Name _____

Chem 352 - Fall 2018
## Quiz 2

$R = 8.314\ J/(mol \cdot K) = 0.08206\ (L \cdot atm)/(mol \cdot K)$

1. Succinate dehydrogenase is an enzyme that catalyzes one of the reactions in the citric acid cycle where succinate is converted to fumarate.

succinate   + Q   ⟶   fumarate   + QH₂
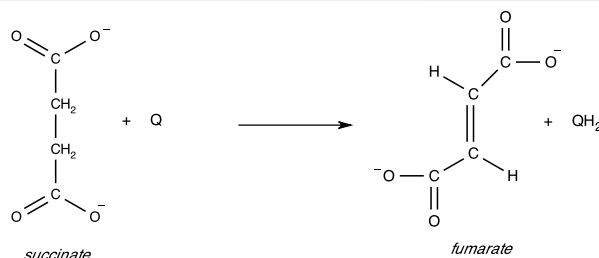
   a. What class of enzyme-catalyzed reaction does this belong to? _____

The initial rate (v_o) for the succinate dehydrogenase reaction was measured as a function of the succinate concentration ([succinate]). The enzyme concentration used in these experiments was 53 pM. The results for this experiment are shown in the graph to the right.
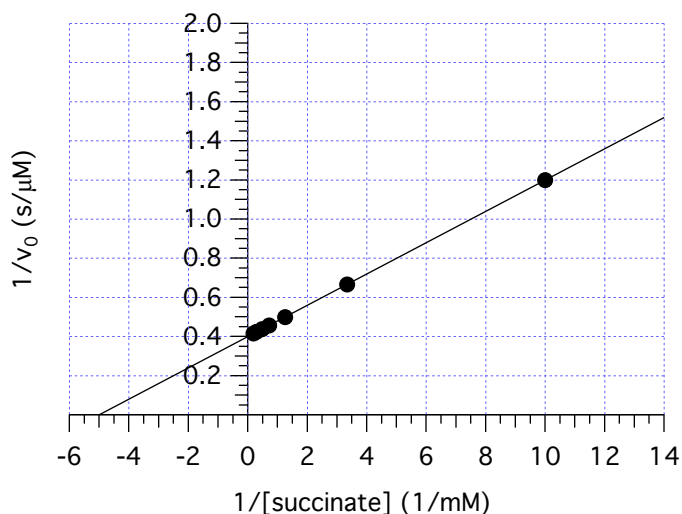
   b. What is the name for this type of plot?

   _____

   c. When fully saturated with succinate, how may succinate molecules does each succinate dehydrogenase molecule convert to fumarate per second? (Show calculations) _____

d. Under these condition, is succinate dehydrogenase displaying catalytic perfection? _____
    What is the evidence for this claim?

e. In words, describe what it mean for an enzyme to be *catalytically perfect*.

f. Malonate is a competitive inhibitor of succinate dehydrogenase.
    i. As a competitive inhibitor does malonate affect the apparent V_{max}, the
        apparent K_M, or both? _____
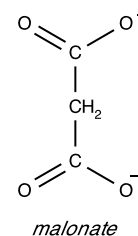
    ii. The follow reaction equation is used to describe enzyme-catalyzed reactions that adhere to
         the Michaelis-Menton model for enzyme kinetics. Using the letter "I" to represent the
         inhibitor malonate, modify this reaction equation to account for malonate as a competitive
         inhibitor.

$$E + S \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} ES \xrightarrow{k_2} E + P$$

    iii. On the graph shown on the previous page, sketch a line that shows the expected effect that
          the presence of malonate should have on the observed kinetics of the reaction catalyzed by
          succinate dehydrogenase.