Spectrofotometric and Voltamperometric Study of the Stability of Dopamine in Basic Aqueous Solution.

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As dopamine is one of the main neurotransmitters of the central nervous system, several researches have been undertaken in order to understand its behaviour **[1-6]**. A large proportion of these investigations were concerned mainly, with the development of modified electrodes, to increase the selectivity during *in vivo* determination of dopamine**[7-9]**. Other researches have been carried out to find out about its behaviour in solution, and have reported constant acidity values for this cathecolamine**[10-13]**. In this work we report on the variation in the spectrofotometric and voltamperometric behaviour, with respect the pH, of the dopamine species.

In the spectrofotometric study, a band at 280 nm was observed in an acidic environment, which corresponds to absorption of an acid species of the dopamine; this is in agreement with the voltammogram obtained for the dopamine in this environment, which only revealed a redox process, with a potential difference of 340±0.006 mV. This electrochemical process has been amply studied [**1, 5, 7**], and corresponds to the change from dopamine to o-benzoquinone (see Fig. 1)

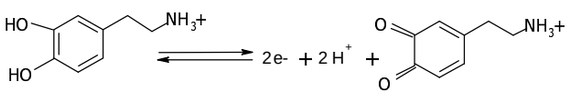

Fig 1. Redox equilibria for dopamine [1, 5, 7].

New signals were evident when the pH increased, either in the absorption spectra or in the voltammograms obtained for dopamine. Such behaviour was expected, as the dopamine presents three values for pKa. However, it was observed during the study that the species formed could not be the ionic species of the dopamine, but the oxidation products since the protonated species are very unstable. Sedeh et al. [**11**], reported the difficulty in determining the constants for the acidity of the dopamine, but only report two pKa values (8.93 ± 0.005 and 10.41 ± 0.03).

In view of the above, a kinetic study was carried out using UV-vis spectrofotometry, to determine the reaction rate for the dopamine at different pH values in a basic environment.

The electrochemical behaviour of the dopamine was studied over a carbon paste electrode in a potential range from –1000 to 1000mV in a basic environment. The redox process for the dopamine presents several signals ascribed to the formation of an intermediary of the ion radical type (semiquinone) and cyclidisation products (leucodopachrome and dopachrome) [**14-19**] at positive potentials. Formation of such intermediaries depends directly on the pH. It is proposed that some of these species could form in a basic solution, which would explain so the behaviour observed during the spectrofotmetric study.

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