

1. One thousand water droplets with radius  $10^{-6}$  m coalesce to form a single droplet. If the surface tension of water is  $7.5 \times 10^{-2} \text{ N m}^{-1}$ , how much energy is liberated when the droplets coalesce?

$$\Delta W = \gamma \text{Area increase}$$

For a water droplet:

$$\text{Surface area for 1 droplet} = 4\pi(10^{-6} \text{ m})^2 = 1.26 \times 10^{-11} \text{ m}^2$$

$$\text{Surface area for 1000 droplets} = 4\pi(10^{-6} \text{ m})^2 \times 1000 = 1.26 \times 10^{-8} \text{ m}^2$$

$$\text{Area increase} = 1.26 \times 10^{-8} \text{ m}^2 - 1.26 \times 10^{-11} \text{ m}^2 \approx 1.26 \times 10^{-8} \text{ m}^2$$

$$\Delta W = \gamma \text{Area increase} = 7.5 \times 10^{-2} \text{ N m}^{-1} \times 1.26 \times 10^{-8} \text{ m}^2 = 9.42 \times 10^{-10} \text{ J}$$

The correct answer for this one is  $8.48 \times 10^{-10} \text{ J}$

Is there something I can remake that you would prefer?