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## Liquid Crystals

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### Centenary of the discovery of liquid crystals

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## Centenary of the discovery of liquid crystals

On the 14 March 1888 Dr. Friedrich Reinitzer, lecturer in botany at the German University of Prague, sent a letter of 16 pages handwritten in gothic characters to Otto Lehmann, at that time Professor of Physics at the Technical University of Aachen, later in Karlsruhe. Reinitzer addressed Professor Lehmann by the time-honoured title 'Esquire'. He enclosed two samples of the new substances, cholesteryl acetate and cholesteryl benzoate, which "exhibit striking and marvellous apparitions that I do hope that they will be also of interest to you to a certain extent" (cf. (a)). Later on (cf. (b)) he described the physical behaviour of cholesteryl benzoate as follows: "The substance exhibits *two* melting points, if one may say so. At 145.5° it melts to a turbid but absolutely fluid liquid which becomes suddenly clear not until 178.8°. On cooling, violet and blue colours appear which quickly vanish with the sample leaving lactescently turbid but fluid. On further cooling the violet and blue colours reappear but very soon the sample solidifies forming a white crystalline mass." Reinitzer concluded his letter with a most servile apology for his bother and expressed his sincerest thanks to Dr. Lehmann for his trouble taken with the possible investigation of the substances (cf. (c)).

The 'second melting point' which Reinitzer observed was nothing but the well-known clearing point of cholesteryl benzoate. The discovery of the first thermotropic liquid crystal must consequently be ascribed to him. The terms 'flowing crystal' or 'liquid crystal' however, were introduced by Lehmann a short time later [1]. The colours mentioned in Reinitzer's letter originate from the selective reflection of circularly polarized light by the liquid-crystalline state of cholesteryl benzoate. However, Reinitzer observed, very precisely, the apparition of these colours *twice* on cooling: the colours appearing at lower temperatures are caused by the cholesteric phase [1] whereas those at higher temperatures are actually due to the *blue phase* of cholesteryl benzoate [2]. Therefore, this year we celebrate the centenary of the discovery of liquid crystals as well as the hundredth anniversary of the detection of the blue phase [3].

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*University of Paderborn, F.R.G.*  
15 August 1988

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- [2] STEGEMEYER, H., and BERGMANN, K., 1980, *Springer Ser. Phys. Chem.*, **11**, 161.
- [3] STEGEMEYER, H., and KELKER, H., 1988, *Nachr. Chem. Techn. Lab.*, **36**, 360.

Ein Alkybenzen!

(a) Flüssigkeit sind unregelmäßig  
 vom Spinnweb z. z. röhrenförmig, prof. die  
 Mineralogie in der folgenden Richtung  
 untersucht, was ist ab. für Alkybenzen  
 kann nicht jene Flüssigkeiten zu sein  
 sondern, und die Stelle, die Flüssigkeiten  
 '40. Alkybenzenen in Folge von Flüssigkeiten  
 dieser Art sind für Alkybenzen. Die  
 beiden Flüssigkeiten (Cholesterinlactat  
 und Cholesterinbenzoat) zeigen so auf,  
 falls sie sind Alkybenzenen,

(b) Cholesterinbenzoat. Das ist ein Fall, in  
 dem man die meisten Alkybenzenen  
 findet. Es tritt für Alkybenzenen  
 Erscheinung hervor. Die Flüssigkeit zeigt  
 einen sehr geringen Anstieg, wenn  
 man sie mit Wasser mischt. Bei 145,5°  
 zeigt sie einen Anstieg  
 sehr geringen Anstieg. Die Flüssigkeit  
 wird erst bei 178,5° flüssig und zeigt  
 dann, dass man ein Alkybenzen, so  
 weit möglich, ein Alkybenzen und keine  
 flüssige Erscheinung auf die Alkybenzen

ausgewaschen, wenn die Flüssigkeit nicht  
 für die Alkybenzen flüssig bleibt. Alkybenzen  
 ist ein Alkybenzen. Alkybenzen  
 und die Alkybenzen sind Alkybenzen  
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