Drug Design

In the quest for a treatment of hepatitis C a group of scientists have decided to concentrate on a particular protein that is involved somehow in the viral replication process.

Firstly they purify a large quantity of the protein. They then determine the primary structure of the protein. Using special techniques they then obtain the 3D structure of the protein.

1. What is primary structure and how is it different from tertiary structure?
   Draw a diagram outlining the different levels of structure.
2. What "special technique" might have been used to obtain the 3D structure?

It is observed that the protein is globular and is also an enzyme.

3. What properties would classify a protein as globular?
4. What is an enzyme?

In an effort to better understand how the enzyme works the scientists carry out kinetic studies. An experiment is carried out in which the initial rate of reaction is measured at various substrate concentrations. A graph of the results is plotted and the enzyme is found to follow Michaelis-Menton kinetics. It is found that $V_{\text{max}} = 100s^{-1}$ and $K_m = 100\mu\text{M}$.

5. What would the graph look like?
6. What is the equation for this curve?
7. What is the significance of $V_{\text{max}}$ and $K_m$?