—Articles—

晶癖を含めた結晶性医薬品の光学的結晶学的特性値一覧表作成の試み（偏光顕微鏡による結晶性医薬品の研究第19報[1]）

渡邉　厚

A Trial Production of a Table of the Optical Crystallographic Characteristics of Crystalline Drugs Including Crystal Habits (Study of Crystalline Drugs by Means of a Polarizing Microscope. XIX[1])

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It was clarified in previous report that the predominant faces of crystal habits mainly coincide with the morphologic crystal face at (001), (010), or (100), and therefore the two measurable key refractive indices are closely related to the principal sections of the two axial wave surfaces and coincide with the one or two of the three principal refractive indices. The three principal refractive indices of biaxial crystalline drugs were measured and tabulated in the ''General Information'' section of the *National Formulary* compiled by the American Pharmaceutical Association. A series of studies was conducted to measure the key refractive indices of the crystalline drugs listed in the *Japanese Pharmacopoeia* X or XI so that the data could be used to improve the quantitative analysis of their crystal habits. The purpose of the present study was to examine data on both the key and principal refractive indices and attempt to produce a general authorized table of optic crystallographic characteristics, including crystal habits, for simpler and more reliable polarizing microscopy studies.

Key words——key principal refractive index; crystal habit predominant face; polarizing microscopy

総　　論

前報[1]の結果から，著者と協同者らのこれまで続けて来た偏光顕微鏡分析とその結果のキー屈折率等が，二軸性結晶の principal refractive indices と全部又は一部一致することなどが明らかになった．また，晶癖の優勢面の大部分は結晶軸の2つに平行な(001), (010), (100) 等で，浸液法では優勢面が elongation 等重要な結晶の定数を提供する．浸液法による結晶のデータには米国薬学会編集の National Formulary XIII, General Information に300種余りの結晶の主屈折率等の数字が表示されているが晶癖に直接関係するデータがない．これらの事情を総合して二軸性結晶医薬品の光学的結晶学的特性値に晶癖を加えた一覧表を試作し，結晶性医薬品の偏光顕微鏡分析の同定法を簡易化して確立し，同時に晶癖の定量的分析法等を迅速化し，製剤学への影響の解明にも寄与しようとするのが本表試作の目的である．

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一覧表の作成

著者はかつてアスピリンの晶癖をライツの偏光顕微鏡で検討した経験から，当時の日局V収載の100種ほどの結晶性医薬品について，浸液法で新しく開発した浸液を用い，載物グラス下自然の状態の消光位で屈折率等を測定した.[2] 試料の半数以上から1—3個の信頼できる屈折率が測定されていた．その後約30余年を経て神戸学院大学で，神戸大学医学部付属病院薬剤部と協同研究の下に主に日局X, XI収載の入手可能の結晶性薬品170種程について浸液法による屈折率測定等を軸に粉末薬品の微量分析と晶癖の研究等を目的に研究を進めた．キー屈折率の測定が可能であった約半数余りについては Birefringence ($n_2 - n_1$) も晶癖の定数となり，表と図に取

り入れた．2つのキー屈折率が測定可能であったA群，伸長方向に1つのキー屈折率と短軸方向に変化する2種の屈折率をもつB群，不安定な2種以上の屈折率の組み合わせで現れるC群等があり，[3] B, C群等は表中に記入した．これらは粉砕末と推定され，その晶癖は劈開性の強弱等にも依存する．キー屈折率のデータは薬品の効能別に数回に分けて報告しているが，本著の表には薬品ごとに引用文献を記載した．

著者らの研究と相前後して米国薬学会編集のNational Formulary XI (1960), XII (1965), XIII (1970)に，同書収載の結晶性医薬品のoptical crystallographic characteristicsとしてprincipal refractive indices, optic axial angle, elongation等の測定値が表示されているが，本表では最終となったXIII版収載の主屈折率等記載のある薬品[4]のみを引用させて戴いた．

(Table. 1参照)

実験と考察

1) 偏光顕微鏡と浸液法：長期間の実験研究の収録であったが用いられている機器の中核はほとんど同じ性能の偏光顕微鏡である．

E. Leitz Wetzler，大型偏光顕微鏡CM，Fedrow: Universal Stage；オリンパス，双眼偏光顕微鏡BHS-P，写真撮影用付属品PM-6, EMM-7等．浸液法の浸液は著者の最初の報告[2]がその後も用いられており，米国NF[4]の実験解説にもほとんど同様

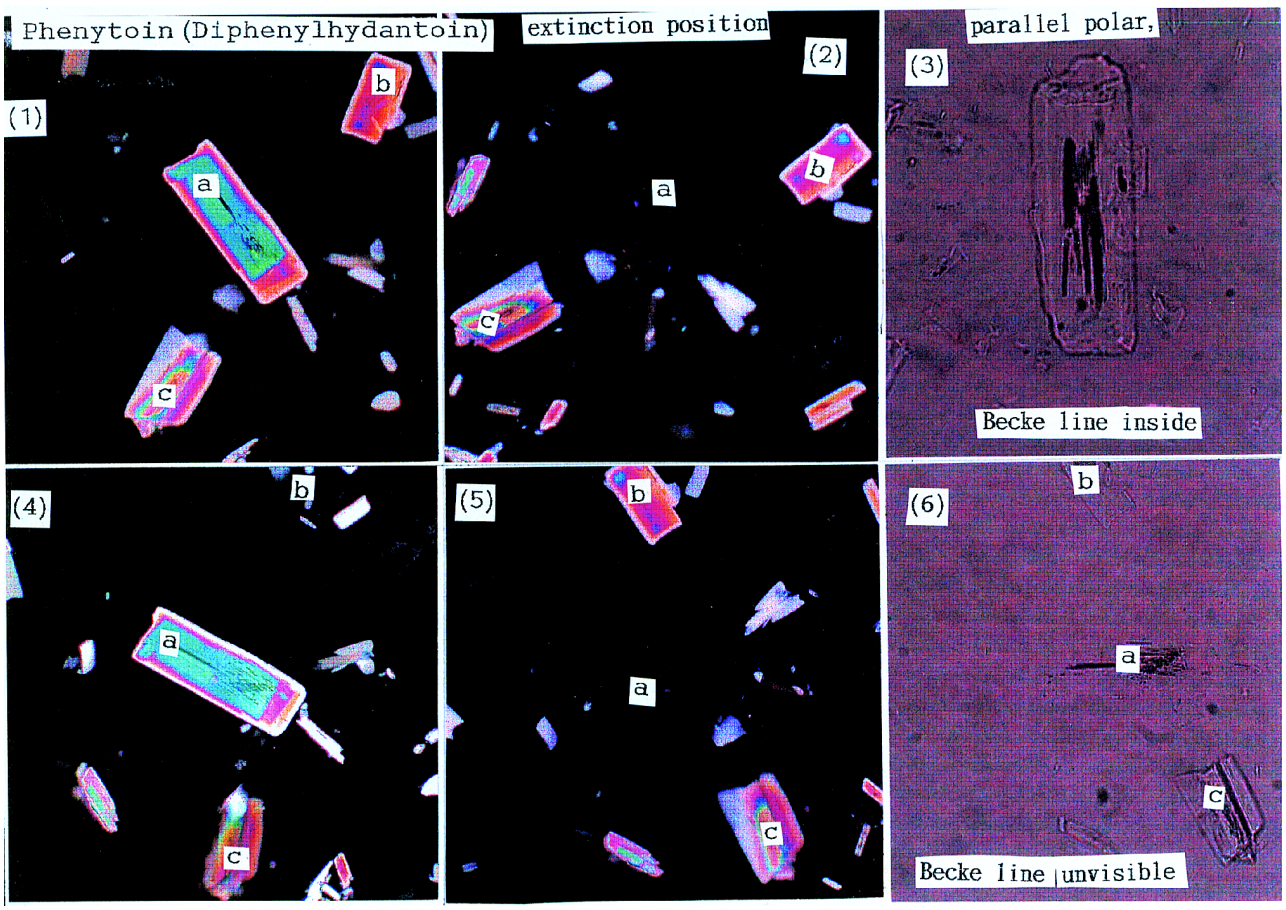

Fig. 1. Polarizing Microscopy of Phenytoin Crystals Using Camedia Microimaging System Attached to the Olympas BHS-P Polarizing Microscope and Internet NEC Valuestar

