SOME OBSERVATIONS ON RIBOFLAVIN ESR SPECTRUM

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Spectra and conditions were found where the ESR hyperfine structure of riboflavin free radical shows a satisfactory good resolution. The overall spectrum looks fairly symmetrical, as can be seen from the graphical analysis of the lines. The possibility of detecting biologically important molecules in a medium whose electronic characteristics are different from that of water may allow some new perspectives for the study of these molecules.

Up to the present, it was not possible to obtain, in spite of the increasing improvement of spectrometers, a good resolution in the ESR spectra of free (riboflavin, dimethylriboflavin, semiriboflavin) radicals, when these compounds are formed in aqueous or aqueous-alcoholic solution (1, 2).

There is not absolute certainty about the semiquinone free nature, although some forms of it have been postulated according to the probable structure of simpler compounds (1). It was thought then of the possibility of attaining a better observation of the free radical hyperfine structure using some solvent whose electric polarity were different from that of water.

Experiments done in various solvents showed that only in acetone medium the free radical is soluble enough to be formed at a high rate on the surface of the riboflavin particles (oxidised riboflavin is scarcely soluble in acetone), in a way that this rate of formation exceeds greatly the rate of destruction of the free radical by any electron acceptor present in the medium.

In some cases other solvents, such as absolute alcohol, were tried, the spectrum showed a noticeable lack of resolution, even when the attained concentration of free radicals was high enough for detection and measurement. This effect could possibly be due to perturbations of the electric field caused by the solvent molecules.