

- 1.1 Find the rate of reaction defined as

$$r_{O_2} = \frac{\text{mol } O_2 \text{ used}}{\text{sec} \cdot \text{m}^3 \text{ of tank}}$$

Evaluate terms

$$\bar{t} = \frac{V}{\bar{v}} \quad \text{or} \quad V = \bar{t} \bar{v}$$

or $\left(\text{Volume of treatment tanks} \right) = \left(\frac{1}{3} \text{ day} \right) \left(32000 \frac{\text{m}^3}{\text{day}} \right) = 10667 \text{ m}^3$

O_2 used $\left(200 \frac{\text{mg}}{\text{lit}} \right) \left(\frac{1 \text{ gm}}{1000 \text{ mg}} \right) \left(\frac{\text{mol}}{32 \text{ gm}} \right) \left(\frac{1000 \text{ lit}}{\text{m}^3} \right) \left(\frac{32000 \text{ m}^3}{\text{day}} \right) = 2 \times 10^5 \frac{\text{mol } O_2}{\text{day}}$

Thus the rate of reaction

$$\left. \begin{aligned} \frac{2.0 \times 10^5 \text{ mol } O_2 / \text{day}}{10667 \text{ m}^3} &= 18.75 \text{ mol/m}^3 \cdot \text{day} \\ &= 2.17 \times 10^{-4} \text{ mol/m}^3 \cdot \text{s} \end{aligned} \right\} \leftarrow$$

- 1.3 Find $-r'_{C_{20}H_{42}}$ and $-r^M_{C_{20}H_{42}}$... evaluate terms

$$V_{\text{cat}} = \frac{50000 \text{ kg}}{800 \text{ kg/m}^3} = 62.5 \text{ m}^3 \text{ of catalyst}$$

$$W_{\text{cat}} = 50000 \text{ kg}$$

$$\text{MW}_{C_{20}H_{42}} = [20(12) + 42(1)] \frac{1}{1000} = 0.282 \text{ kg/mol}$$

$$F_{\text{feed}} = (6000 \text{ m}^3/\text{day})(900 \text{ kg/m}^3) = 5400000 \text{ kg/day}$$

So $-\frac{dN_{C_{20}H_{42}}}{dt} = \left(\frac{5400000 \text{ kg/day}}{0.282 \text{ kg/day}} \right) \left(\frac{\text{day}}{24(3600) \text{ s}} \right) (0.6) = 133 \text{ mol reacted/s}$

Thus the rate of disappearance of $C_{20}H_{42}$

$$\left. \begin{aligned} -r' &= \frac{1}{W_{\text{cat}}} \frac{dN}{dt} = \frac{1}{50000} (133) = 0.0027 \text{ mol/kg cat} \cdot \text{s} \\ -r^M &= \frac{1}{V_{\text{cat}}} \frac{dN}{dt} = \frac{1}{62.5} (133) = 2.13 \text{ mol/m}^3 \text{ cat} \cdot \text{s} \end{aligned} \right\} \leftarrow$$

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menjelaskan prinsip prinsip dasar teknik reaksi kimia dan aplikasi spreadsheet untuk perhitungan teknik reaksi kimia

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