

Answer Key - Quantitative Question from Lecture #4

The protein concentration in the extract is 20 mg/ml. The volume of the extract used for the assay was 10 μ l and the assay was conducted in a final volume of 0.5 ml. The amount of product formed in 1 min was 3 μ moles.

A. (a) $v = 3 \mu\text{moles} / 0.5 \text{ ml} / \text{min} = 6 \mu\text{moles} / \text{ml} / \text{min} = \mathbf{6,000 \mu\text{moles/liter-min}}$.

(b) $v = \mathbf{3 \mu\text{moles/min}}$, as already stated in the problem.

B. (a) $v = 3 \mu\text{moles} / 1 \text{ ml} / \text{min} = \mathbf{3,000 \mu\text{moles/liter-min}}$.

(b) $v = \mathbf{3 \mu\text{moles/min}}$, because you have added the same amount of enzyme molecules (i.e. those present in 10 μ l of extract) and because the substrate concentration is saturating and all other conditions have been maintained at their optimal values (hence, the reaction is running at V_{max} and dependent only upon the amount of enzyme present).

C. One unit of an enzyme is defined, by convention, as 1 μ mole of product formed per min. Hence, the concentration of the enzyme in the extract is 3 μ moles product formed/min / 10 μ l = 3 units/ 10 μ l = **300 units/ml**.

D. The specific activity (units of enzyme in the extract per mg total protein in the extract) = (300 units/ml) / (20 mg/ml) = **15 units/mg**.