National Institute
for Public Health and
the Environment

Datasheet 5-Hydroxythiabendazole

Reference number : CEC/MAT : 34

Date of preparation : 1995.02.03

date : 2001.07.12

source : CSL

"Bank of Reference Standards"

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Contract number	:	MAT-CT92-0020[388710]			
Reference number	:	CEC/MAT 34			
Last update	:	1998.01.06	Chemical purity	:	>95 %
Quantity	:	2.09 mg			

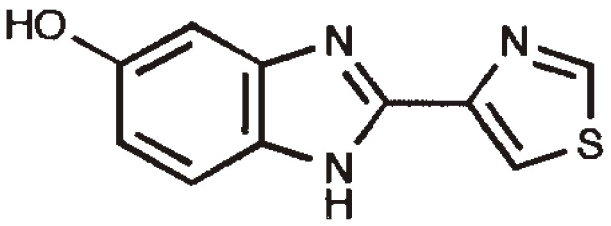


Figure 1. Molecular structure of 5-hydroxythiabendazole

Name	: 5-hydroxy-2-(4'-thiazolyl)-1H-benzimidazole
Synonym	: 5-hydroxythiabendazole
Molecular formula	: $C_{10}H_7N_3OS$
Molecular weight	: 217.246

Long term stability tested on 1997.11.26 : 98.4 ± 1.0 %
(storage 4 °C, analysis HPLC-UV, 6 tests on 2 ampoules)

Methods of Characterization:

I	UV spectroscopy
II	IR spectroscopy
III	Mass spectroscopy
IV	^{1}H-NMR spectroscopy

I UV Spectroscopy

Instrument: Hitachi U 3000
Method: Dissolved in ethanol (2mg/l)

Results

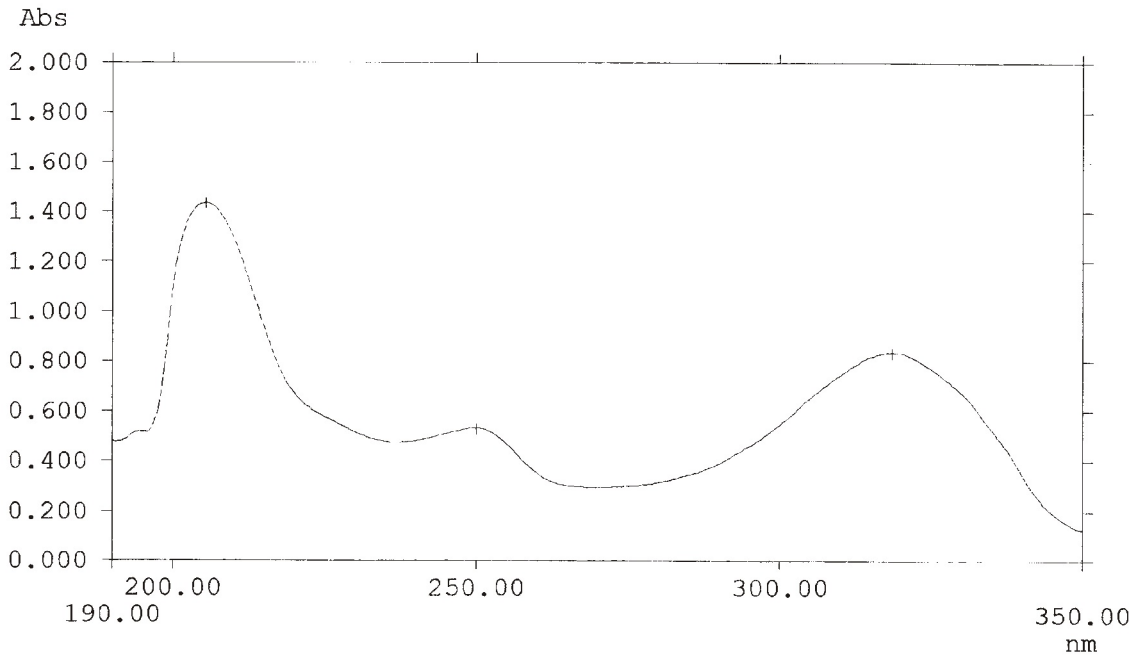


Figure 2. The UV spectrum of 5-hydroxythiabendazole

Peak no.	wavelength (nm)	absorbance
1	318.50	0.8355
2	250.00	0.5319
3	205.50	1.4376

