

Diehl P & Khetrapal C L. NMR studies of molecules oriented in the nematic phase of liquid crystals. *NMR—Basic Princ. Prog.* 1:1-95, 1969.

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Nuclear magnetic resonance (NMR) studies of molecules, oriented in the nematic phase of liquid crystals, were suggested in 1963 by A. Saupe and G. Englert.¹ Our paper in 1969, which reviewed earlier literature and summarized our practical experience, was written to open this fascinating field to practical NMR spectroscopists. [The SCI® indicates that this paper has been cited in over 270 publications since 1969.]

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"Soon after Saupe and Englert published a paper¹ in which for the first time they suggested the use of liquid crystals as orienting solvents for molecules, Englert left Freiburg (Germany) and took a job in a pharmaceutical company in Basel. From several discussions with him, the decision arose to start research in this field in the nuclear magnetic resonance (NMR) group of the department of physics at the University of Basel. In particular, it seemed promising to expand the determination of molecular structure based on the measured direct spin-spin couplings to systems of more spins with lower symmetry. Therefore, when C.L. Khetrapal arrived in Basel, on leave from the Tata Institute of Fundamental Research, Bombay, for a stay of two years, we actually decided on the definite project when we drove from the airport to the city around midnight. We decided that after a period of research, we would write a review article and try to open this field to practical NMR spectroscopists.

"Our work advanced rapidly and we were able to publish approximately one paper per month on all possible aspects of this new spectroscopy: we discussed the dependence of the spectra on temperature, concentration, and spinning speed of the sample and the use of direct and moment methods for their analyses. We analyzed for the first time spectra of molecules with low symmetry, studied intramolecular motion, detected isotope effects on the molecular orientation, and measured quadrupole coupling constants. We wrote about the existence of deceptive simplicity in spectra of oriented molecules and, finally, used electric fields to rotate the liquid crystal optic axis in the magnetic field. At that time, we were 'famous' in the physics department for our permanent 'smell' of liquid crystals and yellow hands. All the liquid crystals then available to us had yellow colours and had to be heated considerably to the isotropic state to dissolve the solute. Heating had to be done in the 5 mm NMR glass tubes and usually the samples boiled over to 'colour' the walls and the ceiling, in addition.

"After 15 months, we had published 13 papers and number 14 was the article which has now become a *Citation Classic*. We wrote it full of enthusiasm for this new spectroscopy which had turned out to be less difficult than anticipated. The article summarized all the available literature and incorporated a considerable amount of our own experience.

"Since 1969, several review articles²⁻⁴ and books^{5,6} have appeared on this subject. Liquid crystals have become well known not only for their spectroscopic and technical applications but also for their importance in biological systems.

"The main reasons, however, why our article has been so highly cited are, in our opinion, its timely appearance, the fact that it was the first effort in which a critical evaluation of the technique was presented, and, finally, perhaps that the readers noticed our excitement as explorers who had made their first small steps on an unknown but promising island."

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