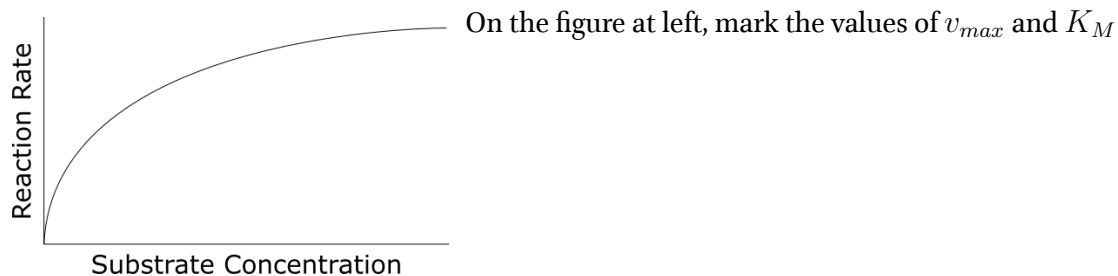


Quiz 17.3 – Reaction Mechanisms

Name: _____



Reaction rates for an enzyme-catalyzed reaction were recorded at different substrate concentrations. The data are tabulated below:

Trial	Rate (M/s)	$[S]_o$ (M)
1	2.7×10^{-3}	0.0100
2	3.5×10^{-3}	0.0300

Use these data to give v_{max} and K_M for the reaction

For these trials, $[E]_o = 0.020 M$. What is the catalytic efficiency, η , for the reaction?

After an inhibitor is added, v_{max} remains the same but K_M is substantially greater. What type of inhibitor was added?

A fluorophore is known to have $k_F = 3.0 \times 10^8 s^{-1}$, $k_{IC} = 1.0 \times 10^8 s^{-1}$, and $k_{ISC} = 6.0 \times 10^7 s^{-1}$

Give the observed fluorescence lifetime (τ) and the quantum efficiency (ϕ_F) for this fluorophore

A quencher is then added to the solution and the quantum efficiency is monitored. Data for the trials are shown in the table below

Trial	ϕ	$\frac{\phi_0}{\phi}$	[Q] (M)
1	0.513		0.0010
2	0.423		0.0020

Find the quenching rate constant k_Q (with proper units)

Assuming this quenching rate holds for auto-quenching, at what concentration of fluorophore will the quantum yield reach 10% of its value in the dilute limit?

A pair of fluorophores is capable of Förster resonant energy transfer with $R_0 = 3.9 nm$. These fluorophores are placed on two sites of a protein, and the energy transfer is observed to have $\eta_T = 0.14$ (14% efficiency of energy transfer). What is the distance between the two sites on the protein?

Your World

By Georgia Douglas Johnson

Your world is as big as you make it.
I know, for I used to abide
In the narrowest nest in a corner,
My wings pressing close to my side.

But I sighted the distant horizon
Where the skyline encircled the sea
And I throbbed with a burning desire
To travel this immensity.

I battered the cordons around me
And cradled my wings on the breeze,
Then soared to the uttermost reaches
With rapture, with power, with ease!