Phenytoin (Diphenylhydantoin): Key principal refractive index, n_{a1} 1.606, n_{c2} 1.631, used immersion oil, No 60_5, 24°C, n_D^{24}=1.603, Photo (1): under crossed polar +, crystals a, b, c inclined and colored, Photo (2): under crossed polar + crystal a extinction position ↑, and b, c inclined position, Photo (3): under parallel polar ↓ and ×400, emphasized the Becke line of a, Photo (4): under crossed polar +, crystals a and c inclined position, crystal b at extinction position ↑, Photo (5): under crossed polar +, crystal a extincts completely →, crystals b and c inclined position with each interference color, Photo (6): under parallel polar, crystals b and c appear distinctly showing Becke lines, however, the crystal a disappeared almost completely showing the key principal index has been coincided with that of the used immersion oil at the temperature. All these photos had been printed out using the Canon printer BJ F300 attached to the computer.

Table 1. Optic Crystallographic Characteristics of Some Crystalline Drugs Including Their Crystal Habits

Substance & Polym.Mod.	System[a], & Pr.F.[b]	Princ.Refr.Ind.[c]: n_a, n_b, n_c & Key Ref.Ind.[d]: n_1, n_2,			Biref.[e] (n_2-n_1)	El.[f]	Remarks Lit.& Oth.
Acetanilid	Or.	$1.515n_{a1}$[g]	$1.620n_{b2}$	$>1.73n_c$	(0.105)	(−)	NF[4,h]
Acetarsone	Or.	$1.495n_{a1}$	$1.714n_{b2}$	$1.770n_c$		(−)	NF
Acetazolamide	Or.	$1.532n_{a1}$		$1.701n_{b2}$	(0.169)		X[5,i]
Acetohexamide, I	Tr.	$1.55n_{a1}$		$1.641n_{c2}$	(0.085)		IX[6,7,8], 43°
Acetohexamide, II	Mo.	$1.571n_{a1}$	$1.601n_2$		(0.030)	(+)	XI[6,7]
Allopurinol	Tr.	$1.47n_{a1}$		$1.75n_{c2}$	(0.28)		XI[7]
Aminophylline	Tr.	$1.49n_1$	$1.74n_2$		(0.25)		XI[5]
Aminopyrine	Tr.	$1.520n_{a1}$		$1.732n_c$	(0.202)		NF
Amitriptyline Hydrochlor.	Tr.	$1.57n_1$	$1.67n_2$		(0.10)		XI[5] C[j], 18°
Amobarbital	Mo.(110)	$1.467n_a$	$1.533n_b$	$1.560n_c$		(+)	NF
		$1.471n_1$	$1.538n_2$*[k]		(0.067)	(+)	XI[8]
Ampicillin (trihydrate)	Or.	$1.573n_{a1}$	$1.597n_{b2}$		(0.024)	(−)	X[9] unstable in air
Ampicillin (anhydrous)	Or.	$1.601n_{a1}$	$1.650n_{b2}$		(0.049)	(−)	X[18] stable in air
Ammonium Carbonate	Or.	$1.420n_a$	$1.534n_b$	$1.553n_c$			V[2], NF
Ammonium Chloride	Iso.	1.635			(0)		V[2]
Ammonium Bromide	Iso.	1.715			(0)		V[2]
Antipyrine	Mo.	$1.570n_{a1}$	$1.694n_{b2}$	$1.732n_{c3}$			NF
Apomorphine Hydrochlochr.		$1.636n_a$	$1.662n_{b1}$	$1.694n_{c2}$	(0.032)		V[2]
		$1.638n_a$	$1.658n_{b1}$	$1.701n_{c2}$			NF
Aprobarbital	Mo.	$1.489n_a$	$1.566n_b$	$1.603n_c$			NF
Arecoline Hydrobromide		$1.555n_a$	$1.590n_b$	1.655_c		(−)	NF
Arsenic Trioxide	Iso.	1.755					NF, Octahedral
Ascorbic Acid		$1.478n_{a1}$		$1.670n_{c2}$	(0.192)		XI[7] 4.5°
Aspirin	Mo.	$1.505n_a$	$1.645n_b$	$1.655n_{c2}$		(+)	NF, V[2]
	Mo.	$1.569n_{a'1}$		$1.652n_{c2}$	(0.083)	(+)	XI[6,2]
Atropin	Or.	$1.550n_a$	$1.583n_b$	$1.595n_c$			NF
Atropin Sulfate		$1.520n_a$		$1.732n_c$	(0.212)		NF
Barbital, Phase I	He.	1.526	1.570		uniaxial		NF
Barbital, Phase II	Mo.	$1.437n_a$	$1.558n_b$	$1.580n_c$			NF
Barbital, Phase III	Or.	$1.463n_{a1}$	$1.550n_{b2}$	$1.570n_c$			NF
Barbital	Or.	$1.460n_{a1}$	$1.553n_{a2}$		(0.093)		XI[5]
Benzoic Acid	Mo.		$1.618n_{b1}$	$1.70n_{c2}$	(0.082)	(−, +)	XI[5]
Benzethonium Chloride		$1.560n_a$	$1.565n_b$	$1.589n_c$			NF
	Mo.	$1.563n_{a1}$	$1.573n_2$		(0.010)		XI[5]
Benzocaine		$1.538n_a$	$1.567n_b$	$>1.744n_c$		(−)	NF
Benzthiazide		$1.581n_a$	$1.687n_b$	$>1.800n_c$			NF
Benzylpenicillin Potassium		$1.561n_1$	$1.602n_{b2}$*		(0.041)	(+)	XI[11]
Betamethasone	Or.		$1.554n_b$	$1.667n_c$		(+)	NF
	Or.		$1.55n_{b1}$	$1.662n_{c2}$*	(0.112)	(+)	X1[5]
Betamethasone Valeate		$1.57n_1$	$1.60n_2$		(0.03)		XI[12] C
Betanaphthol	Mo.	$1.520n_{a1}$		$1.733n_{c2}$	(0.213)		NF
Boric Acid	Tr.	$1.340n_a$	$1.456n_b$	$1.459n_c$			NF
Boric Acid		$1.42n_1$		$1.46n_2$*			V[2]
Bromisovalum Ph.I	Tr.	$1.526n_a$	$1.57n_b$	$1.586n_c$			NF
(Bromvalerylurea I)	Tr.	$1.530n_{a1}$		$1.586n_{c2}$	(0.056)		V[2,13]
Bromisovalum Ph.II	Or.	$1.519n_a$	$1.583n_b$	$1.599n_c$			NF
(Bromvalerylurea II)	Or.(110)		$1.525n_1$	$1.570n_2$	(0.045)		V[2,13]
Butacaine Sulfate	Mo.	$1.550n_a$	$1.570n_b$	$1.680n_c$		(−)	NF

