

MICROSCOPICAL EXPLORATION

THIRTY SEVEN

SAME ACIDS MORE COLOUR

Introduction

The acids under consideration in ME37 are the same 'fruit acids' as in ME35 and are, in alphabetical order, Ascorbic acid (A), Citric acid (C), Malic acid (M) and Tartaric acid (T).

Procedure

This time, however, I start by making an aqueous solution of each acid separately by dissolving 1 gram of the acid crystals in 30mls of pure soft Cumbrian tap water, yielding a clear solution at a concentration of approximately 33mg/ml.

Next, four clean glass microscope slides were labelled A, C, M and T respectively and were placed on the fins behind the room central heating radiator and allowed to equilibrate to 45°C. Two hundred microlitres of each acid solution containing about 7mg of the acid was then pipetted onto the centre of the correspondingly labelled slide and allowed to crystallize.

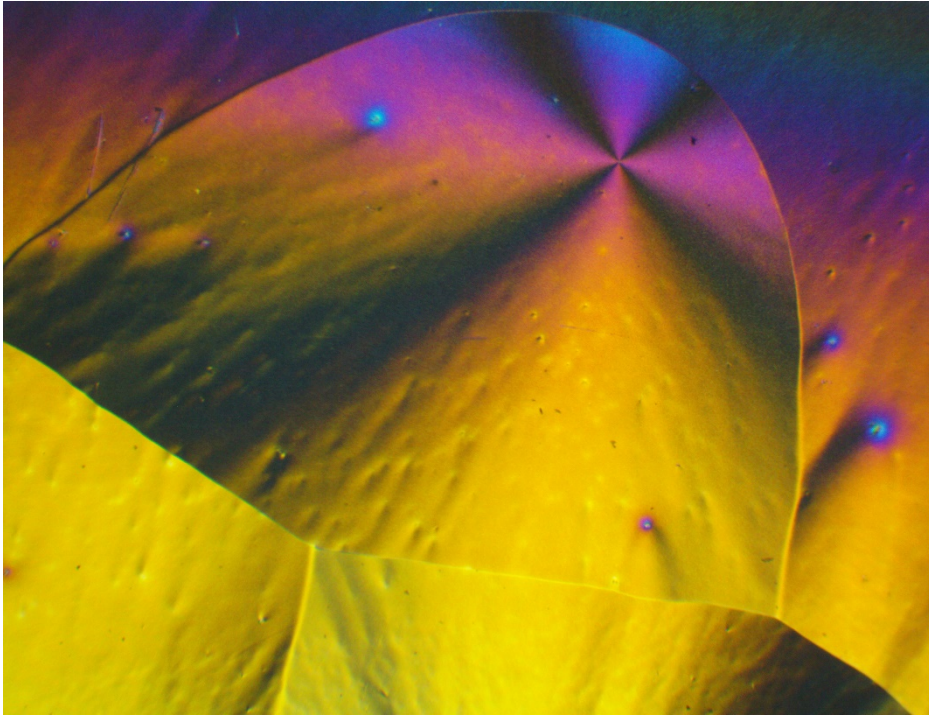
For the observation of the specimen slides thus produced, my Swift SW380T microscope was fitted with linear polarising and analysing filters in orthogonal configuration, and the mechanical stage was positioned such that the field of view of the x4 objective was centred on the centre point of each slide. Images were captured using a Swift SC1003 10MP digital camera in the trinocular port of the instrument.

Images of each slide were captured with crossed polars only, and also with crossed polars plus sticky tape waveplate number 9 (WP9) inserted between polariser and specimen slide.

