

SODIUM BOROHYDRIDE DESULPHURIZATION OF THIOLACTAMS TO AMINES

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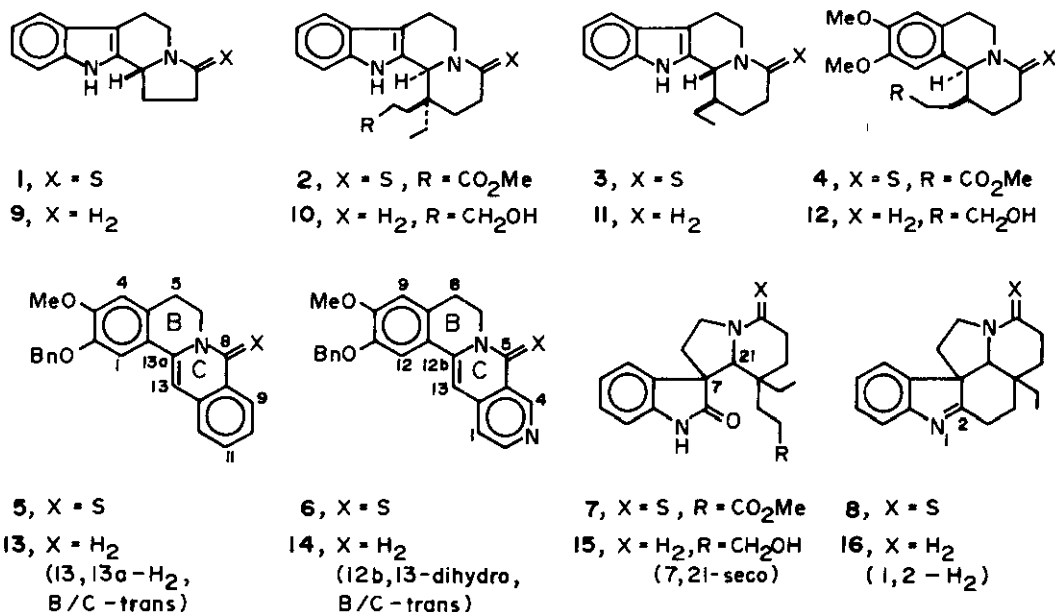
**Abstract** - Sodium borohydride desulphurizes a variety of thiolactams(1-8) in *t*-butanol/methanol mixture under reflux to the respective amines (9-16) in good yield.

Thiolactams are usually reduced to amines by Raney nickel<sup>1</sup> which can also desulphurize many sulphur containing groups<sup>2</sup>. Aluminium amalgam in neutral alcoholic solution<sup>3</sup> has also been used in some cases. However, to the best of our knowledge, the use of NaBH<sub>4</sub> in this conversion is not yet known. Herein we wish to report an efficient method of desulphurization of thiolactams (1-8) to the corresponding amines (9-16) (Scheme 1) in *ca.* 70-94% yield (Table 1) using NaBH<sub>4</sub> in *t*-butanol/methanol mixture, a reagent recently shown to reduce esters<sup>4</sup> and tertiary  $\delta$ -lactams<sup>5</sup>.

In a typical experiment, MeOH (4 ml) was added dropwise over a period of 2-5 h to a refluxing mixture of a thiolactam (0.5 mmol) and NaBH<sub>4</sub> (6-8 mmol) in *t*-BuOH (6 ml). Usual work-up followed by column chromatography and crystallization afforded the desired amine (70-94%).

In case of compounds 5 and 6, since during purification the products were getting easily transformed to the lactams, further reduction of the enamine double bond was ensured to fully characterise

Scheme I



the product. This was done by cooling the reaction mixture to 0 °C followed by successive addition of HOAc (5 ml) and NaBH<sub>4</sub> (~ 2 mmol) with stirring for 20 min at room temperature. It was basified and after usual work-up the product was purified by chromatography.

Table 1. Desulphurization of Thiolactams (1-8) to Amines (9-16)

| Thiolac-<br>tams | NaBH <sub>4</sub><br>(mol<br>ratio) | Time<br>(h) | Product<br>(Yield%) | Observed mp<br>(° C) | Reported mp<br>(° C) | Ref. |
|------------------|-------------------------------------|-------------|---------------------|----------------------|----------------------|------|
| 1                | 12                                  | 5           | 9(83)               | 168-169              | 172.5-173.5          | 6    |
| 2                | 16                                  | 2           | 10(90)              | 126-128              | 128-129              | 5    |
| 3                | 12                                  | 2           | 11(85)              | 88-90                | 90-93                | 7    |
| 4                | 16                                  | 2           | 12(90)              | 107-109              | 109-110              | 5    |
| 5                | 12                                  | 3           | 13(70)              | 98-101               | 100-102              | 8    |
| 6                | 12                                  | 4           | 14(78)              | Foam                 | -                    | 9    |
| 7                | 16                                  | 3           | 15(94)              | Wax                  | -                    | 9    |
| 8                | 16                                  | 2           | 16(71)              | 104-107              | 108-110              | 10   |

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