Table 1. continued

Substance & Polym.Mod.	System[a], & Pr.F.[b]	Princ.Refr.Ind.[c]: n_a, n_b, n_c & Key Ref.Ind.[d]: n_1, n_2,			Biref.[e] (n_2-n_1)	El.[f]	Remarks Lit.& Oth.
Butethal	Mo.	$1.456n_a$	$1.520n_b$	$1.552n_c$		(−)	NF
Butethamine Hydrochlor.		$1.518n_a$	$1.606n_b$	$>1.735n_c$			NF
Butyl Aminobenzoate	Mo.	$1.517n_a$	$1.551n_b$	$>1.80n_c$			NF Y=b
Busulfan	Tr.	$1.509n_1$	$1.521n_2$		(0.012)		XI[5] C
Bethanecol Chloride		$1.49n_1$	$1.525n_2$		(0.035)		XI[5]
Biperiden Hydrochlor.	Mo.	$1.594n_a$	$1.605n_{b2}$*	$1.639n_c$	(0.011)	(+, −)	NF
Caffeine		$1.470n_1$	$1.688n_2$		(0.218)		XI[5]
Calcium Cyclamate		$1.507n_a$	$1.518n_b$	$1.545n_c$			NF
Calcium Hypophosphite	Mo.	$1.543n_{a1}$		$1.578n_{c2}$	(0.035)		NF
Calcium Lactate		$1.470n_a$	$1.510n_b$			(+)	NF
		$1.470n_{a1}$	$1.510n_{b2}$		(0.040)	(+)	XI[7]
Calcium Levulinate	Or.	$1.495n_a$	$1.507n_b$	$1.537n_c$		(+)	NF
Calcium Pantothenatae	Iso.	1.519			(0)		NF
Calcium p-amino-salicylate		$1.60n_1$	1.67_{n2}		(0.070)		XI[7]
Calcium Phosphate Dibasic	Mo.	$1.539n_a$	$1.546n_b$	$1.558n_c$			NF
Calcium Saccharin		$1.480n_a$	$>1.523n_b$	$1.692n_c$			NF
Calcium Sulfate(Anhyd.)		$1.571n_a$	$1.576n_b$	$1.614n_c$			NF
Calcium Sulfate($2H_2O$)	Mo.	$1.521n_a$	$1.523n_b$	$1.530n_c$			NF
Calomel	Te.	$1.973n_a$	$2.656n_b$				NF pyramids
d-Campher		$1.498n_1$	$1.502n_2$				V[2]
Carbamazepine		$1.589n_1$	1.75				XI sol.in oils
Carbromal, Phase I	Or.	$1.529n_a$	$1.575n_b$	$1.618n_c$			NF
(Bromdiethyl-acethylurea I)	Or.	1.54	$1.565n_{b1}$	$1.614n_{c2}$			V[2]
Carbromal, Phase II	Mo.	$1.527n_a$	$1.532n_b$	$1.603n_c$			NF
(Bromdiethyl-acethylurea II)	Mo.(110)	$1.52n_{a1}$		$1.603n_{c2}$*			V[2)14]
Cefazolin Sodium		$1.601n_1$	$1.620n_2$		(0.019)		XI[11]
Cephalexin	Mo.		$1.619n_{b1}$*	$1.630n_{c2}$	(0.011)	(−)	XI[11]
Cephalotin Sodium	Mo.	$1.565n_{a1}$*	$1.617n_{b2}$		(0.052)	(−)	XI[11]
Cephaloridine	Or.	$1.595n_{a1}$	$1.728n_{b2}$*		(0.133)	(+)	XI[11]
Cetyl Alcohol		$1.480n_a$	$1.528n_b$				NF
Cetylpyridinium		$1.509n_a$	$1.566n_b$	$1.613n_c$			NF
Chloramine-T		$1.497n_a$	$1.563n_b$	$1.585n_c$			NF
Chloral Hydrate		$1.58n_1$	$1.617n_2$				XI[5]
Chloramphenicol		$1.523n_a$	$1.608n_b$	$1.659n_c$		(−)	NF
Chloramphenicol	Mo.	$1.526n_{a1}$	$1.609n_{b2}$*		(0.083)	(−)	XI[11]
Chloramphenicol Sodium Succinate		$1.498n_1$*	$1.597n_2$		(0.099)	(−)	XI[11]
Chloramphenicol Palmitate I							XI oil like
Chloramphenicol Palmitate II		$1.530n_1$	$1.568n_2$		(0.038)		XI[11]
Chlorcycline Hydrochlor.		$1.590n_a$	$1.610n_b$	$1.665n_c$			NF
Chlordiazepoxide Hydrochl.		$1.634n_a$	$1.71n_b$	$>1.78n_c$			NF
Chlordiazepoxide		$1.69n_1$	$1.76n_2$				XI[5]
Chlormerodin		$1.579n_a$	$1.635n_b$	$1.690n_c$			NF
Chlormezanone		$1.578n_1$	$1.650n_2$				XI[7]
Chlorothen Citrate		$1.583n_a$	$1.603n_b$	$1.645n_c$			NF
Chlorothymol	Mo.	$1.520n_a$	$1.597n_b$	$1.685n_c$			NF
Chlorpheniramine Maleate		$1.533n_a$	$1.668n_b$	$<1.734n_c$			NF
		$1.540n_1$	$1.624n_2$		(0.084)		XI[7]
Chlorpromazine Hydrochlor.		$1.59n_1$	$1.78n_2$		(0.19)		XI[5]
Chlortetracycline Hydrochlor.	Or.	$1.635n_a$	$1.706n_b$	$1.730n_c$			NF
Chlorzoxazone		$1.46n_1$	$1.73n_2$		(0.27)		XI[7]

