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(مراسلة قصيرة) ***(Short Communication)***

Dethiation of α-Methyl and α-Phenylmercaptopropionic Acid Derivatives

إزالة الكبريت من بعض مشتقات حمض البروبيونيك

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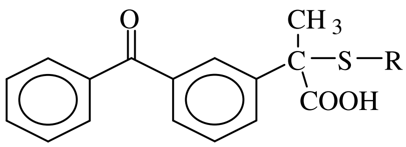
Abstract

Dethiation of α-(3–benzoylphenyl)-α-methyl and α-phenylmercaptopropi-onic acid (I & II) with Raney nickel is described.

ملخص

تمت إزالة الكبريت من المركبين ألفا–ميثيل وألفا–فنيل كبريت ألفا–(٣–بنزوييل فنيل) حمض البروبيونيك (I, II).



I R = CH_3

II R = C_6H_5

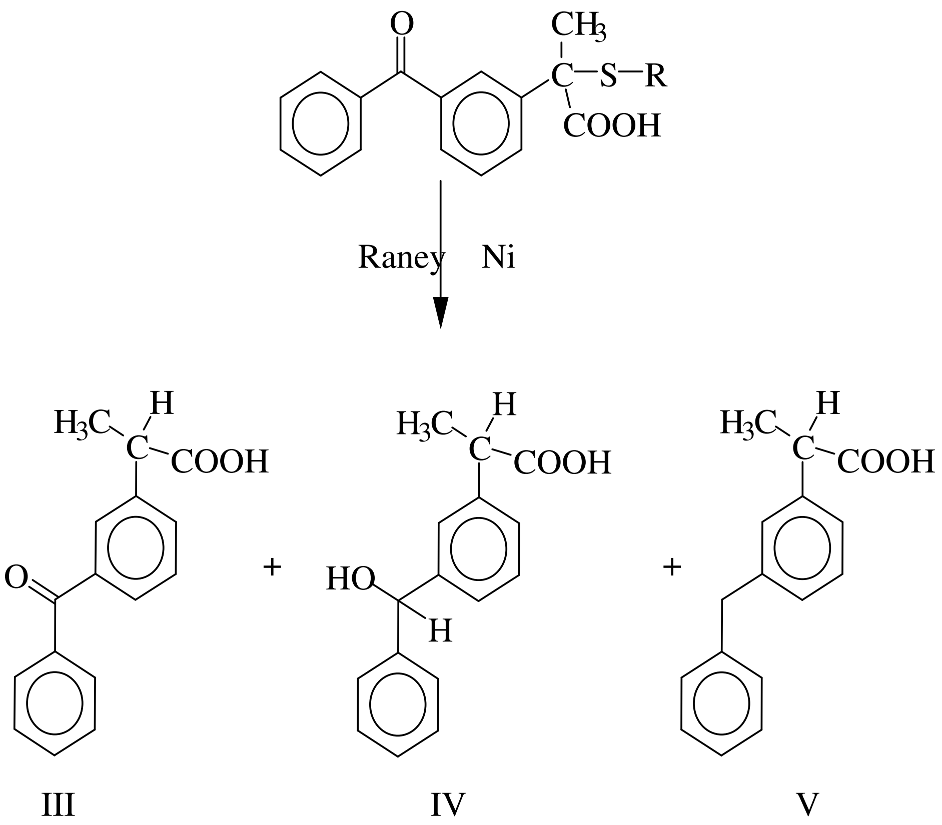
Introduction

In a previous publication [1], we reported the synthesis and dethiation of α-(3–benzoylphenyl)-α-phenylmercaptopropionic acid (I) using potassium salt of thiophenol in methanol[2]. *Such intermediates (I & II) are starting materials for the preparation of the well known anti-inflammatory agent, α - (3- benzoylphenyl) propoionic acid (III).*

In continuation of our research we study the dethiation of the same compounds with Raney nickel. Blicke, et al.[3] described the dethiation of benzo [b] thiophene-3- carboxylic acid with Raney nickel which gave a high yield of α - phenylpropionic acid.

