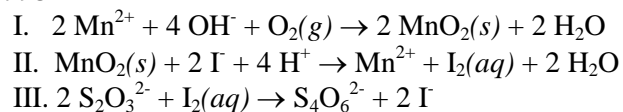


1993 B

The amount of oxygen, O_2 , dissolved in water can be determined by titration. First, MnSO_4 and NaOH are added to a sample of water to convert all of the dissolved O_2 to MnO_2 , as shown in equation I above. Then H_2SO_4 and KI are added and the reaction represented by equation II proceeds. Finally, the I_2 that is formed is titrated with standard sodium thiosulfate, $\text{Na}_2\text{S}_2\text{O}_3$, according to equation III.

- (a) According to the equation above, how many moles of $\text{S}_2\text{O}_3^{2-}$ are required for analyzing 1.00 mole of O_2 dissolved in water?
- (b) A student found that a 50.0-milliliter sample of water required 4.86 milliliters of 0.0112-molar $\text{Na}_2\text{S}_2\text{O}_3$ to reach the equivalence point. Calculate the number of moles of O_2 dissolved in this sample.
- (c) How would the results in (b) be affected if some I_2 were lost before the $\text{S}_2\text{O}_3^{2-}$ was added? Explain.
- (d) What volume of dry O_2 measured at 25°C and 1.00 atmosphere of pressure would have to be dissolved in 1.00 liter of pure water in order to prepare a solution of the same concentration as that obtained in (b)?
- (e) Name an appropriate indicator for the reaction shown in equation III and describe the change you would observe at the end point of the titration.