (98.6 \, °F - 32) + 273.15 = 310.15 \text{ K}$$

Answer: 310.2 K.