II IR-Spectroscopy

Instrument: Perkin Elmer STIR 1720X
Sampling technique: nujol mull

Results

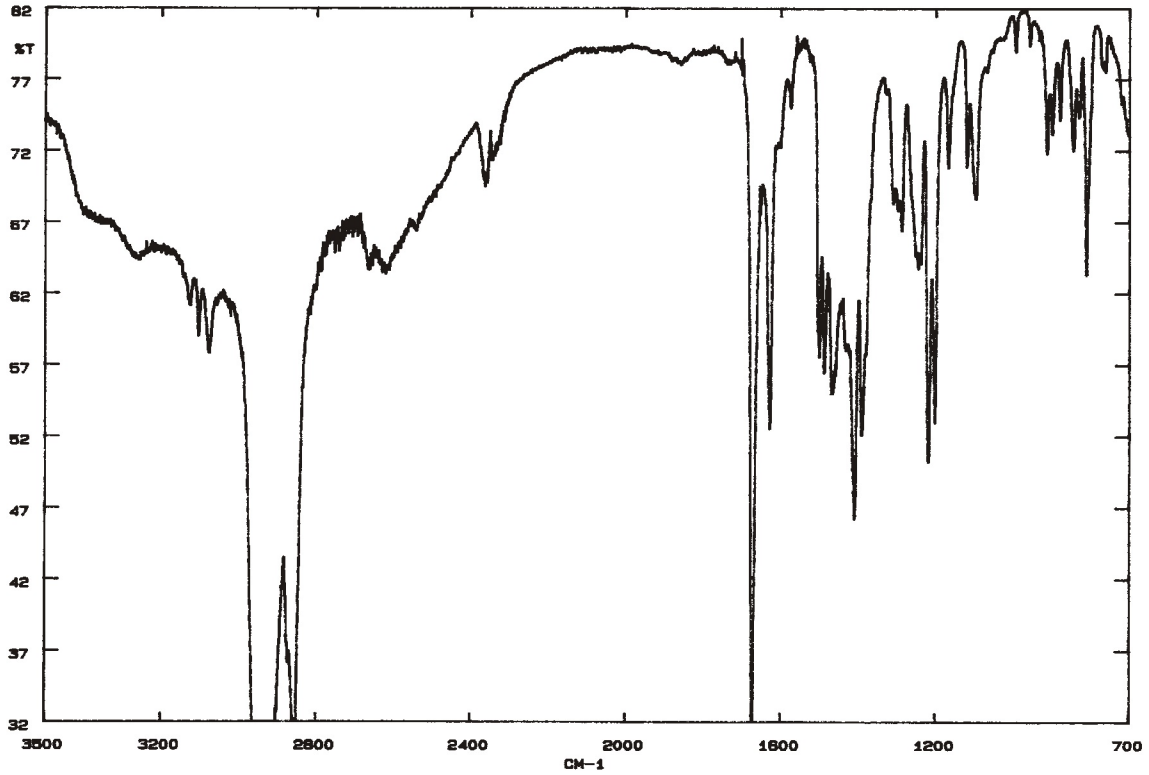


Figure 3. The IR spectrum of 5-hydroxythiabendazole

Wavelength (cm-1)	designation
3241	O-H stretch
2618	N-H stretch
1627	C=C stretch in aromatic compounds
1499	C=C stretch in aromatic compounds
1487	
1408	
1287	
1244	
1217	
1200	
1167	
1118	
1095	
913	C-H out of plane deformations
844	C-H out of plane deformations
811	C-H out of plane deformations

