

- Sevoflurane is an anaesthetic with a half-life in the brain of 2.3 minutes. How long does it take for the concentration of sevoflurane in brain tissue to drop from 0.025 mM to one hundredth of this value?

**For the first order decay of sevoflurane (S),**

$$\ln[S] = \ln[S]_0 - kt \quad \text{and} \quad t_{1/2} = \frac{\ln 2}{k}$$

Hence  $k = \frac{\ln 2}{2.3 \text{ min}}$ . Using  $[S]_0 = 0.025 \text{ mM}$  and  $[S] = 1/100 \times 0.025 \text{ mM}$ :

$$\ln(0.00025) = \ln(0.025) - \frac{\ln 2}{2.3 \text{ min}} \times t$$

so

$$t = 15 \text{ min}$$

Answer: **15 min**