Table 1. continued

Substance & Polym.Mod.	System[a], & Pr.F.[b]	Princ.Refr.Ind.[c]: n_a, n_b, n_c & Key Ref.Ind.[d]: n_1, n_2,			Biref.[e] (n_2-n_1)	El.[f]	Remarks Lit.& Oth.
Chlorpropamide		$1.58n_1$	$1.625n_2$				XI[7]
Ciclacillin		$1.559n_{a1}$*	$1.623n_{b2}$		(0.064)	(−)	XI[11]
Cinchophen Phase I	Or.	$1.545n_a$	$1.575n_b$	$>1.734n_c$		(+)	NF
Cinchophen Phase II	Tr.	$1.545n_a$	$1.590n_b$	$1.630n_c$			NF
Citric Acid		$1.495n_{a1}$	$1.507n_{b2}$				NF
Cocain	Mo.	$1.502n_a$	$1.581n_b$	$<1.737n_c$		(−)	NF
Cocain Hydrochlor.		$1.570n_a$	$1.596n_b$	$1.618n_c$			NF
			$1.597n_{b1}$	$1.613n_{c2}$	(0.016)		V[2]
Codeine($1H_2O$)	Or.	$1.543n_a$	$1.636n_b$	$1.684n_c$			NF
Codeine Sulfate	Or.	$1.561n_a$	$1.642n_b$	$1.661n_c$			NF
Cortisone Acetate		$1.512n_a$	$1.552n_b$*	$1.621n_c$	(0.040)	(+, −)	NF
			$1.547n_1$	$1.585n_2$	(0.038)		XI[7] C
Coumarin	Or.	$1.572n_a$	$1.681n_b$	$>1.81n_c$		(−)	NF
Cupric Sulfate	Tr.	$1.514n_a$	$1.537n_b$	$1.543n_c$			NF
Cupric Sulfate		$1.523n_1$		$1.543n_{c2}$	(0.020)		XI C
Cyanocobalamin		$1.623n_1$	$1.664n_2$		(0.041)	(+)	XI[7]
Cyclobarbital	Mo.	$1.515n_a$	$1.546n_b$*	$1.621n_c$	(0.031)	(+, −)	NF
Cyclophosphamide		$1.490n_1$	$1.550n_2$		(0.070)		XI[7]
Cycloserine		$1.583n_1$	$1.594n_2$		(0.027)		XI[11]
Cyproheptadine Hydrochlor.		$1.620n_a$	$1.647n_b$	$1.738n_c$			NF
		$1.618n_{a1}$*		$1.730n_{c2}$	(0.112)		XI[7]
Dehydrocholic Acid		$1.510n_a$	$1.542n_b$*	$1.572n_c$	(0.032)	(+, −)	NF
Desoxycorticosteron Acetate	Mo.	$1.529n_a$	$1.550n_b$	$1.630n_c$			NF
Dexamethasone		$1.553n_a$	$1.572n_b$	$1.648n_c$			NF
Dexamethasone		$1.56n_1$	$1.59n_2$		(0.03)		XI[7] C
Dexchlorpheniramine Maleate		$1.509n_a$	$1.564n_b$	$1.683n_c$			NF
Dextroamphetamine Phosphate		$1.546n_a$	$1.583n_b$*	$1.664n_c$	(0.037)	(+, −)	NF
Dextrose($1H_2O$)		$1.515n_a$	$1.528n_b$*	$1.557n_c$	(0.013)	(+, −)	NF
Dextromethorphan Hydrobromide	Or.	$1.574n_{a1}$	$1.618n_{b2}$		(0.044)		XI[5]
Diallylbarbitric Acid	Mo.	$1.516n_a$	$1.572n_b$	$1.625n_c$		(−)	NF
Dicloxacillin Sodium		$1.577n_{a1}$	$1.582n_{b2}$*		(0.005)	(+)	IX[11] B
Dienestrol		$1.622n_a$	$1.684n_b$	$1.692n_c$			NF
Diethylcarbamazine Citrate		$1.524n_{a1}$	$1.535n_{b2}$*		(0.011)	(+)	XI[7]
Digitoxin	Mo.	$1.513n_a$	$1.518n_b$	$1.568n_c$			NF
	Mo.	$1.522n_{a1}$		$1.557n_{c2}$*	(0.035)	(+)	XI[5]
Dimenhydrinate		$1.551n_1$	$1.625n_2$		(0.074)		XI[5] sol.in oils
Dimorphoramine		$1.525n_1$	$1.621n_2$		(0.096)		XI[5]
Diphenylhydantoin(Phenytoin)		$1.600n_{a1}$		$1.635n_{c2}$	(0.035)	(−)	NF
Diphenhydramine Hydrochlor.		$1.597n_1$	$1.623n_2$		(0.026)		XI[11]
Doxycycline Hydrochlor.		$1.580n_1$		$1.733n_2$*	(0.153)	(+)	XI[11]
Doxylamine Succinate	Or.	$1.525n_a$	$1.563n_b$	$1.598n_c$			NF
Drocarbil Phase I	Mo.	$1.496n_a$	$1.710n_b$	$1.780n_c$			NF
Drocarbil Phase II	Or.	$1.597n_a$	$1.610n_b$	$1.710n_c$			NF
Ephedrine Hydrochlor.	Mo.	$1.530n_a$	$1.603n_b$	$1.638n_c$		(−)	NF
	Mo.		$1.602n_{b1}$*	$1.64n_2$	(0.038)	(−)	XI[5]
Ephedrine Sulfate		$1.540n_a$	$1.565n_b$	$1.587n_c$			NF
Epinephrine		$1.539n_1$	$1.602n_2$		(0.063)		XI[5]
Ergocalciferol		$1.534n_1$	$1.55n_2$				XI C
Erythromycin		$1.493n_1$*	$1.501n_2$		(0.008)	(−)	XI[11]
Erythromycin Estolate		$1.483n_a$	$1.488n_b$	$1.515n_c$		(−)	NF

Table 1. continued

Substance & Polym.Mod.	System[a], & Pr.F.[b]	Princ.Refr.Ind.[c]: n_a, n_b, n_c & Key Ref.Ind.[d]: n_1, n_2,			Biref.[e] (n_2-n_1)	El.[f]	Remarks Lit.& Oth.
Erythromycin Ethylsuccinate		$1.490n_a$	$1.515n_b$	$1.567n_c$		(+)	NF
		$1.492n_{a1}$	$1.516n_{b2}$*		(0.024)	(+)	XI[11]
Estradiol Benzoate		$1.586n_a$	$1.603n_b$	$1.633n_c$		(−)	NF
Estradiol Dipropionate		$1.506n_a$	$1.598n_b$				NF
Estrone Phase I	Mo.	$1.520n_a$	$1.642n_b$	$1.692n_c$			NF
Estrone Phase II	Or.	$1.511n_a$	$1.621n_b$	$1.697n_c$			NF
Estrone Phase III	Or.	$1.594n_a$	$1.628n_b$	$1.647n_c$			NF
Ethanbutol Hydrochlor.		$1.524n_1$	$1.536n_2$*		(0.012)	(+)	XI[5]
Ethionamide		$1.57n_1$	$1.79n_2$		(0.22)		XI[5] C
Ethisteron		$1.576n_a$	$1.625n_b$	$1.645n_c$			NF
Ethoheptazine Citrate		$1.537n_a$		$1.556n_c$			NF
Ethyl Aminobenzoate		$1.532n_1$	$1.75n_2$		(0.218)	(+)	XI[7] B
Ferrous Gluconate($2H_2O$)		$1.545n_a$	$1.555n_b$	$1.565n_c$		(+)	NF
Ferrous Sulfate		$1.475n_a$	$1.486n_b$*			(+)	NF
Fluocinolone Acetnide		$1.532n_1$	$1.580n_2$		(0.048)		XI[7]
Fluorometholone		$1.562n_a$	$1.568n_b$	$1.704n_c$			NF
Folic Acid		$1.60n_1$*	$1.72n_2$		(0.12)	(−)	XI[7]
Fructose	Or.	$1.558n_a$		$1.561n_c$			NF
Glucose		$1.528n_1$*	$1.558n_2$		(0.030)	(−)	XI[7]
Glutamic Acid Hydrochlor.	Or.	$1.546n_a$	$1.559n_b$	$1.583n_c$		(+)	NF
Glutethimide		$1.572n_a$	$1.585n_b$	$1.590n_c$		(+)	NF
Glyceryl Guaiacolate	Mo.	$1.585n_a$	$1.589n_b$	$1.643n_c$			NF
Glycopyrolate		$1.573n_a$	$1.606n_b$	$1.615n_c$			NF
Gold Sodium Thiosulfate	Mo.	$1.617n_a$	$1.679n_b$	$1.734n_c$		(−)	NF
Gramicidin		$1.541n_a$	ca.$1.553n_b$	$1.573n_c$			NF irregular
Griseofulvin		$1.65n_a$	$1.672n_b$*		(0.022)	(+)	XI[7]
Haloperidol		$1.584n_1$*	$1.710n_2$		(0.126)	(−)	XI[5]
Hexestrol	Mo.	$1.495n_a$	$1.565n_b$	$1.687n_c$			NF Y = b
Histidin Monohydrochlor.	Or.	$1.566n_a$	$1.597n_b$	$1.623n_c$			NF
Hydralazine Hydrochlor.		$1.528n_1$*	$1.78n_2$		(0.252)	(−)	XI[5]
Hydrochlorothiazide		$1.498n_1$*	$1.653n_2$		(0.155)	(−)	XI[5]
Hydrocortisone		$1.531n_a$	$1.550n_b$	$1.638n_c$		(−)	NF
Hydrocortisone		$1.54n_1$	$1.62n_2$		(0.08)		XI[7]
Hydrocortisone Acetate	Mo.	$1.543n_a$	$1.589n_b$*	$1.627n_c$	(0.046)	(+, −)	NF
Hydroflumethiazide		$1.494n_a$	$1.607n_a$	ca.$1.78n_c$			NF
Hydroquinone	Tr.	$1.626n_1$	$1.633n_2$				NF
Hydroxocobalamin Acetate		$1.618n_1$	$1.645n_2$*		(0.027)	(+)	XI[7]
Hyoscyamine Hydrochromide		$1.555n_a$		$1.623n_c$		(+)	NF
Imipramine Hydrochlor.		$1.605n_1$	$1.654n_2$		(0.049)		XI[5]
Indometacin		$1.55n_1$	$1.75n_2$		(0.20)		XI[5] s.rods
Inositol	Mo.	$1.527n_a$	$1.560n_b$	$1.567n_c$			NF
Iotalamic Acid		$1.642n_1$*	$1.72n_2$		(0.078)	(−)	XI[7]
Isobucaine Hydrochlor.		$1.522n_a$	$1.574n_b$*	$1.612n_c$	(0.052)	(+, −)	NF
L-Isoleucine		$1.537n_1$	$1.561n_2$		(0.024)		XI[7]
Isoniazid		$1.508n_1$*	$1.740n_2$		(0.232)	(−)	XI[7]
Isoxsuprine Hydrochlor.	Mo.	$1.508n_a$	$1.648n_2$	$1.670n_c$			NF
Kainic Acid		$1.556n_1$*	$1.571n_2$		(0.015)	(−)	XI[7]
Lactose		$1.520n_1$	$1.553n_2$		(0.033)		XI[7]
Lanatoside C	Mo.	$1.502n_a$	$1.524n_b$	$1.568n_c$			NF

