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ESR SPECTRUM OF 2,3,5-TRIPHENYL TETRAZOLIUM

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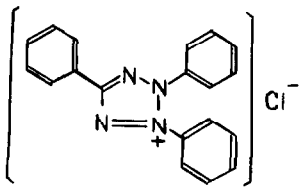
2,3,5-TRIPHENYL tetrazolium chloride has been widely used as a staining reagent for living materials to test biochemical redox activity.[1]



2,3,5-triphenyl tetrazolium chloride

Using the well-known reducing method with silver amalgam in vacuo, 2, 3, 5-triphenyl tetrazolium chloride was reduced in 1, 2-dimethoxy ethane (DME). The solution turned to red gradually and showed an ESR spectrum.

It was a peculiar feature of this spectrum that the intensity increased day after day accompanying strong coloring of the solution. This means that reduction of 2, 3, 5-triphenyl tetrazolium chloride with silver amalgam proceeds very slowly and the radical thus produced is fairly stable.

Fig. 1 is the ESR spectrum due to the radical by reduction of 2,3,5-triphenyl tetrazolium chloride with silver amalgam. The g-value of this radical is 2.0037 ± 0.00005 and the integrated intensity ratios of each line agree well with those of the theoretical spectrum,

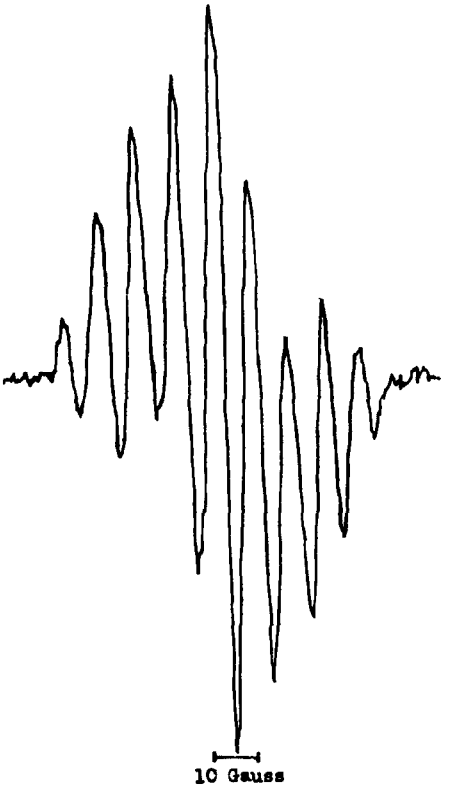


Fig.1. ESR spectrum of the radical produced by reduction of tetrazolium chloride with silver amalgam in DME.

[1] R.Kuhn and D.Jerchel, Ber. 74, 941, 949 (1941).

provided we analyse this spectrum as A_N= 6.4 Gauss, assuming four ^{14}N nuclei are equivalent. From these results, it was concluded that this spectrum should be identified as that of 2,3,5-triphenyl tetrazolium radical.

If reduced in tetrahydrofuran (THF), the same result as above was obtained but decay of the produced radical was rapid. Using zinc amalgam or zinc dust in THF, the same color solution was obtained but was too unstable to observe an ESR spectrum.

In ethyl alcohol we could obtain the red solution but not any ESR spectrum.

The above mentioned results were also obtained in the case of the samples prepared in the open air.

Further investigation is now going on to obtain more resolution of the ESR spectra due to the hyperfine interaction of the protons of the phenyl rings.