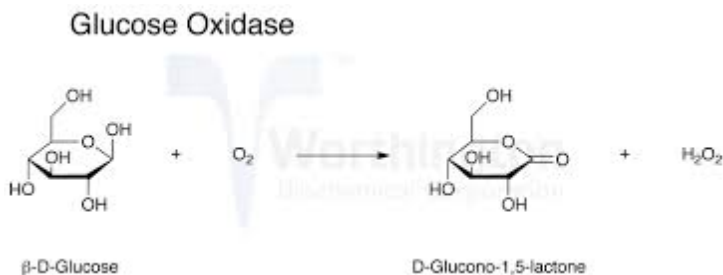


Please answer all the following questions.

1. One type of blood glucometer utilizes, in part, an electrode that has been modified with the enzyme glucose oxidase to catalyze the reaction shown in Scheme 1. In the device design the amount of blood glucose present is quantitatively transduced to current. Explain how. (5 pts.)



- What is an important interferent in the measurement and how is it accounted for to improve accuracy? (5 pts.)
2. Amperometric or conductivity detection has been used with capillary electrophoresis. Draw a diagram or describe either detection method. (5 pts.) What are the challenges of electrochemical detection for CE? (10 pts.)
3. A pH electrode is a potentiometric electrode. Give the line notation for this electrochemical cell. (5 pts.) Explain how the hydronium ion activity is transduced into a potential. (10 pts.)
4. Explain how pH could be measured with a field effect transistor. Include a diagram. (10 pts.)
5. Ion chromatography utilizes what type of electrochemical detector? (5 pts.) How can Ion Chromatography be 'reagent free'? (5 pts.)
6. Electrochemistry is often used to study surfaces. Explain why. Include an example. (10 pts.)
7. Describe the basic instrumentation used for performing a cyclic voltammetric experiment where the function of all components is clearly noted. Include a diagram. (10 pts.)
8. In spectroscopy the product of the Boltzmann Constant and temperature (kT) often governs the feasibility of the measurement. Evaluate the impact of considering kT in determining the potential from a galvanic cell. (10 pts.)
9. What is meant by the "Nernstian slope"? (10 pts.)