

Hydroborations: New Routes to Isoflavanones and Homoisoflavanones

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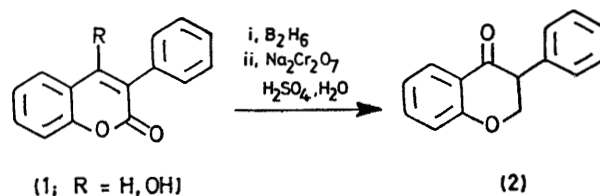
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Summary Hydroboration followed by chromic acid oxidation of 3-phenylcoumarin and 4-hydroxy-3-phenylcoumarin yields isoflavanone; when 3-benzyl-4-hydroxycoumarin was used homoisoflavanone was produced.

PREVIOUSLY we have shown that hydroboration followed by chromic acid oxidation of 3-methylcoumarin and 4-hydroxy-3-methylcoumarin forms the corresponding 3-methyl-4-chromanones.¹

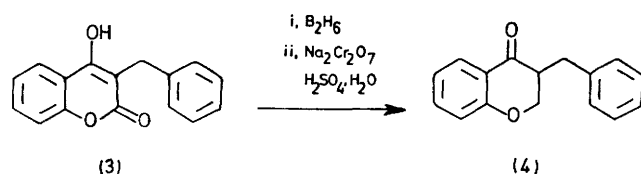
We now report the extension of these reactions to the synthesis of isoflavanone and homoisoflavanone. When 3-phenylcoumarin (**1**; R = H) and 4-hydroxy-3-phenylcoumarin (**1**; R = OH) are submitted to hydroboration

followed by chromic acid oxidation,² isoflavanone (**2**) is formed. Isoflavanone (**2**), m.p. 75–76° (benzene–hexane)



was separated from the reaction mixture by column chromatography over silica. Its structure was confirmed

by comparison of i.r. spectra, m.p. and mixed m.p. with an authentic sample previously prepared.³



The same reaction (hydroboration followed by chromic acid oxidation) was also performed using 3-benzyl-4-hydr-

oxycoumarin (3) to produce 3-benzyl-4-chromanone (4) (homoisoflavanone).

Separation of the homoisoflavanone (4) was also achieved by column chromatography over silica, [m.p. 63–64° (benzene–hexane), i.r. $\nu(\text{C}=\text{O})$ 1680 cm^{-1}]. Its structure was confirmed by comparison with an authentic sample prepared by a known method.⁴

The yields of isoflavanone and homoisoflavanone are ca. 25%.

Isoflavanones can also be easily converted to isoflavones by dehydrogenation,⁵ by known methods.

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¹ B. S. Kirkiacharian, G. H. Elia, and G. Mahuzier, *Compt. rend.*, 1974, **279**, 151.

² H. C. Brown and C. P. Garg, *J. Amer. Chem. Soc.*, 1961, **83**, 2951.

³ B. S. Kirkiacharian and H. Chidiac, *Compt. rend.*, 1973, **276**, 795.

⁴ P. Pfeiffer, K. Grimm, and H. Schmidt, *Annalen*, 1949, **564**, 208.

⁵ F. M. Dean, 'Naturally Occuring Oxygen Ring Compounds', Butterworths, London, 1963, 366.