TRANSFER HYDROGENATION: A STEREOSPECIFIC METHOD FOR THE CONVERSION OF NITRO ALKANES INTO AMINES

Anthony G.M. Barrett^{*} and Christopher D. Spilling Department of Chemistry, Northwestern University, Evanston, Illinois 60208

<u>Abstract</u>: A series of nitro alkanes were converted into the corresponding amines with retention of configuration by transfer hydrogenation using ammonium formate and palladium on carbon.

Recently we needed a mild, rapid procedure for the conversion of β -nitro alcohols into the corresponding hydroxy amines with retention of configuration. Usually such reductions are carried out by hydrogenation over Raney nickel or platinum.¹ However these procedures frequently require elevated pressures and temperatures. In 1984 Ram and Ehrenkaufer reported that nitro compounds could be easily converted into the corresponding amines by transfer hydrogenation using ammonium formate catalyzed by palladium on carbon.² The authors however did not determine the stereochemical outcome of the reaction. Herein we report our observations on this reduction protocol which clearly demonstrate that the method is stereospecific and proceeds with retention of configuration. As such we consider that it is the method of choice for the production of amines from functionalized nitro alkanes.

Thus transfer hydrogenation of the pure racemic syn^3 nitro alcohol 1a in methanol solution gave the amino alcohol 2a (80%). None of the anti isomer was detected in the product, by NMR spectroscopy. In the same way the nitro alcohols⁴ 1b (syn: anti 6.5:1), 3a (syn: anti 1:2.9), 3b (syn: anti 1:3.2), 5a (anti only) and 6a (syn: anti 1:8.1) were converted into the corresponding β -amino alcohols 2b (44%, syn: anti 6:1), 4a⁵ (61%, syn: anti 1:2.8), 4b (87%, syn: anti 1:3.2), 5b (73%, anti) and 6b (58%, anti only observed). Additionally transfer hydrogenation of the axial nitro steroid 7a⁶ gave the 6 β -amine 7b⁷ (82%).





A typical procedure is as follows: to a solution of the nitro alcohol **3b** (0.219g, 1.1mmol) in THF and methanol (50:50, 10mL) was added 10% palladium on carbon (50mg) followed by ammonium formate (0.35g, 5 equiv.). The mixture was stirred at room temperature until all the starting nitro alcohol had been consumed (t.1.c.). The mixture was diluted with Et₂0 (100mL), filtered and the filtrate was evaporated <u>in vacuo</u> to yield the crude amine. Flash column chromatography [SiO₂, methanol chloroform, 2:98 v/v] gave the amine **4b** (0.16g, 87%).

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