III Mass Spectroscopy

Instrument: Kratos MS 25
Sampling technique: Direct probe, 70 ev electron impact

Results

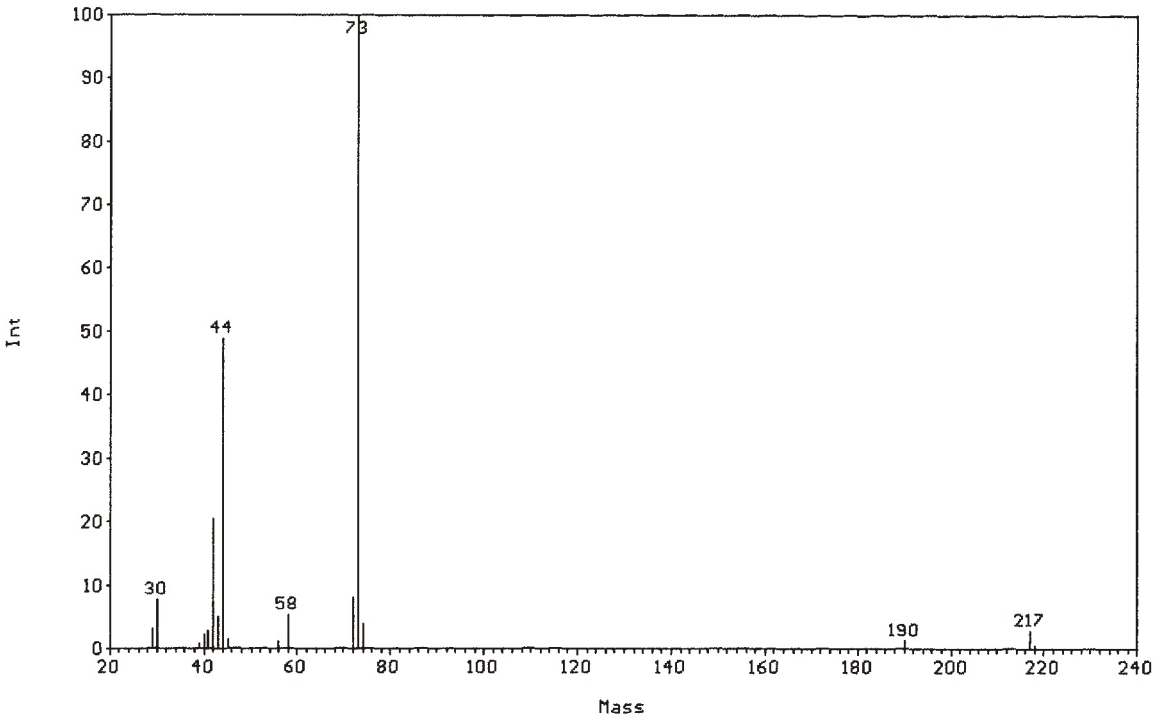


Figure 4. The mass spectrum of 5-hydroxythiabendazole

m/u	percentage	designation
217	2.9	M
190	1.2	M - HCN
73	100DMF	
44	49	DMF - NCH_3

III ^{1}H-NMR Spectroscopy

Instrument: Bruker AC250
Solvent: CD_3OD with TMS ($\delta = 0.0$) as internal standard.

