7. 10 mL of 1 mM surfactant solution forms a monolayer covering 0.24 cm^2 on a polar substrate. If the polar head is approximated as a cube, what is its edge length?

[April 9, 2019 (II)]

(a) 1.0 pm
(b) 2.0 pm
(c) 0.1 nm
(d) 2.0 nm

Ans. (b)

7. **(b)** No. of surfactant molecule $= 6 \times 10^{23} \times \dfrac{10}{1000} \times 10^{-3}$

$= 6 \times 10^{18}$ molecule

Let edge length $= a$ cm

Total surface area of surfactant $= 6 \times 10^{18} a^2$

$= 0.24$ cm^2

$a^2 = \dfrac{0.24}{6 \times 10^{18}} = 0.04 \times 10^{-18} = 4 \times 10^{-20}$

$a = 2 \times 10^{-10}$ cm $= 2$ pm