

2.2 Enzymes and enzyme kinetics

Name: _____ Class: _____ Date: _____

Total: 24 marks

KEY WORDS K_m

Objective

Extract K_m and V_{max} from data and identify inhibitor type from kinetic changes.

1 Key knowledge and worked examples

■ The two constants

$v = V_{max}[S]/(K_m + [S])$; $K_m = [S]$ at half- V_{max} . Lineweaver–Burk intercepts: $1/V_{max}$ (y), $-1/K_m$ (x).

■ Worked example: two points, two constants

$v = 33$ at $[S] = 1$, $v = 60$ at $[S] = 4$: $33(K + 1) = 60(K + 4) \Rightarrow K_m = 1.5$ mM, $V_{max} = 82.5$ $\mu\text{mol/min}$ ✓.

2 Practice

2.1 $V_{max} = 120$, $K_m = 3$: compute v at $[S] = 3$ and $[S] = 30$. [3]

2.2 An inhibitor doubles apparent K_m ; V_{max} unchanged. Classify it. [3]

2.3 Where do competitive L-B lines intersect? [3]

3 Exam-style questions

3.1 An enzyme yields $v = 20$ at $[S] = 0.5$ mM and $v = 50$ at $[S] = 4$ mM.

Determine K_m and V_{max} . Verify with the half- V_{max} point. Estimate v at $[S] = 20$ mM. [8]

3.2 The same enzyme is studied with a drug present: apparent K_m is fourfold higher, V_{max} unchanged.

Classify the inhibition and explain the mechanism. Predict the L-B plot appearance. State whether a high-substrate dose can restore full rate, with a reason. [7]