Results

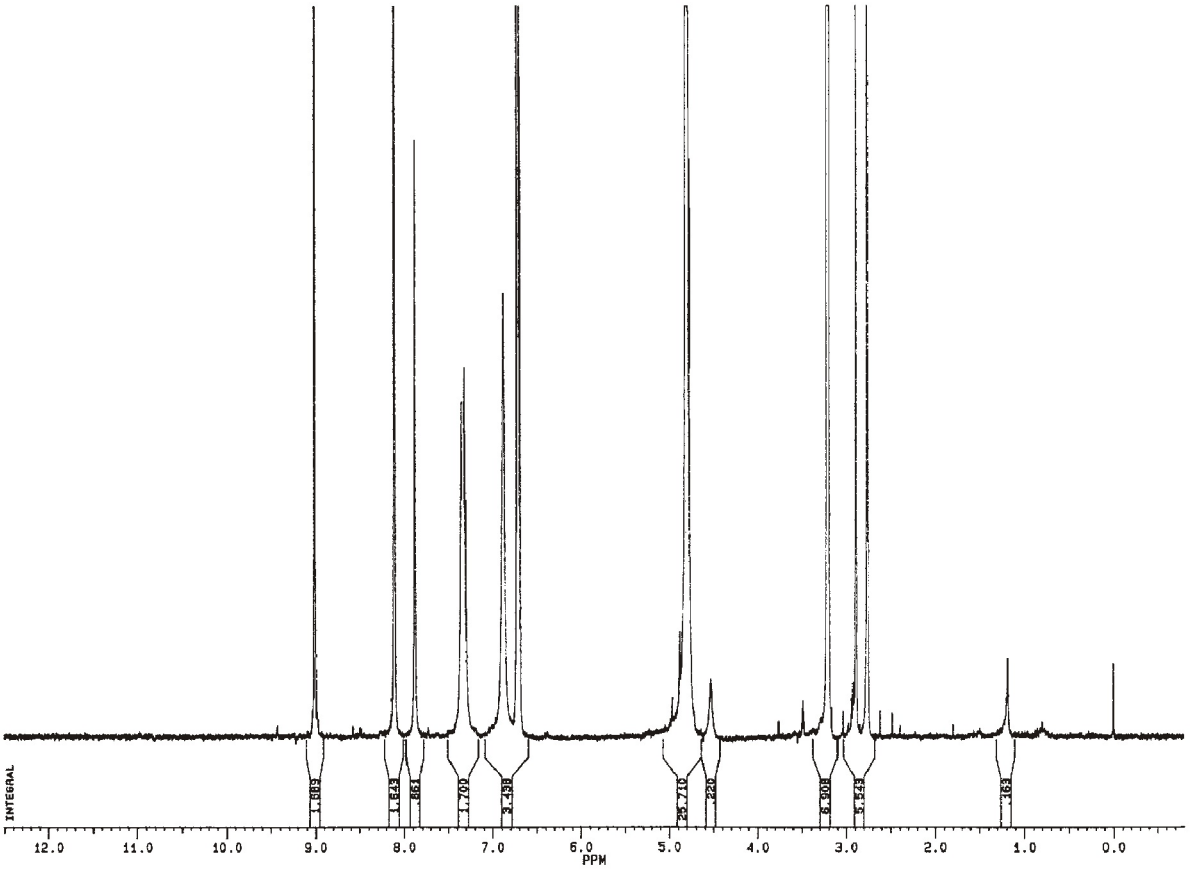


Figure 5. The NMR spectrum of 5-hydroxythiabendazole

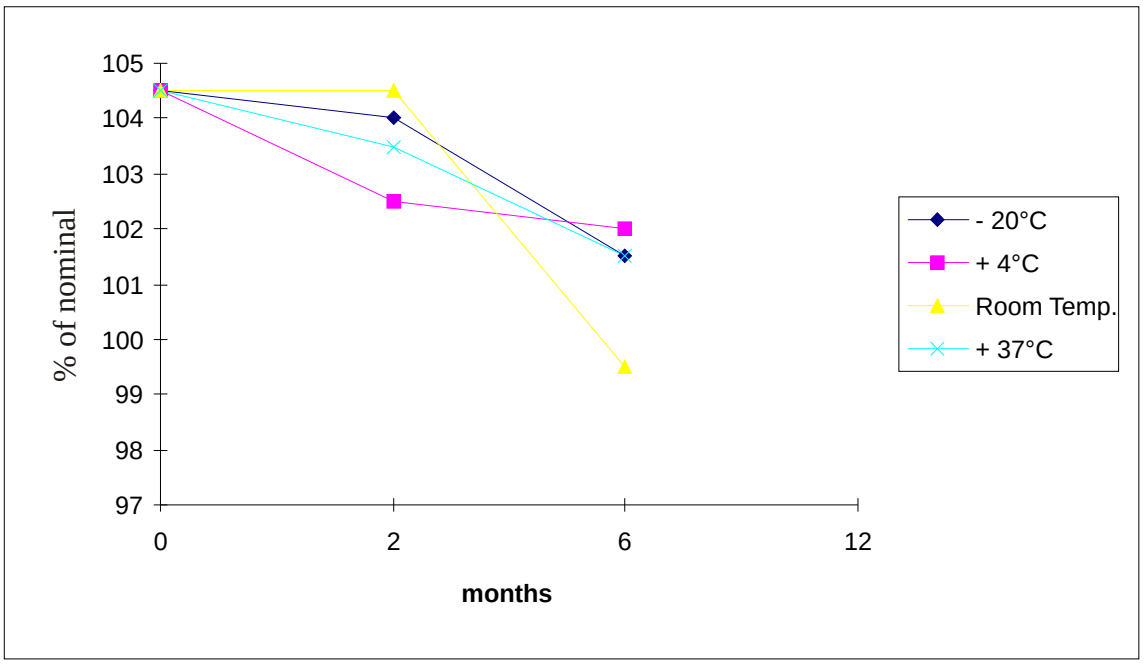
Chemical Shift (δ)	number of protons	designation
6.7}	2	H6
6.9}		H4
7.3	1	H7
7.9	0.5	OH
8.1	1	H5'
9.0	1	H2'

The proton signal from the OH has a lower peak area than expected probably due to it being partially deuterated.

Preparation and validation of reference standards.

The production of ampoules containing the reference material was described in the final report produced September 1995.
The thermal stability of the compound is under investigation and the results over a period of six months are expressed in the table and chart below.

5-hydroxythiabendazole Stability Trials



Results of 5-hydroxythiabendazole stability trials

The results below are the % recovery (with cv) of 5-hydroxythiabendazole at 4 different storage temperatures over a period of 6 months compared with a standard equivalent to 2.0 mg.

	temp. (^{0}C)	t = 0 months (% recovery)	t = 2 months (% recovery)	t = 6 months (% recovery)	t = 12 months (% recovery)
5-HTB	- 20°C	104.5 +/- 1.0	104.0 +/- 2.5	101.5 +/- 1.0	-
	4°C	-	102.5 +/- 0.5	102.0 +/- 1.0	-
	Room Temp.	-	104.5 +/- 1.0	99.5 +/- 0.5	-
	37°C	-	103.5 +/- 0.5	101.5 +/- 1.0	-

Conclusion

The spectroscopic data is consistant with the proposed structure for all the methods of determination although DMF (which was used as solvent during ampouling) was detected in the methods of characterization. In the UV spectrum this is shown by a rounding off of the peak at 205.5 nm whereas in the compound before ampouling there was a very sharp strongly absorbing peak at 205 nm followed by a rounded peak at 211 nm. In the IR spectrum a peak for DMF can clearly be seen at 1673 cm^{-1}. In the mass spectrum the main peak is the DMF peak at m/u 73 (approximately 34 times the size of the 5-hydroxythiabendazole peak at 217 m/u) whereas the main peak was 5-hydroxythiabendazole at 217 m/u before ampouling. In the NMR spectrum a doublet for DMF can be seen at 2.8 and 2.9 d, equivalent to approximately 3 H (or approximately 0.34 mg DMF/ampoule).
No significant impurities were detected by any of the methods of characterization employed.

The results from the stability trials indicate that 5-hydroxythiabendazole is acceptably stable over a period of six months at temperatures up to 37 °C.