

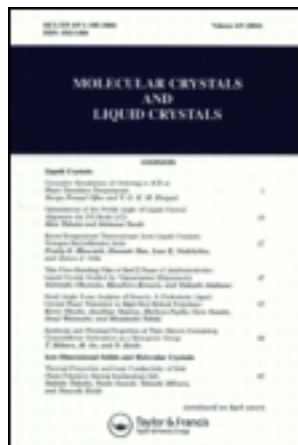
This article was downloaded by: [Tomsk State University of Control Systems and Radio]

On: 21 February 2013, At: 10:49

Publisher: Taylor & Francis

Informa Ltd Registered in England and Wales Registered Number: 1072954

Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Molecular Crystals and Liquid Crystals

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/gmcl16>

Polar and Chiral Organic Crystals, Striking Reactivity and Selectivity

Alain Thozet ^a, Monique Perrin ^a, Robert Perrin ^b, Guy Bertholon ^b, Jacques Vicens ^b & Roger Lamartine ^b

^a Laboratoire de Minéralogie, Cristallographie

^b Laboratoire de Chimie Industrielle - ERA 600 du CNRS Université Claude Bernard, LYON I, 43, boulevard du 11 novembre 1918, 69622, Villeurbanne, FRANCE

Version of record first published: 17 Oct 2011.

To cite this article: Alain Thozet, Monique Perrin, Robert Perrin, Guy Bertholon, Jacques Vicens & Roger Lamartine (1983): Polar and Chiral Organic Crystals, Striking Reactivity and Selectivity, *Molecular Crystals and Liquid Crystals*, 96:1, 33-34

To link to this article: <http://dx.doi.org/10.1080/00268948308074687>

PLEASE SCROLL DOWN FOR ARTICLE

Full terms and conditions of use: <http://www.tandfonline.com/page/terms-and-conditions>

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly forbidden.

The publisher does not give any warranty express or implied or make any representation that the contents will be complete or accurate or up to date. The accuracy of any instructions, formulae, and drug doses should be independently verified with primary sources. The publisher shall not be liable for any loss, actions, claims, proceedings, demand, or costs or damages whatsoever or howsoever caused arising directly or indirectly in connection with or arising out of the use of this material.

POLAR AND CHIRAL ORGANIC CRYSTALS, STRIKING
REACTIVITY AND SELECTIVITY

ALAIN THOZET, MONIQUE PERRIN
Laboratoire de Minéralogie - Cristallographie

ROBERT PERRIN, GUY BERTHOLON, JACQUES VICENS,
ROGER LAMARTINE
Laboratoire de Chimie Industrielle - ERA 600 du CNRS
Université Claude Bernard - LYON I, 43, boulevard du
11 novembre 1918 - 69622 - Villeurbanne - FRANCE

Abstract Polar reactivity differences have been found on the two faces of a slice cut along a polar axis in a 3-methyl 4-isopropyl phenol crystal. A case of absolute asymmetric synthesis is noted during the chlorination of the same compound.

It is possible to obtain organic polar crystals *i.e.* crystals in which the disposition of molecules does not present a center of symmetry. The polar axis in such crystals can be but not necessarily, a crystallographic axis¹. It could be possible with such crystals to observe solid-gas reactions which present selectivities and specificities depending on the absolute direction of the polar axis. In the same way, it is possible to obtain organic chiral crystals *i.e.* crystals in which the disposition of molecules does not present centers of inversion, mirror planes, glide planes and rotation - reflection axis¹⁻². Such crystals exist on both forms depicted in terms of right and left crystals. The corresponding crystalline arrangements may concern both achiral and prochiral molecules. The reactions of such crystals with gases are potentially able to produce mixtures containing one enantiomer in excess, the enantiomeric excess depending on

whether the reaction is performed on a right handed crystal or on a left handed crystal. In both cases one realizes an absolute asymmetric synthesis.

We found two phenolic substances crystals of which present a polar axis and moreover are also chiral. They are 4-isopropyl phenol 1 and 3-methyl-4-isopropyl phenol 2.



They have the same crystalline structure and crystallize in $P4_1$ space group. As they are uniaxial it is easy to identify right and left crystals by simple polarized microscopic observations. We have been able to make grow crystals of 18 x 18 x 70 mm dimensions.

The gaseous chlorination of slices cut in such crystals in a direction perpendicular to polar axis shows the reactivity to vary by a factor of 2 as the reaction is performed on one side or the other side of the slices. In addition different selectivities are observed. From a more general point of view, we obtained a *monochlorocyclohexadienone* which is not produced in solution.

The gaseous chlorination of powdered left or right handed crystals of 3-methyl-4-isopropyl phenol gives liquid mixtures from which the *monochlorocyclohexadienone* is isolated. This substance in solution presents rotatory power showing that an enantiomeric excess has been produced.

REFERENCES

1. D.Y. Curtin and I.C. Paul, Chem. Reviews, **81**, 524 (1981).
2. B.S. Green, M. Lahav, D. Rabinovich, Acc.Ch.Res. 191 (1979).