

NOTES

° Synthesis of an Isomer of Chaulmoogric Acid

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An isomer of Chaulmoogric acid has been synthesised from methyl ricinoleate obtained from castor oil, —the commercial commodity.

Chaulmoogric acid is obtained from fresh seeds of *Gynocardia odorata* R. Br.¹, *Hydrocarpus kurzil warb*² and *Hydrocarpus laurifolia* (Dennst.), Sleumer², all from family Flacourtiaceae. The oil is mainly useful for leprosy and other skin diseases. The oil contains only 22-27% chaulmoogric acid along with hydrocarpic acid and its lower homologues, garlic acid, oleic acid, palmitic acid etc. In the present study use of castor oil in the preparation of an isomer of chaulmoogric acid is described.

Methyl ricinoleate was obtained by methanolysis of castor oil. It was selectively hydroxylated with perchloric acid in acetic acid to give 9,12-dihydroxyoctadecanoic acid. This acid was further oxidised with chromium trioxide in acetic acid to give corresponding diketo compound. The base catalysed cyclisation of the diketo compound in aqueous ethanolic solution of caustic alkali was very much facile. The cyclised product was then subjected to Hauang-Minlon reduction to give cyclopentene ring with two side chains at *vicinal* positions. This compound is an isomer of chaulmoogric acid (Scheme—1).

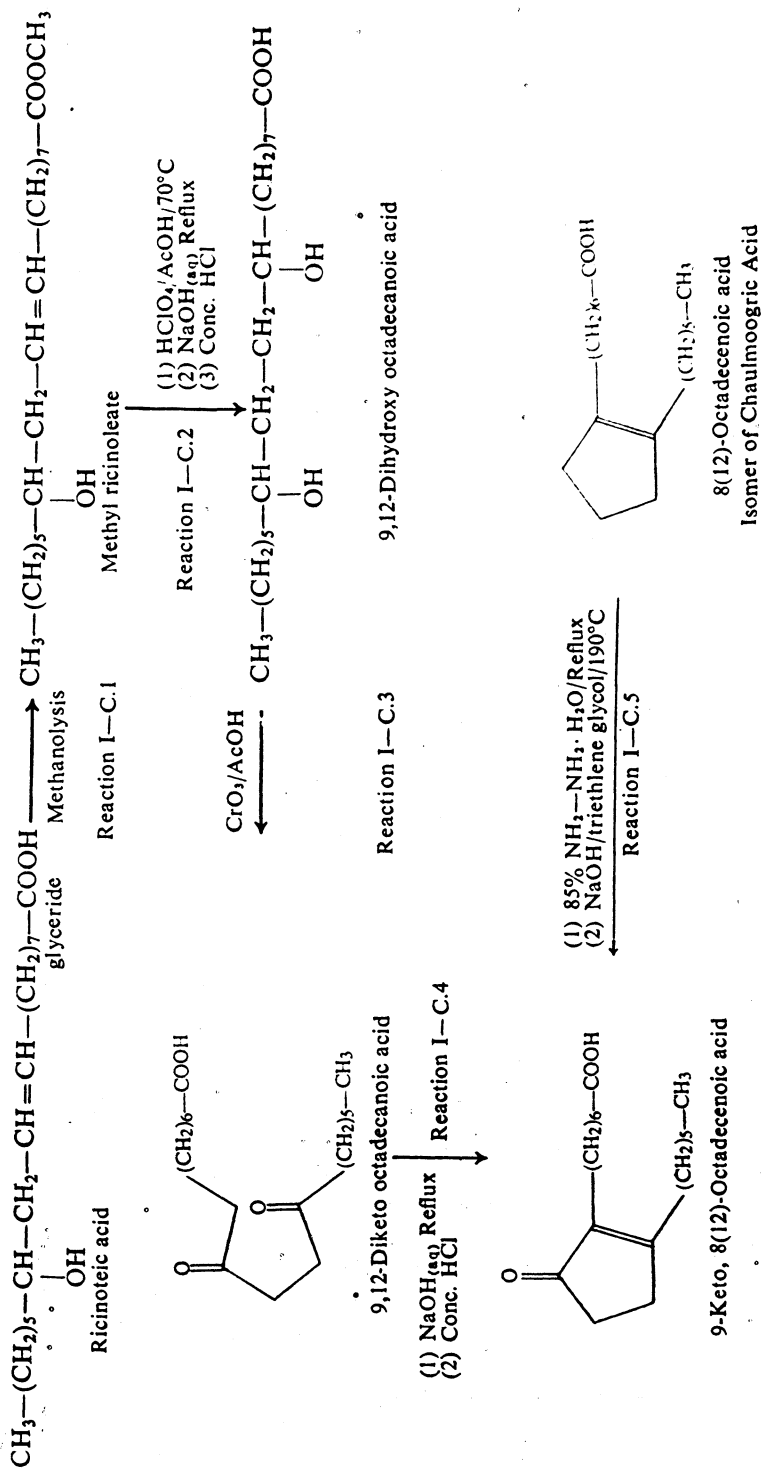
Synthesis of 9,12-dihydroxyoctadecanoic Acid (Reaction I—C.2).

