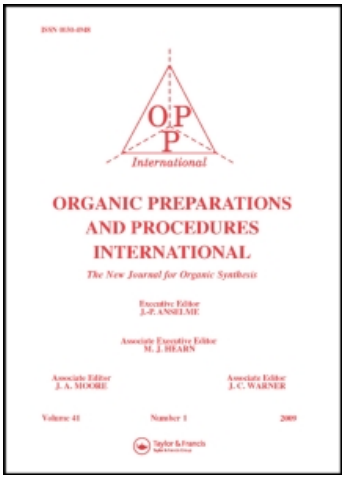


Organic Preparations and Procedures International
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t902189982

AN IMPROVED PROCEDURE FOR THE CONVERSION OF 2H-(1, 4)-BENZO-THIAZIN- AND 2H-(1, 4)-BENZOXAZIN-3(4H)-ONES INTO 3(4H)-THIONES

D. R. Shridhar[a]; C. V. Reddy Sastry[a]; L. C. Vishwakarma[a]; G. K. A. S. S. Narayan[a]
[a] Research Centre Indian Drugs & Pharmaceuticals Limited, Hyderabad, INDIA

To cite this Article Shridhar, D. R. , Sastry, C. V. Reddy , Vishwakarma, L. C. and Narayan, G. K. A. S. S.(1980) 'AN IMPROVED PROCEDURE FOR THE CONVERSION OF 2H-(1, 4)-BENZO-THIAZIN- AND 2H-(1, 4)-BENZOXAZIN-3(4H)-ONES INTO 3(4H)-THIONES', Organic Preparations and Procedures International, 12: 3, 203 — 206
To link to this Article: DOI: 10.1080/00304948009458549
URL: http://dx.doi.org/10.1080/00304948009458549

ORGANIC PREPARATIONS AND PROCEDURES INT. 12(3-4), 203-206 (1980)

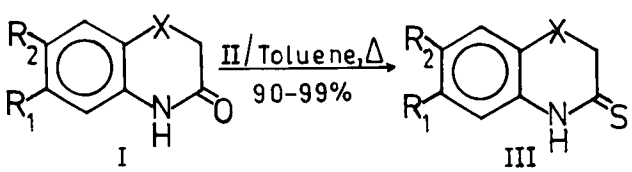
AN IMPROVED PROCEDURE FOR THE CONVERSION OF 2H-(1,4)-BENZO-THIAZIN- AND 2H-(1,4)-BENZOXAZIN-3(4H)-ONES INTO 3(4H)-THIONES

D. R. Shridhar*, C. V. Reddy Sastry, L. C. Vishwakarma and

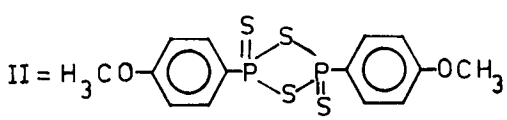
G. K. A. S. S. Narayan

Research Centre
Indian Drugs & Pharmaceuticals Limited
Hyderabad-500 037, INDIA

A large number of compounds derived from 2H-(1,4)-benzothiazin- and 2H-(1,4)-benzoxazin-3(4H)-thiones have been reported[1] to exhibit diverse types of biological activities. During the course of some other studies, some of these thiones (IIIa-f) were needed in larger quantities. Earlier preparations have described the use of P_2S_5 in xylene, pyridine or trieth-



a) $R_1 = R_2 = H$, X = S
b) $R_1 = H$, $R_2 = Cl$, X = S
c) $R_1 = R_2 = H$, X = O
d) $R_1 = Cl$, $R_2 = H$, X = O
e) $R_1 = H$, $R_2 = OCH_3$, X = S
f) $R_1 = H$, $R_2 = CH_3$, X = S



ylamine for the conversion of the 3-oxo derivatives (I) into thiones (III) which involves tedious procedures for isolation of the products. Although benzoxazin-3-thione (IIIc) was prepared[2,3] in 75-80% yield by this method, benzothiazin-3-thione (IIIa) was obtained[4] in low yield (50%).† Scheibye et al.[5] have recently reported the conversion of carboxamides to thiocarboxamides using p-methoxyphenylthionophosphine sulfide dimer (II[6]) in HMPA.

