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SYNTHESIS OF 1H-PYRROLO-[1.2-c]-[1.3]-THIAZINE: A NEW SULPHUR-NITROGEN HETEROCYCLE

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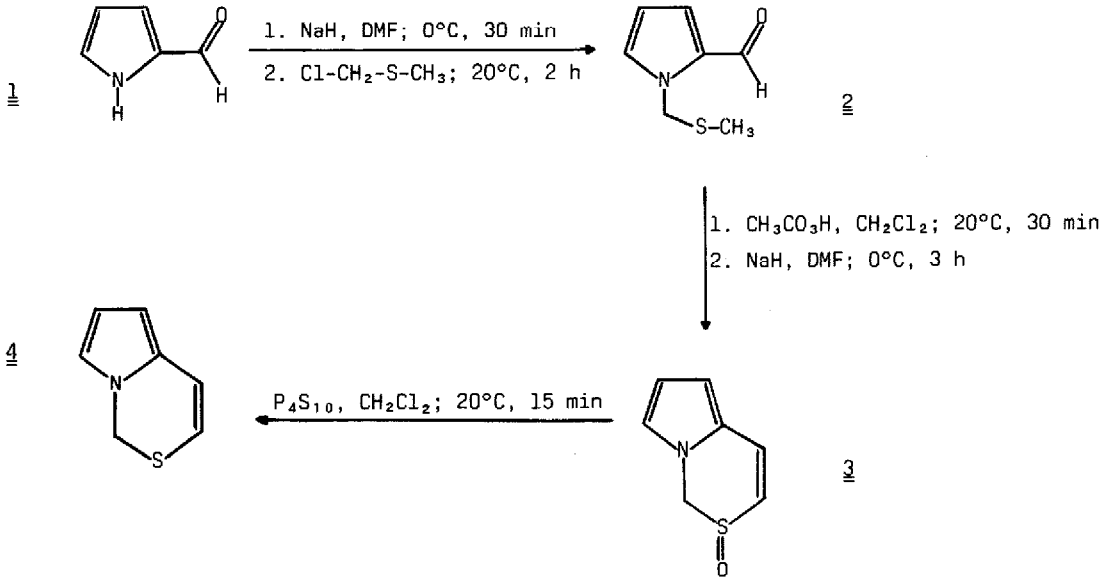
Summary: A total synthesis of 1H-pyrrolo-[1.2-c]-thiazine 4 from pyrrolo-2-carbaldehyde has been accomplished in 4 steps.

Heterocyclic compounds such as furans, pyrroles, pyrazines, thiophenes and thiazoles are important flavor compounds. Furthermore, due to their often extremely low threshold concentrations, these materials are difficult to determine analytically since they occur only in trace amounts in foodstuffs [1,2].

For analytical and sensory reasons, we decided to synthesize 1H-pyrrolo-[1.2-c]-[1.3]-thiazine, a compound not yet found in nature. The synthetic pathway is shown in the following scheme (the analytical data for these compounds are given in the table):



Starting from pyrrole-2-carbaldehyde 1 alkylation with sodium hydride and chlorodimethylsulfide generates 2, which after formation of the sulfoxide on further treatment with sodium hydride yields 3. Subsequent reduction with phosphorpentasulfide (P_4S_{10}) leads to 4 in almost quantitative yield.

Table: Spectroscopic data for compounds 3 and 4.

3 ^{1}H-NMR (200 MHz, $CDCl_3$, TMS): δ = 7.13 (d, 9.8 Hz; 4-H), 6.89 (m; 7-H), 6.53 (dd, 9.8, 1.3 Hz; 3-H), 6.51 (m; 5-H), 6.32 (dd, 3.8, 2.8 Hz; 6-H), 5.27 (dd, 13.6, 1.2 Hz; 1-H), 4.62 (dt, 13.6, 0.7 Hz; 1-H)

4 ^{1}H-NMR (200 MHz, $CDCl_3$, TMS): δ = 6.64 (d, 9.3 Hz), 6.53 (m; 7-H), 6.1-6.2 (2 m; 5-H, 6-H), 6.07 (d, 9.3 Hz), 4.99 (s, br; NCH_2)
MS: (70 eV): m/z 137 (M^+, 100%), 138 (11), 136 (64), 110 (16), 109 (10), 104 (25), 65 (10), 63 (8), 45 (10), 39 (14).

The pyrrolothiazine 4 exhibits an interesting chocolate, malt-type note and its threshold level in water was shown to be 1.9 x 10^{-6} mole/l.

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References

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