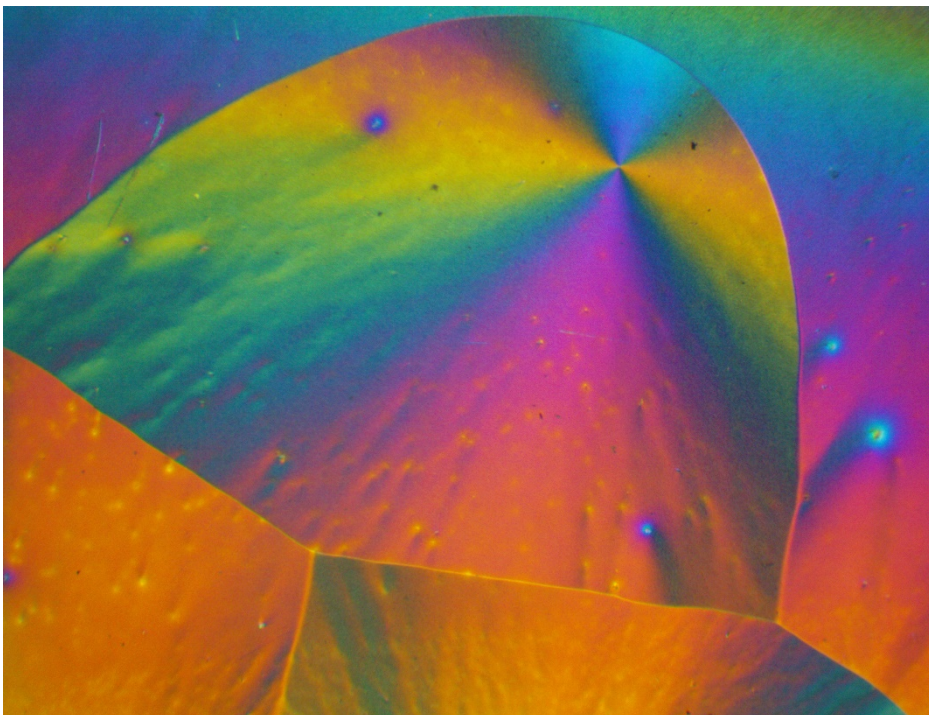
(For details of sticky tape waveplate number 9 (WP9) see Microscopical Exploration 31 in the April 2024 *Micscape* magazine [here](#)).