We now report the use of this reagent for facile conversion of 2H-(1,4)-benzothiazin- and 2H-(1,4)-benzoxazin-3(4H)-ones (I) to 3(4H)-thiones (IIIa-f) in almost quantitative yields using toluene as solvent instead of more expensive HMPA. Hitherto unreported 7-substituted 2H-(1,4)-benzothiazin-3(4H)-thione (IIIb, IIIe and IIIf) were also prepared by this method.

EXPERIMENTAL

IR spectra were measured in nujol on Perkin-Elmer 237 grating spectrophotometer. NMR spectra were recorded on a Varian A-90 (EM 390) spectrometer using TMS as internal standard. Melting points were determined in open capillary tubes with Gallenkamp melting point apparatus and are uncorrected. Micro-analyses were performed using Hosli micro-combustion apparatus MK-101.

2H-(1,4)-Benzothiazin-3(4H)-thione (IIIa).- A mixture of 2H-(1,4)-benzothiazin-3(4H)-one (Ia)[7] (16.5 g; 0.1 mole) and p-methoxyphenylthionophosphine sulfide dimer (II) (20.2 g; 0.05 mole) in dry toluene (200 ml) was heated under reflux for 1 hr. The reaction mixture turned into dark green homogeneous solution. Toluene was completely removed under reduced pressure. The resulting dark green residue was purified by column chromatography over silica gel and eluted with chloroform to give 18.0 g (99%) of pure IIIa as pale yellow crystalline solid, mp. 128-129° (benzene-pet. ether); lit.[4] mp. 128°; IR(nujol): 3140 (m), 3080 (m), 1600 (m), 1540 (s), 1110 (s), 1070 (m), 780 (m), 740 (s) and 730 cm^{-1} (s); NMR (DMSO-d_6) δ 3.88 (s, 1H, SH, exchangeable with D_2O), 4.08 (s, 2H, CH_2) and 6.85-7.80 (m, 4H, ArH).

Anal. Calcd. for $C_8H_7NS_2$: C, 53.04; H, 3.87; N, 7.70.

Found: C, 53.44; H, 3.97; N, 7.50.

7-Chloro-2H-(1,4)-benzothiazin-3(4H)-thione (IIIb).- A mixture of Ib[8] (20 g; 0.1 mole) and II (20.2 g; 0.05 mole) in dry toluene (200 ml) was heated under reflux for 0.5 hr. and worked up as described above to give 20.3 g (94%) of IIIb; mp. 206-208° (benzene-pet. ether); IR(nujol): 3120 (m),

3045 (m), 1580 (s), 1530 (s), 1150 (s), 1110 (s), 1060 (s), 860 (s) and 800 cm^{-1} (s); NMR (Acetone-d_6); δ 2.44 (s, 1H, SH exchangeable with D_2O), 3.80 (s, 2H, CH_2), 7.06-7.22 (m, 2H, H_5 & H_6) and 7.28 (d, J=1.5 Hz, 1H, H_8).

Anal. Calcd. for $C_8H_6ClNS_2$: C, 44.55; H, 2.78; N, 6.49.

Found: C, 44.92; H, 3.10; N, 6.59.

2H-(1,4)-Benzoxazin-3(4H)-thione (IIIc).- A mixture of Ic[9] (14.9 g; 0.1 mole) and II (20.2 g; 0.05 mole) in dry toluene (200 ml) was refluxed for 0.5 hr. and worked up as described for IIIa to give 15.2 g (92%) of pure IIIc as pale yellow needles (benzene-pet. ether); mp. 119-120°; lit.[3] mp. 121°; IR(nujol): 3150 (m), 3090 (m), 1595 (m), 1550 (s), 1140 (s), 1030 (s) and 735 cm^{-1} (s); NMR (CCl_4): δ 4.76 (s, 2H, CH_2), 6.9 (s, 4H, ArH) and 11.06 (br, NH, exchangeable with D_2O).

Anal. Calcd. for C_8H_7NOS: C, 58.18; H, 4.27; N, 8.48.

Found: C, 58.39; H, 4.25; N, 8.10.