Table 1. continued

Substance & Polym.Mod.	System[a], & Pr.F.[b]	Princ.Refr.Ind.[c]: n_a, n_b, n_c & Key Ref.Ind.[d]: n_1, n_2,			Biref.[e] (n_2-n_1)	El.[f]	Remarks Lit.& Oth.
Lanatoside C			$1.521n_{b1}$*	$1.551n_2$	(0.030)		XI[5]
Lead Acetate($3H_2O$)	Mo.	$1.559n_a$	$1.576n_b$	$>1.690n_c$			NF
L-Leucine		$1.526n_1$	$1.542n_2$		(0.016)		XI[7]
Levallorphan Tartrate		$1.545n_a$	$1.595n_b$	$1.653n_c$			NF
Levodopa		$1.625n_1$	$1.703n_2$		(0.078)		NF
Levomepromazine Maleate		$1.61n_a$	$1.64n_b$				NF
Levopropoxyphene Napsylate		$1.566n_a$	$1.635n_b$	$1.638n_c$			NF
Lithium Bromide	Is.	1.784n			(0)		NF
L-Lysine Hydrochlor.		$1.55n_a$	$1.57n_b$		(0.020)		NF
Magnesium Carbonate	Mo.	$1.457n_a$	$1.470n_b$	$1.508n_c$			NF
Magnesium Hydroxide	He.	$1.559n_a$	$1.580n_b$				NF
Mannitol	Or.	$1.520n_a$	$1.555n_b$	$1.558n_c$		(+)	NF
Mechlorethamine Hydrochlor.		$1.535n_a$	$1.550n_b$*	$1.612n_c$	(0.015)	(+, −)	NF
Meperidine Hydrochlor.		$1.545n_a$	$1.581n_b$	$1.618n_c$		(+)	NF
Mephenesin		$1.549n_a$	$1.616n_b$			(−)	NF
Mephentermine Sulfate		$1.530n_a$	$1.585n_b$	$1.596n_c$			NF
Mephobarbital	Mo.	$1.594n_a$	$1.610n_b$	$1.651n_c$		(−)	NF
Meprobamate		ca.$1.515n_a$	ca.$1.544n_b$				NF
Mercaptopurine		$1.45n_a$	$1.652n_b$*		(0.202)	(+)	XI[7]
Methamphetamine Hydrochlor.		$1.530n_a$	$1.537n_b$	$1.615n_c$			NF irregul.
Methaphenilene Hydrochlor.		$1.604n_a$	$1.675n_b$	$1.733n_c$			NF
Methapyrilene Hydrochlor.		$1.588n_a$	$1.654n_b$	$1.703n_c$			NF hexagon.pl.
Metharbital		$1.529n_a$	$1.533n_b$	$1.590n_c$		(+)	NF
Methenamine	Is.	1.590					NF
Methionine		$1.544n_a$	$1.577n_b$	$1.600n_c$		(−)	NF
L-Methionine		$1.563n_1$	$1.568n_2$		(0.005)		XI[7]
Methohexital		$1.516n_a$	$1.554n_b$	$1.628n_c$			NF
Methscopolamine Bromide		$1.580n_a$	$1.615n_b$	$1.617n_c$			NF
Methylbenactyzium Bromide	Or.	$1.606n_1$	$1.609n_2$		(0.003)		XI[5]
Methylbenzethonium Chloride		$1.558n_a$	ca.$1.576n_b$	$1.593n_c$			NF
Methyldopa		$1.576n_1$	$1.625n_2$		(0.049)		XI[5]
Methylprednisolone Acetate	Or.	$1.562n_a$	$1.575n_b$	$1.700n_c$			NF
Methylprednisolone Sodium Succinate		$1.552n_a$	$1.561n_b$				NF
Methyltestosterone		$1.555n_a$	ca.$1.565n_b$	$1.620n_c$		(−)	NF
Morphine Hydrochlor.		$1.542n_1$*	$1.59n_2$		(0.048)	(−)	V[2]
Moroxydine Hydrochlor.		$1.558n_1$	$1.724n_2$		(0.166)		XI[7]
Naphazoline Hydrochlor.	Tr.	$1.615n_a$	$1.623n_b$*	$>1.780n_c$	(0.008)	(+, −)	NF
Naphazoline Nitrate		$1.560n_1$	$1.617n_b$		(0.057)		XI[7]
Naepaine Hydrochlor. I	Or.	$1.498n_a$	$1.585n_b$	$1.734n_c$		(+)	NF
Naepaine Hydrochlor. II	He.	$1.573n_a$	$1.582n_b$				NF
Nalidixic Acid		$1.53n_1$	$1.75n_2$		(0.22)		XI[7]
Neocinchophen		$1.462n_a$	$>1.81n_b$			(+)	NF
Neomycin Sulfate	Is.	1.541			(0)		NF
Niacin	Mo.	$1.424n_a$	$1.717n_b$	$1.79n_c$			NF
Nicotinamide		$1.525n_1$	$1.550n_2$		(0.025)		XI[7]
Nicotinic Acid		$1.47n_1$	$1.75n_2$		(0.28)		XI[7]
Norethisterone		$1.567n_1$	$1.624n_2$		(0.057)		XI[5]
Nortriptyline Hydrochlor.		$1.561n_a$	$1.659n_b$	$1.672n_c$		(−)	NF
Noscapine Hydrochlor.		$1.550n_1$	$1.694n_2$		(0.144)		XI[5]
Nystatin		$1.512n_a$	$1.583n_b$	$1.682n_c$		(−)	NF

