

4. The energy required to break one mole of Cl–Cl bonds in Cl<sub>2</sub> is 242 kJ mol<sup>-1</sup>. The longest wavelength of light capable of breaking a single Cl–Cl bond is

(C = 3×10<sup>8</sup> m/s and N<sub>A</sub> = 6.02×10<sup>23</sup> mol<sup>-1</sup>)

(1) 494 nm

(2) 594 nm

(3) 640 nm

(4) 700 nm

**Solution:**

We have B.E = 242KJ/Mol

$$E = h_c N_A / \lambda$$

$$\therefore \lambda = h_c N_A / E$$

$$= 3 \times 10^8 \times 6.626 \times 10^{-34} \times 6.02 \times 10^{23} / (242 \times 10^3)$$

$$= 0.494 \times 10^{-3} \times 10^3$$

$$= 494 \text{ nm}$$

Hence option (1) is the answer.