6-Chloro-2H-(1,4)-benzoxazin-3(4H)-thione (IIId).- A mixture of Id[10] (18.35 g; 0.1 mole) and II (20.2 g; 0.05 mole) in dry toluene (200 ml) was refluxed for 0.5 hr. and worked up as above to give 18.0 g (90%) of IIId as pale yellow needles; mp. 195-196° (benzene-pet. ether); lit.[11] mp. 193°; IR(nujol): 3150 (w), 3080 (w), 1605 (s), 1540 (s), 1130 (s), 1100 (s), 1000 (s), 845 (s) and 800 cm^{-1} (s); NMR (DMSO-d_6): δ 4.82 (s, 2H, CH_2) and 6.93-7.31 (m, 3H, ArH).

Anal. Calcd. for C_8H_6ClNOS: C, 48.11; H, 3.01; N, 7.01.

Found: C, 48.60; H, 3.50; N, 6.81.

7-Methoxy-2H-(1,4)-benzothiazin-3(4H)-thione (IIIe).- A mixture of Ie (19.5 g, 0.1 mole) and II (20.2 g, 0.05 mole) in dry toluene (200 ml) was heated under reflux for 0.5 hr. and worked up as above to give 19.5 g, (92%) of IIIe, mp. 162-163° (EtOH); IR (nujol): 3140 (m), 3050 (m), 1575 (s), 1530 (s), 1215 (s), 1100 (s), 1060 (s), 865 (s) and 795 cm^{-1} (s); NMR (DMSO-d_6):

δ 3.70 (s, 1H, OCH_3), 3.83 (s, 2H, CH_2), 6.7 (m, 2H, ArH), 7.12 (d, J=9Hz, 1H, C_5-H) and 12.4 (br, 1H, NH, exchangeable with D_2O).

Anal. Calcd. for $C_9H_9NOS_2$: C, 51.18; H, 4.26; N, 6.63

Found: C, 51.64; H, 4.66; N, 6.19

7-Methyl-2H-(1,4)-benzothiazin-3(4H)-thione (IIIf).- A mixture of If (17.9 g, 0.1 mole) and II (20.2 g, 0.05 mole) in dry toluene (200 ml) was heated under reflux for 0.5 hr. and worked up as described above to give 18.1 g (93%) of IIIf, mp. 187-189° (EtOH); IR (nujol); 3190 (m), 3150 (m), 3080 (m), 1595 (s), 1580 (s), 1400 (s), 1100 (s), 1060 (s), 820 (s) and 800 cm^{-1} (s); NMR (DMSO-d_6): δ 2.22 (s, 3H, CH_3), 3.83 (s, 2H, CH_2), 7.0 (m, 3H, AzH) and 12.4 (br, 1H, NH-exchangeable with D_2O).

Anal. Calcd. for $C_9H_9NS_2$: C, 55.39; H, 4.61; N, 7.18

Found: C, 56.01; H, 4.66; N, 6.84

Acknowledgement.- The authors wish to thank the staff of the Analytical Laboratories of this Centre for the microanalyses and spectral measurements.

REFERENCES

1. J. Krapcho and C. F. Turk, U. S. Patent 3,929,783 (1975); Chem. Abstr., 84, 105628y (1976).
2. C. Someswara Rao, M. P. Dave, P. N. Mody and A. P. Pandya, Ind. J. Chem., 14B, 999 (1976).
3. M. Mazharuddin and G. Thyagarajan, Tetrahedron, 25, 517 (1969).
4. A. I. Kipricanov and T. M. Verboskaya, Zh. Obshch. Khim., 32, 3946 (1962); Chem. Abstr., 58, 12707b (1963).
5. S. Scheibye, B. S. Pedersen and S. O. Lawesson, Bull. Soc. Chim. Belg., 87, 229 (1978).
6. H. J. Lecher, R. A. Greenwood, K. C. Whitehouse and T. H. Chao, J. Am. Chem. Soc., 78, 5018 (1956).
7. A. S. Angeloni and G. Pappalardo, Gazz. Chim. Ital., 91, 633 (1961); Chem. Abstr., 56, 10136e (1962).
8. G. Vasilu, O. Maior and N. Arsenescu, Ser. Stiint. Nat., 12, (42), 47 (1963); Chem. Abstr., 64, 17581d (1966).
9. J. D. Loudon and J. Ogg, J. Chem. Soc., 3904 (1952).
10. J. R. Geigy, Ger. Patent 1,161,080 (1964); Chem. Abstr., 66, 10693c (1964).
11. P. Marcel, Fr. Patent 1,561,854 (1964); Chem. Abstr., 72, 55469b (1970).

(Received July 13, 1979; in revised form October 9, 1979)