Table 1. continued

Substance & Polym.Mod.	System[a], & Pr.F.[b]	Princ.Refr.Ind.[c]: n_a, n_b, n_c & Key Ref.Ind.[d]: n_1, n_2,			Biref.[e] (n_2-n_1)	El.[f]	Remarks Lit.& Oth.
Nystatin		$1.513n_{a1}$*	$1.553n_2$		(0.040)	(−)	XI[11]
Oxandrolone		$1.537n_a$	$1.590n_b$	$1.605n_c$			NF
Oxyphenbutazone		$1.569n_a$		$1.638n_c$			NF
Oxyphenbutazone	Mo.(010)	$1.564n_{a1}$*		$1.619n_{c2}$	(0.055)		XI[5]
Oxytetracycline		$1.634n_a$	$1.646n_b$	$>1.700n_c$			NF
Papaverine Hydrochloride		$1.555n_a$	$1.733n_b$	$>1.733n_c$			NF
Para-nitrosulfa-thiazole	Tr.	$1.557n_a$	$1.711n_b$*	$>1.80n_c$	(0.154)	(+, −)	NF
Pentaerythritol Tetranitrate	Te.	$1.553n_a$	$1.554n_b$				NF
Perphenazine		$1.56n_1$	$1.73n_2$		(0.17)		XI[5]
Phenacetin	Mo.	$1.518n_a$	$1.574n_b$	$>1.733n_c$			NF
Phenacetin	Mo.		$1.572n_{b1}$*	$1.75n_2$	(0.178)		XI[5]
Phenacaine Hydrochlor.		$1.518n_a$	$1.603n_b$	$1.740n_c$			NF
Phenethicillin Potassium		$1.580n_1$*	$1.598n_2$		(0.018)	(−)	XI[11]
Pheniramine Maleate	Mo.	$1.546n_a$	$1.558n_b$	$1.669n_c$			NF Z=b
Phenobarbital		$1.557n_a$	$1.620n_b$	$1.667n_c$		(−)	NF
Phenobarbital		$1.557n_{a1}$	$1.621n_{b2}$		(0.064)		XI[5,15]
Phenolphthalein	Tr.	$1.635n_a$		$1.673n_c$	(0.038)		NF irregul
Phenolphthalein	Tr.	$1.64n_{a1}$		$1.67n_{c2}$	(0.03)		XI
Phenothiazine	Or.	$1.610n_a$	$1.734n_b$	$1.95n_c$			NF
Phenoxymethyl Penicillin		$1.526n_a$	$1.617n_b$	$1.677n_c$			NF
Phenoxymethyl-Penicillin Potassium		$1.588n_{a1}$	$1.607n_{b2}$*		(0.019)	(+)	XI[11]
Phenprocoumon		$1.539n_a$	$1.706n_b$	$1.745n_c$			NF
Phensuximide		$1.536n_a$	$1.617n_b$	$>1.673n_c$			NF
Phenmetrazine Hydrochlor.		$1.508n_a$	$1.623n_b$	$1.646n_c$			NF
L-Phenylalanine		$1.602n_1$	$1.662n_2$		(0.060)		XI[7] pl.
Phenylbutazone		$1.600n_a$	$1.620n_b$			(−)	NF
Phenylbutazone		$1.600n_{a1}$*	$1.616n_2$		(0.016)	(−)	XI[5]
Phenylmercuric Acetate		$1.540n_a$	$1.683n_b$	$2.0n_c$			NF
Phenylpropanolamine Hydrochlor.		$1.563n_a$	$1.618n_b$	$1.650n_c$			NF
Phenyl Salicylate	Or.	$1.532n_a$	$1.620n_b$	$>1.745n_c$			NF
Phenytoin	Or.	$1.606n_{a1}$*		$1.631n_{c2}$	(0.025)	(−)	XI[5,16]
(Diphenylhydantoin	Or.	$1.600n_a$		$1.635n_c$		(−)	NF)
Phthalylsulf-acetamid	Mo.	$1.550n_a$	$1.568n_b$	$>1.80n_c$			NF X=b
Picrotoxin	Or.	$1.520n_a$	$1.552n_b$	$1.565n_c$		(+)	NF
Pilocarpin Hydrochlor.		$1.534n_1$	$1.61n_2$*		(0.076)		V[2]
Potassium Bromide	Is.	1.559			(0)		NF cubic
Potassium Iodide	Is.	1.667			(0)		NF, V[2]
Potassium Nitrate	Or.	$1.334n_a$	$1.505n_b$	$1.506n_c$			NF
Potassium Thiocyanate	Mo.	$1.532n_a$	$1.660n_b$	$1.730n_c$		(+)	NF
Precipitated Calcium Carbonate		$1.490n_a$	$1.658n_b$				NF
Prednisolone		$1.58n_1$	$1.61n_2$		(0.03)		XI[7]
Prednisolone Acetate		$1.580n_1$	$1.656n_2$		(0.076)		XI[7]
Probenecid		$1.553n_1$*	$1.60n_2$		(0.047)		XI[7]
Procaine Hydrochlor.		$1.542n_1$	$1.560n_2$		(0.018)		XI[7]
Procainamide Hydrochlor.		$1.64n_1$	$1.742n_2$		(0.102)		XI[5]
Procaine Penicillin G		$1.545n_a$	$1.570n_b$*	$1.685n_c$	(0.025)	(+,−)	NF
Prochlorperazine Maleate		$1.673n_1$	$1.704n_2$		(0.031)		XI[5]
Progesterone B	Or.	$1.529n_a$	$1.575n_b$	$1.676n_c$		(−)	NF
Progesterone A	Or.	$1.542n_a$	$1.554n_b$	$1.663n_c$			NF
Progesterone		$1.54n_1$	$1.55n_2$		(0.01)		sol. XI[5]

