OPTICAL CRYSTALLOGRAPHIC PROPERTIES OF SOME SYMPATHOMIMETIC AMINES

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THE micro-identification of the sympathomimetic amines may be important in pharmaceutical chemistry and toxicology. As most of the sympathomimetic drugs belong to the same chemical group and some of them are commercially available in stereo-isomeric forms (ephedrine, amphetamine and desoxy-ephedrine), their micro-identification may offer some difficulties.

Optical crystallography has proved to be useful in the micro-identification of some sympathomimetic amines (Keenan[1]). The stereo-isomeric forms of ephedrine, amphetamine and desoxyephedrine, used in therapeutics, may be differentiated by examination of the substance in the polarising microscope (Keenan[1,2]). This differentiation may be confirmed by observation of the optical properties of precipitates obtained with gold chloride from amphetamine[2], with chloro-auric acid from desoxy-ephedrine[1] and with dilituric acid from ephedrine and amphetamine (Plein[3]). In current analytical work our experience is that the direct examination of the substance leads to sure conclusions in the differentiation of *l*-ephedrine and *dl*-ephedrine.

The purpose of this paper is to report the optical crystallographic properties of three sympathomimetic amines of the phenylethylamine group, two of which are included in the Scandinavian pharmacopœias, and in addition to give the optical data respecting two substances of the imidazoline-group, which are pharmacologically related to the sympathomimetic amines in the narrower sense of this word. For convenience of the analyst the results are tabulated with previously reported data for sympathomimetic drugs according to the ascending value of the lower index.

The refractive indices were determined for yellow light by the immersion method (all $\pm$ 0·002). The principal indices were determined partly by the statistical method as in a previous publication[4], partly with reference to the orientation of the optic axis observed in convergent light. Significant intermediate refractive indices (n_i) are reported when they may be useful in the identification of the substance. Where recrystallisation of the substance is not indicated, the sample consisted of fragments of suitable size for examination in convergent polarised light.

NAPHAZOLINE NITRATE

2-(1-naphthyl-methyl)-imidazoline(4-5)nitrate.

Observations in parallel polarised light (crossed Nicols). Irregular fragments and six-sided plates, more or less disintegrated, showing sym-

metrical 1/2 (106° ± 2°) or unsymmetrical extinction. Extinction dispersion is observed on some specimens; all extinguish sharply.

Observations in convergent polarised light (crossed Nicols). Acute bisectrix is commonly observed (on plates), centred or slightly inclined. Optic sign: positive.

Refractive indices. $\alpha = 1{\cdot}560$ and $\beta = 1{\cdot}619$ are frequently observed. $\gamma > 1{\cdot}740$.

Benzazoline Hydrochloride

2-benzyl-imidazoline(4-5)-hydrochloride (Priscol).

Observations in parallel polarised light (crossed Nicols). Plates with parallelogrammatic or six-sided silhouette, which do not extinguish sharply. As a rule the extinction is unsymmetrical with dispersion. Some irregular fragments are found.

Observations in convergent polarised light (crossed Nicols). Inclined optic axis figure, inclined or off-centred bisectrix are commonly found. Optic sign: positive.

Refractive indices. $\alpha = 1{\cdot}586$, $\beta = 1{\cdot}604$, $\gamma = 1{\cdot}703$.

Supriphen Hydrochloride

dl, 1-(*p*-hydroxyphenyl)-2-methylaminopropanol hydrochloride.

Observations in parallel polarised light (crossed Nicols). Rectangular rods with parallel extinction and elongation negative or positive. Some irregular fragments.

Observations in convergent polarised light (crossed Nicols). Obtuse bisectrix commonly observed (on rectangular rods). Optic sign: negative.

Refractive indices. $\alpha = 1{\cdot}507$ and $\beta = 1{\cdot}604$ are frequently observed (on rectangular rods). $\gamma = 1{\cdot}668$.

System, orthorhombic.

Oxedrini Tartras (Ph. Dan. IX)

dl, 1-(*p*-hydroxyphenyl)-2-methylamino-ethanol tartrate.
(Sympathol, Synephrine tartrate.)

Observations in parallel polarised light (crossed Nicols). Rods with oblique extinction at different angles, 30° to 32° commonly, and positive elongation. Some irregular fragments.

Observations in convergent polarised light (crossed Nicols). An off-centred optic axis figure is frequently observed. Optic sign: positive.

Refractive indices. $\alpha = 1{\cdot}517$, $\gamma = 1{\cdot}689$. β not determined. 1·625 is a characteristic intermediate refractive index observed on rods with the extinction angle 30° to 32°.

System, triclinic.

Isodrini Sulfas (Ph. Suec. XI)

dl. 1-(p-hydroxyphenyl)-2-methylaminopropane sulphate.

The material is recrystallised from a drop of water on the microscope slide before examination.

Observations in parallel polarised light (crossed Nicols). Rhombohedral or six-sided plates with symmetrical extinction 1/2 ($76° \pm 2°$) and positive elongation. Elongated rods with parallel or oblique ($13° \pm 1°$) extinction and negative elongation. Some irregular fragments.

Observations in convergent polarised light (crossed Nicols). The plates with symmetrical extinction usually show inclined bisectrix such as to give the indices α and $n_i = 1{\cdot}560$. Optic sign: positive.

Refractive indices. $\alpha = 1{\cdot}516$, $\beta = 1{\cdot}552$, $\gamma = 1{\cdot}645$.

System, monoclinic.

TABLE I

Substance	Reference	Refractive indices		
		α	β or n_i	γ
Tuamine sulphate	1	1.458(ω)	—	1.468(ε)
d-Amphetamine sulphate	2	1·505	1·545	1·608
Supriphen hydrochloride...		1·507	1·604	1·668
Isodrine sulphate		1·516	1·552 1·560(n_i)	1·645
Oxedrine tartrate		1·517	1·625(n_i)	1·689
dl-Amphetamine sulphate	2	1·520	indet.	indet.
d-Desoxy-ephedrine hydrochloride	1	1·530	1·537	1·615
l-Ephedrine hydrochloride	4	1·530	1·603	1·638
dl-Desoxy-ephedrine hydrochloride	1	1·535	indet.	1·620
l-Ephedrine sulphate	1, 4	1·540	1·565	1·587
Paredrine hydrobromide...	1	1·560	1·680	1·734
Naphazoline nitrate		1·560	1·619	> 1·740
dl-Ephedrine hydrochloride	1	1·570	1·608	1·630
Vonedrine hydrochloride	1	1·577	indet.	1·603
Benzazoline hydrochloride		1·586	1·604	1·703

SUMMARY

The optical crystallographic properties of five sympathomimetic amines are described and tabulated with previously reported optical data of related substances, for use in analytical work with the polarising microscope.

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