3. The mass of gas adsorbed, x, per unit mass of adsorbate, m, was measured at various pressures, p. A graph between $\log\frac{x}{m}$ and $\log p$ gives a straight line with slope equal to 2 and the intercept equal to 0.4771. The value of $\frac{x}{m}$ at a pressure of 4 atm is : (Given $\log 3 = 0.4771$)

[NV, Sep. 02, 2020 (I)]

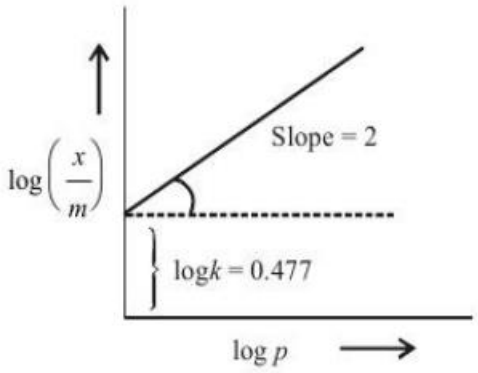
Ans. 6

3. (6)

$$\left(\frac{x}{m}\right) = k(p)^{\frac{1}{n}}$$

$$\log\left(\frac{x}{m}\right) = \log k + \frac{1}{n}\log p$$

$$\text{Slope} = \frac{1}{n} = 2, \text{ so } n = \frac{1}{2}.$$



$$\text{Intercept} \Rightarrow \log k = 0.477. \text{ So } k = \text{Antilog}(0.477) = 3$$

$$\text{So, } \left(\frac{x}{m}\right) = k(p)^{\frac{1}{n}} = 3(4)^{\frac{1}{2}} = 6.$$