Table 1. continued

Substance & Polym.Mod.	System[a], & Pr.F.[b]	Princ.Refr.Ind.[c]: n_a, n_b, n_c & Key Ref.Ind.[d]: n_1, n_2,			Biref.[e] (n_2-n_1)	El.[f]	Remarks Lit.& Oth.
Propantheline Bromide		$1.561n_1$	$1.645n_2$		(0.084)		XI[7]
Propranolol Hydrochlor.		$1.567n_1$	$1.678n_2$		(0.111)		XI[5]
Prothionamide		$1.575n_1$	$1.75n_2$		(0.175)		XI[7]
Promazine Hydrochlor.		$1.614n_a$	$1.635n_b$	$>1.735n_c$			NF
Promethazine Hydrochlor.		$1.617n_a$	$1.691n_b$	$1.733n_c$		(+)	NF
Propoxyphene Hydrochlor.	Or.	$1.560n_a$	$1.582n_b$	$1.638n_c$			NF
Pseudoephedrine Hydrochlor.		$1.543n_a$		$1.632n_c$		(−)	NF
Pyrathiazine Hydrochlor.		$1.690n_a$	$1.737n_b$				NF
Pyrazinamide		$1.495n_1$*	$1.692n_b$		(0.197)	(−)	XI[7]
Pyrogallol	Or.	$1.492n_a$		$1.712n_c$		(−)	NF
Pyrobutamine Phosphate		$1.566n_a$	$1.614n_b$	$1.653n_c$			NF
Quinidine Sulfate		$1.591n_1$	$1.671n_2$*		(0.080)	(+)	XI[5]
Quinine (Anhydrous)		$1.596n_a$	$1.624n_b$	$1.689n_c$			NF
Quinine Dihydrochloride	Mo.	$1.542n_a$	$1.657n_b$	$1.689n_c$			NF X=b
Quinine Ethylcarbonate		$1.57n_1$	$1.68n_2$*		(0.11)	(+)	V[2]
Quinine Hydrochlor.		$1.585n_a$	$1.615n_b$	$1.656n_c$		(+)	NF
			$1.613n_{b1}$	$1.657n_{c2}$	(0.044)	(+)	V[2]
Quinine Phosphate		$1.575n_a$	$1.595n_b$	$1.655n_c$		(+)	NF
Quinine Sulfate	Or.		$1.635n_{b1}$	$1.687n_{c2}$*	(0.052)	(+)	V[2]
Rolitetracycline		$1.595n_1$	$1.666n_2$*		(0.071)	(+)	XI[11]
Rutin		$1.508n_a$	$1.734n_b$	$>1.734n_c$		(−)	NF
Salicylanilide	Or.	$1.497n_a$	$1.704n_b$*	$>1.81n_c$	(0.207)	(+,−)	NF
Salicylamide	Mo.	$1.595n_a$	$1.637n_b$	$1.727n_c$			NF
Salicylic Acid		$1.55n_1$	$1.74n_2$		(0.19)		XI[7]
Santonin	Or.	$1.589n_a$	$1.592n_b$	$1.639n_c$			NF
Santonin	Or.	$1.59n_{a1}$		$1.66n_2$	(0.07)		XI[7]
Scopolamine Hydrobromide		$1.568n_a$	$1.586n_b$		(0.018)		V[2]
Sodium Acetate ($3H_2O$)	Mo.	$1.416n_a$	$1.463n_b$	$1.482n_c$			NF
Sodium Benzoate		$1.55n_1$	$1.66n_2$*		(0.11)	(+)	XI[7]
Sodium Bicarbonate		$<1.40n_1$	$1.580n_2$*		(0.180)	(+)	V[2]
Sodium Biphosphate	Or.	$1.456n_a$	$1.483n_b$	$1.487n_c$			NF
Sodium Borate		$1.447n_1$	$1.469n_2$*		(0.022)		V[2]
Sodium Bromide (Monohydrate)	Is.	1.641			(0)		NF
Sodium Butabarbital		$1.465n_a$	$1.529n_b$	$1.532n_c$		(+)	NF
Sodium Cacodylate		$1.478n_a$	$1.485n_b$	$1.503n_c$			NF
Sodium Chloride	Is.	1.544			(0)		NF, V[2] cubic
Sodium Citrate	Mo.	$1.470n_a$	$1.500n_b$	$1.510n_c$			NF
Sodium Cromoglilcate		$1.541n_1$*	$1.598n_2$		(0.057)	(−)	XI[5]
Sodium Cyclamate		$1.548n_a$	$1.550n_b$*	$1.559n_c$	(0.002)	(+,−)	NF
Sodium Glycerophosphate ($5H_2O$)	Mo.	$1.474n_a$	$1.489n_b$	$1.499n_c$			NF
Sodium Glycerophosphate ($6H_2O$)	Mo.	$1.444n_a$	$1.455n_b$	$1.468n_c$			NF
Sodium Lauryl Sulfate		$1.451n_a$	$1.491n_b$		(0.040)	(−)	NF
Sodium Novobiotin		$1.565n_a$	$1.629n_b$		(0.064)	(−)	NF
Sodium Penicillin G		$1.550n_a$	$1.609n_b$	$1.620n_c$		(+)	NF
Sodium Phosphate Dibasic ($7H_2O$)	Mo.	$1.441n_a$	$1.442n_b$	$1.453n_c$			NF
Sodium Probarbital		$1.532n_a$	$1.629n_b$			(+)	NF
Sodium Saccharin		$1.560n_a$	$1.642n_b$	$1.733n_c$			NF
Sodium Secobarbital		$1.490n_a$	$1.500n_b$	$1.525n_c$			NF
Sodium Salicylate		$1.435n_1$	$1.686n_2$		(0.251)		V[2]
Sodium Sulfate	Mo.	$1.394n_a$	$1.396n_b$	$1.398n_c$			NF

Table 1. continued

Substance & Polym.Mod.	System[a], & Pr.F.[b]	Princ.Refr.Ind.[c]: n_a, n_b, n_c & Key Ref.Ind.[d]: n_1, n_2,			Biref.[e] (n_2-n_1)	El.[f]	Remarks Lit.& Oth.
Sodium Thiosulfate	Mo.	$1.489n_a$	$1.508n_b$	$1.536n_c$			NF
	Mo.	$1.495n_{a1}$		$1.531n_{c2}$	(0.036)		V[2]
Sorbitol		$1.51n_1$	$1.54n_2$*		(0.03)	(+)	NF
Strychnine	Or.	$1.61n_a$	$1.68n_b$	$1.74n_c$		(+)	NF
Strychnine Nitrate	Mo.	$1.610n_a$	$1.624n_b$	$1.675n_c$		(−)	NF
Strychnine Phosphate	Mo.	$1.589n_a$	$1.597n_b$*	$1.655n_c$	(0.008)	(+,−)	NF
Strychnine Sulfate	Mo.	$1.592n_a$	$1.597n_b$	$1.661n_c$		(−)	NF
Succinylsulfathiazole	Mo.	$1.578n_a$	$1.676n_b$	$1.710n_c$			NF
Sulfacetamide	Or.	$1.559n_a$	$1.564n_b$	$1.727n_c$			NF
Sulfadiazine	Mo.	$1.596n_a$	$1.675n_b$*	$1.830n_c$	(0.079)	(+,−)	NF
Sulfaguanidine(H_2O)	Mo.	$1.586n_a$	$1.649n_b$	$1.731n_c$			NF
Sulfamerazine	Or.	$1.568n_a$	$1.657n_b$*	$1.687n_c$	(0.089)	(+,−)	NF
Sulfamethizole		$1.628n_1$	$1.643n_2$		(0.015)		XI[7]
Sulfanilamide, 1	Mo.	$1.500n_1$	$1.674n_b$	$1.840n_c$			NF Y=b
Phase III	Mo.	$1.500n_{a1}$	$1.674n_{b2}$*		(0.174)	(−)	V[17]
Sulfanilamide, 2	Mo.	$1.550n_a$	$1.674n_b$	$1.820n_c$			NF, (St.Phase)
Phase II(100)	Mo.	$1.550n_{a1}$	$1.674n_{b2}$*		(0.124)		V[17]
Sulfanilamide, 3	Or.	$1.548n_a$	$1.623n_b$	$1.810n_c$			NF Y=b
Phase I(001)	Or.	$1.547n_{a1}$	$1.621n_{b2}$		(0.074)		V[17]
Sulfanilamide	Or.	$1.606n_a$	$1.615n_b$	$1.820n_c$			NF Y=a
Sulfanilamide(H_20)	Or.	$1.505n_a$	$1.639n_b$	$>1.85n_c$			NF Y=a
Sulfadiazine	Mo.	$1.596n_a$	$1.675n_b$*	$1.830n_c$	(0.079)	(+, −)	NF
Sulfaguanidine(H_2O)	Mo.	$1.586n_a$	$1.649n_b$	$1.731n_c$			NF
Sulfamerazine	Or.	$1.568n_a$	$1.657n_b$*	$1.687n_c$	(0.089)	(+,−)	NF
Sulfamethizole(H_2O)		$1.628n_1$	$1.643n_2$		(0.015)		XI[7]
Sulfisomidine		$1.588n_1$*	$1.74n_2$		(0.152)	(−)	XI[7]
Sulfisoxazole		$1.605n_a$	$1.642n_b$*	$1.697n_c$	(0.037)	(+,−)	NF
Sulfisoxazole		$1.646n_1$	$1.72n_2$		(0.074)		XI[7] C
Sulpyrine		$1.521n_1$*	$1.602n_2$		(0.081)	(−)	XI[5]
Suxamethonium Chloride		$1.526n_1$	$1.573n_2$		(0.045)		XI[7]
Syrosingopine		$1.529n_a$	$1.538n_b$	$1.646n_c$		(−)	NF
Testosteron		$1.548n_a$	$1.565n_b$	$1.670n_c$		(−)	NF
Tetracycline		$1.617n_1$	$1.683n_2$		(0.066)		XI[11]
Tetracycline Hydrochlor.		$1.603n_a$	$1.685n_b$	$1.714n_c$			NF
			$1.687n_{b1}$	$1.710n_{c2}$	(0.023)		XI[11]
Tetracycline Metaphospate		$1.61n_1$	$1.62n_2$*		(0.010)	(+)	XI[11]
Theobromine	Mo.	$1.435n_a$	>1.74	>1.74			NF
Theophylline	Mo.	$1.447n_a$	$1.695n_b$	$1.733n_c$			NF Z=b
Thiamazole		$1.69n_1$	$1.717n_2$				NF
Thiamine Hydrochlor.							
Phase I, (H_2O)	Mo.(010)	$1.605n_{a1}$		$1.689n_{c2}$	(0.084)		XI[7] E.14°
Phase II	Mo.	$1.617n_1$	$1.638n_2$		(0.021)		XI[7]
Thiamine Nitrate		$1.598n_1$	$1.672n_2$		(0.074)		XI[7]
Tolbutamide I		$1.550n_1$*	$1.599n_2$		(0.049)		XI[7]
Tolbutamide II		$1.517n_1$	$1.565n_2$		(0.048)		XI[7]
Triamcinolone Acetonide	Tr.	$1.546n_a$	$1.595n_b$				NF
		$1.55n_1$	$1.58n_2$		(0.03)		XI[5]
Triamcinolone Diacetate	Or.	$1.517n_a$	$1.567n_b$	$1.592n_c$			NF
Triamteren		$1.522n_1$	$1.78n_2$		(0.258)		XI[5]
Trichlormethiazide		$1.534n_a$	$1.666n_b$	$>1.800n_c$			NF

