- Direct damage to the DNA of skin cells can be brought about by exposure to ultraviolet radiation of wavelength 300.0 nm. What are the frequency and energy of this radiation?

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The wavelength, λ, is related to the energy and the frequency, ν, by the equations:

$$\nu = \frac{c}{\lambda} \text{ and } E = h\nu = \frac{hc}{\lambda}$$

Therefore with $\lambda = 300.0$ nm $= 3.000 \times 10^{-7}$ m:

$$\nu = \frac{(2.998 \times 10^8 \text{ m s}^{-1})}{(3.000 \times 10^{-7} \text{ m})} = 9.993 \times 10^{14} \text{ s}^{-1}$$

$$E = \frac{(6.626 \times 10^{-34} \text{ J s}) \times (2.998 \times 10^8 \text{ m s}^{-1})}{(3.000 \times 10^{-7} \text{ m})} = 6.622 \times 10^{-19} \text{ J}$$

(As the wavelength is given to four significant figures, this limits the accuracy of the answers to also being four significant figures).

Frequency: **9.993×10^{14} s^{-1}** | Energy: **6.622×10^{-19} J**