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Effect of Surfactant Dissolution of Spherical Particles in Micellar Systems

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Abstract: The influence of micelle-drug solubilization on the dissolution rate of monodisperse particles of benzocaine has been investigated. A model describing and predicting the initial dissolution rates of spherical particles was derived starting from the boundary layer theory. The dissolution rate of benzocaine spherical particles was determined in water and in solutions of sodium lauryl sulfate (SLS) under static conditions. The derived model was applied to the experimental data. The diffusion coefficients and the aqueous diffusion layer values were estimated from the experimental results and the aforementioned model. The diffusion coefficients and the boundary layer thickness values were also obtained experimentally from the rotating disk method and were used to predict the initial dissolution rates. Excellent correlations were obtained between the experimental and the calculated values at low micellar concentrations. However, obvious deviation was observed at high micellar concentrations. The results obtained from this study suggest that it is possible to predict the initial dissolution rates of monodisperse particles in micellar systems.