Table 1. continued

Substance & Polym.Mod.	System[a], & Pr.F.[b]	Princ.Refr.Ind.[c]: n_a, n_b, n_c & Key Ref.Ind.[d]: n_1, n_2,			Biref.[e] (n_2-n_1)	El.[f]	Remarks Lit.& Oth.
Trichlormethiazide		$1.534n_1$*	$>1.76n_2$		(0.226)		XI[5]
Trihexyphenidyl Hydrochlor.		$1.567n_1$	$1.589n_2$		(0.022)		XI[5]
Trimethadione		$1.476n_1$	$1.539n_2$		(0.063)		XI[5]
Trimethidinium Methosulfate		$1.509n_a$	$1.515n_b$	$1.528n_c$			NF
L-Tryptophan		$1.636n_1$	$1.641n_2$		(0.005)		XI[7]
L-Valine		$1.552n_1$	$1.581n_2$		(0.029)		XI[7]
Viomycine Sulfate		$1.556n_1$	$1.564n_2$		(0.008)		XI
Zinc Chloride		$1.687n_a$	$1.713n_b$				NF
Zinc Phenol-sulfonate($8H_2O$)		$1.480n_a$	$1.551n_b$	$1.625n_c$			NF
Zinc Sulfate		$1.460n_1$	$1.490n_2$		(0.030)		V[2]

a) crystal system, Or.: orthorhombic, Mo.: monoclinic, Tr.: triclinic, Is.: isometric, He.: hexagonal, Te.: tetragonal. *b*) predominant face: in most cases (001) or (100) is common in the orthorhombic or monoclinic system when the elongation is (+) or (−), and also in the triclinic system when a definit extinction angle is observed, and in not so often cases (010) is predominant in the monoclinic system, and in rare cases (110) is predominant in the orthorhombic or monoclinic system showing prismatic habits. *c*) principal refractive index: n_a, n_b and n_c, refractive lindices obtained from 3 main directions of biaxial wave surfaces, X, Y and Z, composing of 3 principal sections X-Y, Y-Z and X-Z, the optic axial plane. *d*) key refractive index: n_1 and n_2, refractive indices obtained from natural position at an immersion method, and uniquly to a habit of a substance. *e*) birefringence of key refractive indices: n_2-n_1. *f*) Elongation: when a elongated direction of a parallel extinctioned crystal is Z, then Elongation is (+), and is X, then Elongation is (−); there are some cases that Elongation (+) mixed with (−), or (−) mixed with (+), where a cristal will rotate along the elongated direction. *g*) n_{a1}: when a key refractive index n_1 is coincided with a principal refractive index n_a, it is written as n_{a1}, samely n_{b1}, n_{c2} or n_{b2}. *h*) NF[4]: the substance is listed in the National Formuraly and the characteristics are written in the Literature 4); NF is the same as NF[4]. *i*) X[5]: the substance is listed in the Japanese Pharmacopoeia X and the references are in 5). *j*) C: a case where a definite couple of key refractive indices is dificult to measure, and a comparatively relyable couple is selected here. *k*) *: the most relyable key refractive index, one is a data of elongated direction, when Elongation is (+) or (−) and (+, −).

の混合浸液が記載されている.

Fedrow: Universal Stage は光軸角 2V の測定等に欠かせない付属品であるが，優勢面以外の面の屈折率測定に用いるのは無理なようである．NF[4] の広範な principal refractive index の測定には，単斜晶系の場合等晶癖の自然な位置だけでは測定できないので，方法に無理があるのではなかろうかと思われる.

2) 本表では試料となる結晶粉末が再結晶等で得られたそのままのものか，粉砕末を篩にかけたものか等で A, B 群か C 群か[3]の相違が別れる場合がある．C 群に晶癖特性がどの程度残るかは劈開性の強弱等も関係する.

3) 本著のデータを活用し新試料の同定と晶癖分析等を行うには，従来の機器や写真機，浸液キット等でよいが，カメラ部分にデジタル方式を用いた，例えば Camedia Microimaging System（オリンパス光学工業株式会社）等が最近用いられてきて，視野をビデオに写し両眼で観察し，動画の記録も自在である．天然物の微量抽出，再結晶等の途もあるのでこの分野への進出も考えられる．Figure 1 はこの方式を用いフェニトインの粉末を Table 1 のデータを用いて同定した写真をコンピュータで印刷した実施例の 1 つである.

4) Table 1 の NF[4] のデータだけではキー屈折率，複屈折（n_2-n_1）等を求められないが，試料があれば逆同定法で NF に晶癖のデータを追加補充することができる．この先の晶癖分析は既報の文献を用いればよい.[12,19]

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