

Solutions

2.1

- $[S] = K_m$: $v = 60$ (= half); $[S] = 30$: $v = 120 \times 30/33 = 109$ ✓.

2.2

- Competitive: active-site mimic outcompeted by substrate.

2.3

- On the y-axis ($1/V_{max}$ shared).

3.1

- Write both as $V = v(K + [S])/[S]$: $V = 40K + 20$ and $V = 12.5K + 50 \Rightarrow 27.5K = 30 \Rightarrow K_m = 1.09$ mM, $V_{max} = 63.6$ $\mu\text{mol}/\text{min}$ ✓.
- Check: $v(K_m) = 63.6/2 = 31.8 = V_{max}/2$ ✓.
- $v(20) = 63.6 \times 20/21.1 \approx 60.3$ ✓.

3.2

- Competitive – substrate-mimic at the active site.
- L-B: lines intersect on the y-axis; slope $\times 4$.
- Yes: at saturating $[S]$ the substrate outcompetes the inhibitor, restoring V_{max} .