Results

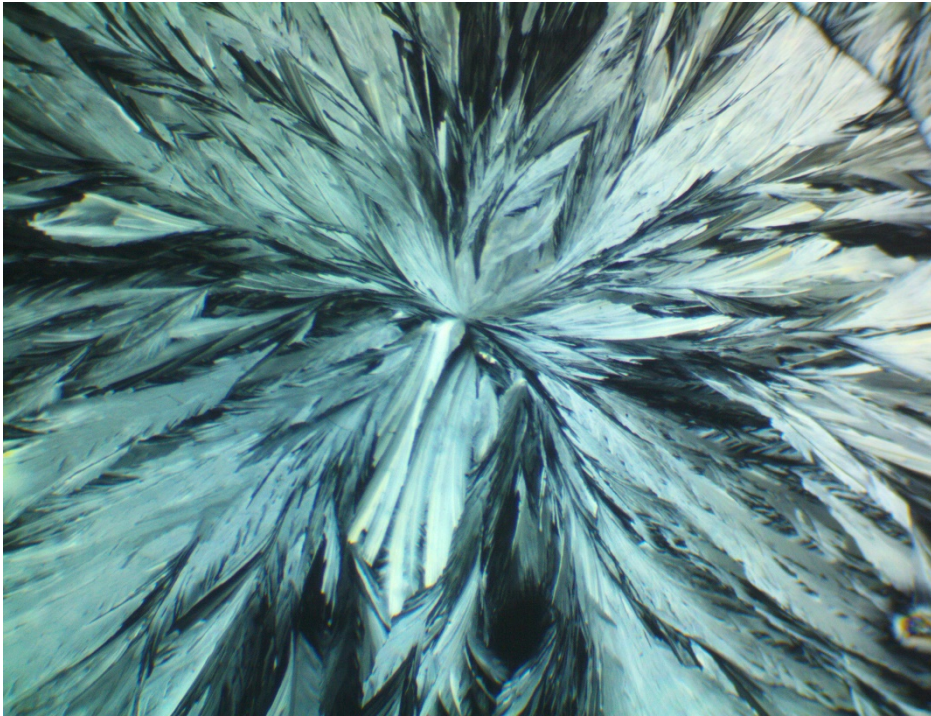
Ascorbic acid(A) crossed polars



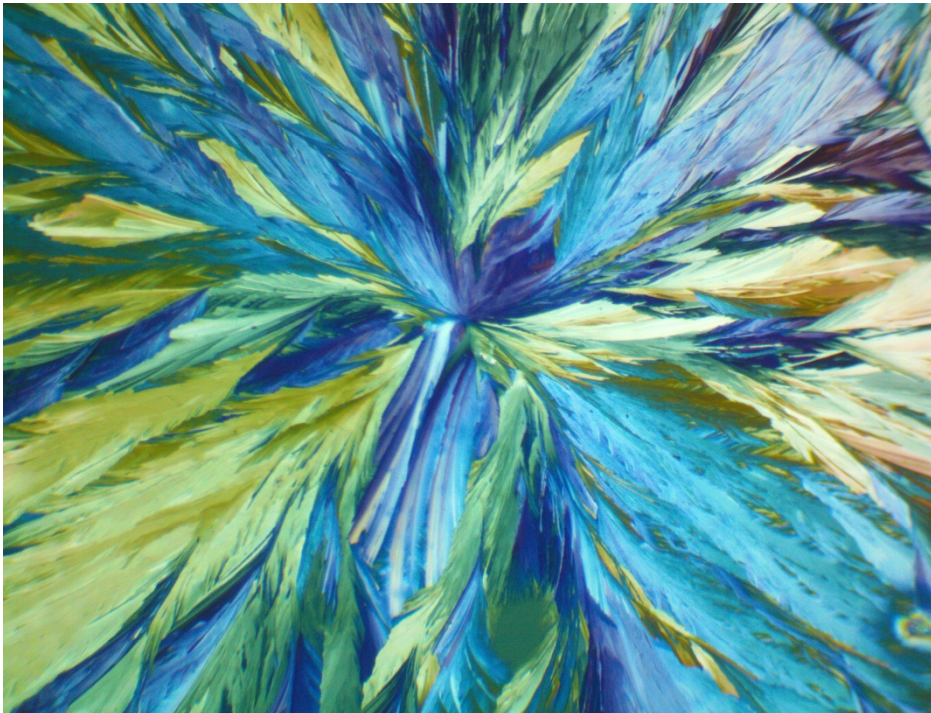
Ascorbic acid(A) crossed polars plus WP9