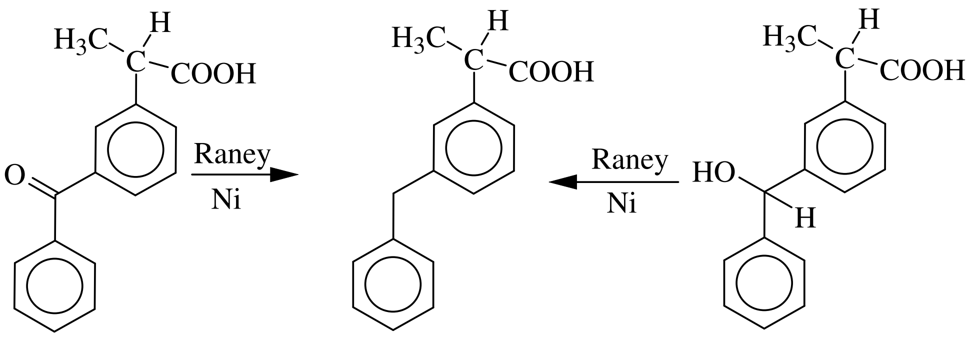
Results and Discussion

Using procedure analogous to Blicke’s [3] for dethiation of compounds (I) and (II) (method A), a mixture of compounds [(III), (IV) and (V)] was obtained (**Scheme 1**).



Scheme 1:

Obviously, the catalyst was too active and the reduction was carried beyond the desired stage, i.e. further reduction attacked the benzophenone carbony1 group. On a second try we first deactivated the catalyst by heating it in boiling acetone for a few hours prior to use [4] (method B). The results were enhanced, and compounds (III) and (IV) were the only products of scheme I. Reactions were controlled by means of thin layer chromatography (TLC), considering that the end of the reactions were the end of dethiation. Exact structures for compounds (III), (IV), (V) were determined spectroscopically. Further reduction using method A, compounds (III) and (IV) were converted into compound (V) (**Scheme 2**.). Likewise, our attempts to find conditions under which only dethiation takes place leaving the carbonyl group unattacked, were unsuccessful.



III V IV

Scheme 2:

Experimental:

All melting points are uncorrected. H^1 NMR spectra were recorded on a Varian T-60 instrument with TMS serving as an internal standard. All chemical shifts are given on the scale (ppm). FT-IR spectra (KBr disk) were obtained with a Perkin Elmer M257 spectrophotometer (absorptions in cm^{-1}). Mass spectra were recorded on a Shimadzu GC MS – QP 5000, using chloroform as solvent.

Compounds (I) and (II) were synthesized by a known procedure [1] and characterized by mp, IR and H^1 NMR spectra.

Method A

Raney nickel (1.5g) was suspended in 5% sodium hydroxide solution (10mL) and ethanol (5ml). To this suspension compound (I)* (0.75g, 2.67 mmol) was added. The mixture was stirred at 70-80^o for 3 hours, cooled, and filtered. The solid was washed with 10ml of 50% NaOH solution. The filtrate was acidified to pH=1 followed by extraction with (3×15mL) of ether. The combined ethereal extracts were washed with water (2x 10 ml), dried over sodium sulfate and evaporated *in vacuo.* Residual oil was separated by silica gel preparative plate chromatography [25:75(v/v)ether/petroleum ether]. Three different reaction products were obtained:

- 2-(3-benzoylphenyl) propionic acid (III) R_f:0.5, the yield was 0.14g (20%). Mp. 92-93^o C. Lit (5) mp. 93-95^{o}C, mass:m/z 254 (M+).
- 2-[3- α -hydroxybenzyl) phenyl] propionic acid (IV) R_f:0.35, the yield was 0.33g (46%), mp. 119-120 ^{o}C Lit (6), 120-121 ^{o}C, mass:m/z 240(M^+).
- 2-(3-benzyl phenyl) propionic acid (V), R_f:0.78, the yield was 0.12g (18%) mp. 59-60 ^{o}C , Lit (6), 60-61 ^{o}C , mass:m/z 240 (M^+).

The IR and NMR spectra for the three compounds were identical with those of an authentic sample.

Method B

Raney nickel (1.5g) was suspended in acetone (40mL) and the mixture was refluxed for 2 hours. The mixture was allowed to cool to room temperature, followed by addition of 40mL of 5% sodium hydroxide solution. The acetone was evaporated *in vacuo* and a solution of compound (I)* (0.75g, 2.67 mmol) in (25 mL) ethanol was added. The

* *The same methods A & B were used for compound (II) and the same results were obtained.*

suspension was stirred for 1 hour at reflux temperature, then allowed to cool. The catalyst was filtered off and washed with a solution of 5% sodium hydroxide. The filtrate was acidified to pH = 1 with concentrated hydrochloric acid followed by extraction with (2X 10mL) of ether. The combined ethereal extracts were washed with water (10mL) and dried over sodium sulfate. The ether was evaporated *in vacuo.* Residual oil was separated by silica gel preparative plate chromatography [25:75 (v/v) ether / petroleum. ether]. Only two different reaction products were obtained: 2-(3-benzoylphenyl) propionic acid (III), the yield was 0.37g (55%), and 2-[3-α-hydroxybenzyl) phenyl] propionic acid (IV), the yield was 0.17g (25%). The IR, NMR and mass spectra were identical with those obtained via method A.

Acknowledgments

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