Methyl ricinoleate (10 g.) in acetic acid (200 ml.) containing aqueous perchloric acid (60%, 12 ml.) was stirred at 70°C for 5 hrs and kept overnight. Acetic acid (100 ml.) was recovered under reduced pressure. The residue was diluted with cold water and extracted with benzene (100 ml.). Benzene extract was washed free of acid, dried over anhydrous sodium sulphate and solvent recovered to get a dark brown residue (9.85 g.). The residue in ethanol (60 ml.) was refluxed with aqueous sodium hydroxide solution (10%, 75 ml.) for 3 hrs. Ethanol was then evaporated, residue diluted with the cold water and acidified with concentrated HCl, aqueous layer was filtered and dried in air (7.5 g.) and crystallised from diisopropyl ether, m.pt 72°C. The structure was confirmed by i.r. and n.m.r. spectra and other analytical data.

Synthesis of 9,12 diketo octadecanoic acid (Reaction I—C.3)

To a solution of 9,12-dihydroxyoctadecanoic acid (5 g.) in acetic acid (160 ml.) was added a solution of chromium trioxide (3.3 g.) in water

SCHEME 1—C



(30 ml.) The mixture was stirred for 1 hr at 35–40°C, and then for 2 hrs at room temperature. The reaction mixture was diluted with ice-cold water (300 ml.). The liberated solid was filtered at pump washed with water. The solid 9,12-diketo octadecanoic acid was dried in air (3.45 g.) and crystallised from diisopropyl ether to give white crystalline solid (m.pt. 89°C).

Synthesis of 9-Keto, 8(12)-octadecenoic acid (Reaction I.C. 4)

9,12-Diketo octadecenoic acid (5 g.) in ethanol (200 ml.) was mixed with aqueous solution of sodium hydroxide (4%, 200 ml.). The reaction mixture, orange in colour, was refluxed for 4 hrs when it turned red. Ethanol was recovered by distillation. The concentrated reaction mixture was dumped in ice-cold water, acidified with concentrated hydrochloric acid. The separated yellowish product was taken in ether; ethereal layer was washed several times with water to make it free from mineral acid. Ether layer was dried over anhydrous sodium sulphate. Ether was evaporated to get crude cyclised product (5 g.).

Preparation of 8 (12)-octadecenoic acid by Huang-Minlon reduction (Reaction I—C.5)

A mixture of 9-keto, 8 (12)-octadecenoic acid (5.0 g.) hydrazine hydrate (85%, 2.5 ml.) in ethyl alcohol (30 ml.) was refluxed for 2 hrs. Triethylene glycol (40 ml.) and solid sodium hydroxide (2.5 g.) was added to it and water condenser was detached. The reaction mixture was heated strongly so that ethyl alcohol, water vapour, excess hydrazine hydrate were evaporated completely. The temperature of the reaction mixture was allowed to increase to *ca.* 190°C. The reaction mixture was further refluxed for another 3 hrs. The whole contents were then cooled and extracted with benzene after acidification by HCl(2N). Benzene layer was separated, washed twice or thrice with water and dried over anhydrous sodium sulphate. (yield *ca* 4.5 g.) The acid was converted into ethyl ester b.pt 248°C. It was hydrolysed, acidified, extracted with ether and dried. Ethyl ester of chaulmoogric acid has been reported to have b.pt 236°C.

REFERENCES

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