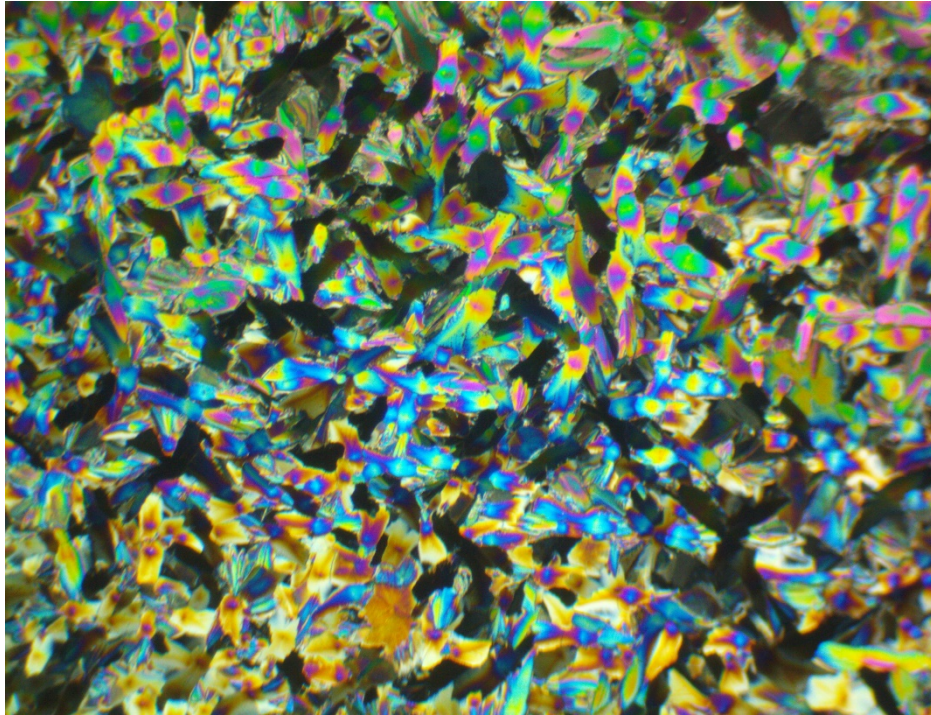
Citric acid(C) crossed polars



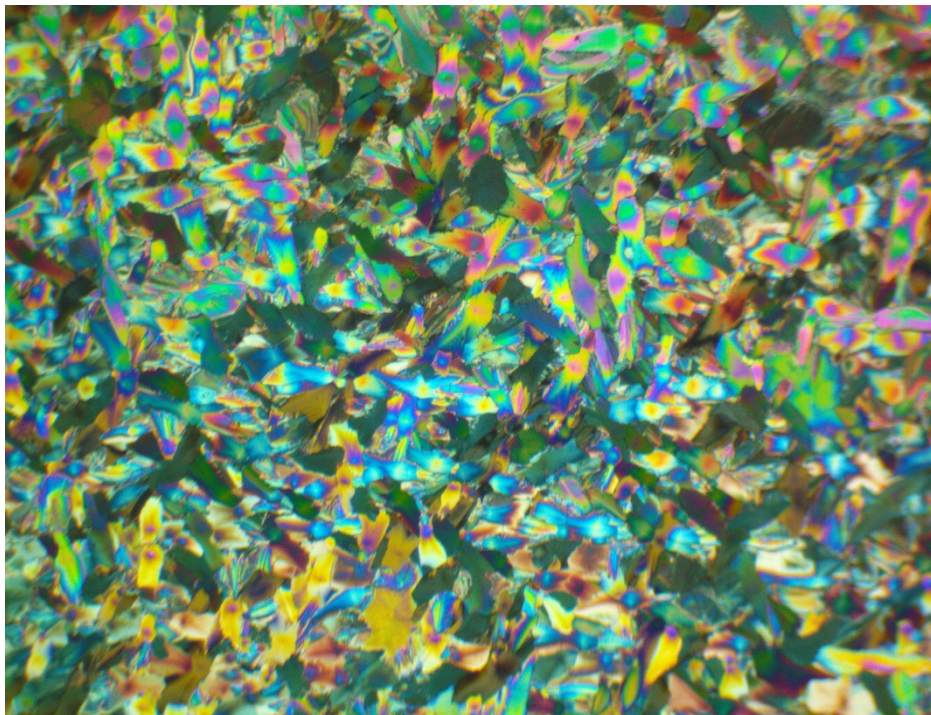
Citric acid(C) crossed polars plus WP9



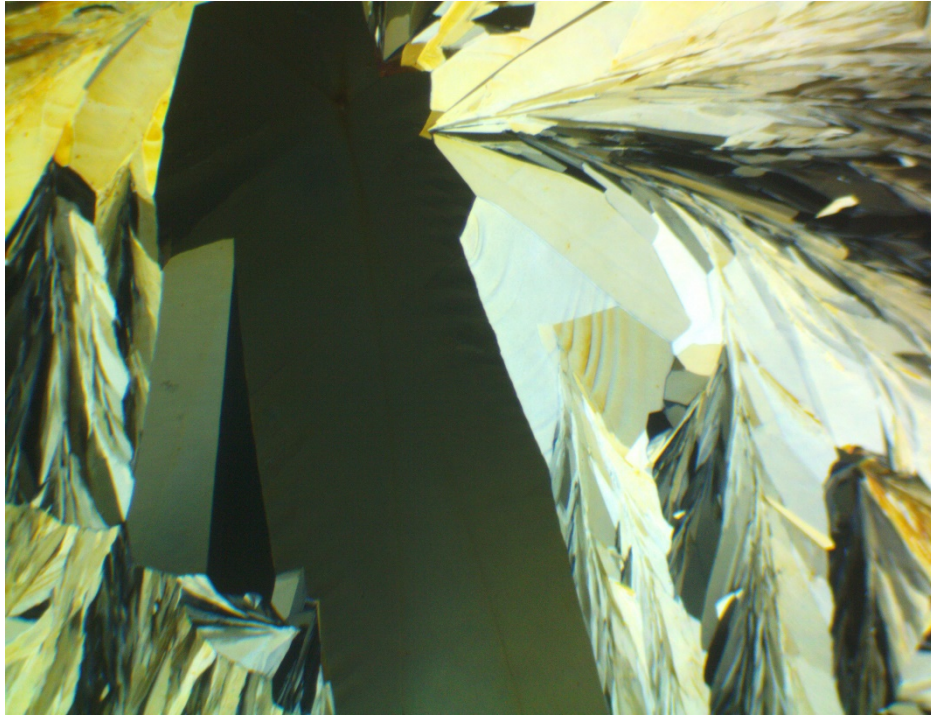
Malic acid(M) crossed polars



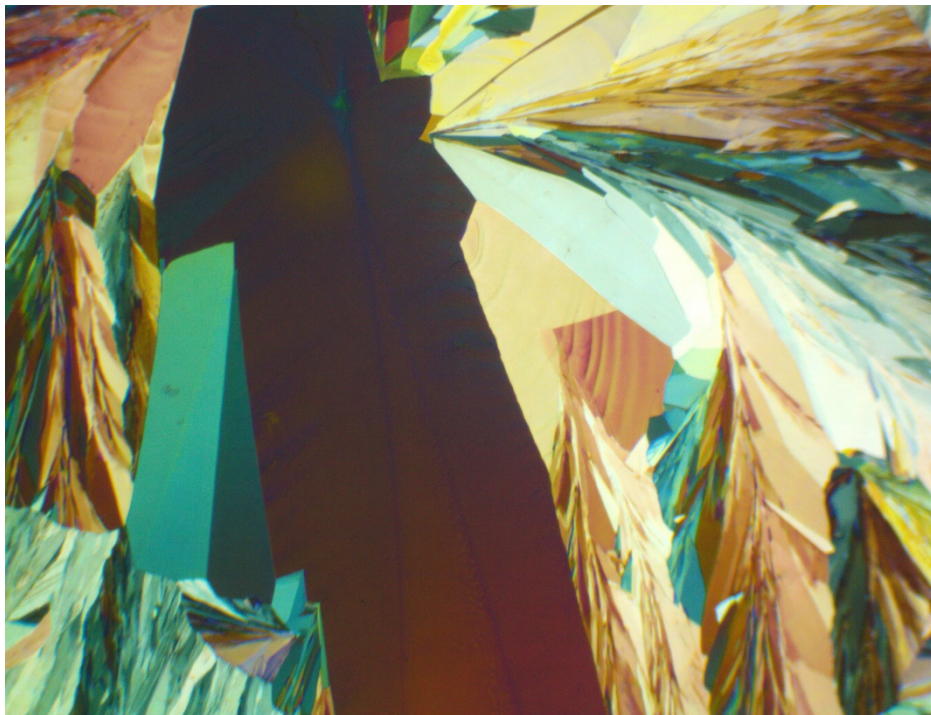
Malic acid(M) crossed polars plus WP9



Tartaric acid(T) crossed polars



Tartaric acid(T) crossed polars plus WP9



Conclusions

The four fruit acids are readily soluble in water in the amounts used here and may partially dissociate in solution, but undergo no other chemical reaction unlike in alcoholic solution where esterification can occur.

The crystallization on the specimen slides was observed to be slower due to the lower volatility of water compared with organic solvents such as ethanol and acetone (propan-2-one)

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As we say here in Cumbria:

‘Ave a go yersel’!

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Published in the October issue of *Micscape* magazine.