PFANSTIEHL CHEMICALS

The Standard for Research

Laboratory Reagents
Rare Sugars
Amino Acids
and
Reagents for Blood Chemistry

"There is no substitute for purity."

PFANSTIEHL CHEMICALS
The Mark of Purity

April 1, 1922

SPECIAL CHEMICALS COMPANY
DEVOTED TO THE CHEMICAL INDEPENDENCE OF AMERICA
HIGHLAND PARK, ILL.

PFANSTIEHL CHEMICALS

The Mark of Purity

PURITY

For the bacteriologist who uses rare sugars there is but one consideration entering into the question of their selection — **quality.**

No bacteriologist can afford to run the risk of having his determinations made valueless through variation in the purity of his media.

There is a way to avoid this risk — by having sugars tested for other sugars, ash, moisture, chlorides, etc.

The makers of Pfanstiehl Sugars invite this test in the conviction that thereafter Pfanstiehl Sugars will stand on their merits as "the standard for bacteriology".

The label bears the analysis. "The Rare Sugars: Their Purity and Tests," (Pfanstiehl and Black) is reprinted by request from *The Journal of Industrial and Engineering Chemistry* (Vol. 13, No. 8) in the back of this booklet.

"There is no substitute for purity."

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Price List

Pfanstiehl Rare Sugar and Amino Acids

Pfanstiehl Chemicals, the Standard for Research

WITH this issue of the price list, we are grouping the C. P., Pure, and Extremely Rare Carbohydrates, formerly listed in three separate divisions, in one group and including here also the Amino Acids.

Containers are included in prices quoted below.

Prices subject to change without notice.

	10 g.	25 g.	100 g.	500 g.
Adonitol, C. P. (Adonitol) (*out of stock*)				
Aesculin, Highest Purity	5.00			
a-**Alanine, C. P.** (*racemic*)	3.25	7.75	28.50	
b-**Alanine, C. P.** (*racemic*)	3.25	7.75	28.50	
Alant Starch (*see* Inulin)				
Aminoacetic Acid (*see* Glycine)				
Amygdalin, Highest Purity		2.25	7.50	31.00
l-**Arabinose, C. P.**	2.25	5.65	22.00	89.00
a-d-**Arabinose, C. P.** (*extremely rare*)	15.00			
l-**Arabitol, C. P.** (Arabite)	15.00			
Arginine (*inquiries solicited*)				
Asparagin, Pure (Amino-succinamic Acid)		1.75	6.00	26.40
l-**Aspartic Acid, C. P.** (Asparaginic)	4.25	10.00	38.00	
Cellose (Cellobiose) (*in research*)				
Corn Sugar (*see* Glucose)				
Cysteine Hydrochloride, C. P.	6.00	14.50	55.00	
Cystine, C. P.	5.00	11.00	40.00	
Dextrin (bacteriological) (*in research*)				
Dextrin, precipitated by Alcohol			1.00	3.85
Dextrose (*see* Glucose)				
Diabetin (*see* Levulose)				
Diastase of Malt (Maltine)			1.25	4.25
Dulcitol, C. P. (Dulcite)	5.50	12.60	49.00	195.00
Edestin, Highest Purity		3.60	14.00	
Erythritol, C. P. (Erythrite)	3.60	9.00	34.00	133.00
Fruit Sugar or Fruitose (*see* Levulose)				
d-**Galactonic Lactone, C. P.** (*for treating root canals*) ($5.00 per 5 g.)	9.50			
d-**Galactose, C. P.**	.50	1.15	4.00	16.50
b-d-**Galactose, C. P.** (*extremely rare*)	7.50			

	10 g.	25 g.	100 g.	500 g.
a-Galaheptitol, C. P. (Galaheptite)	50.00			
a-d-Galaheptonic Lactone, C. P.	10.00			
a-d-Galaheptose, C. P.	50.00			
a-d-Glucoheptonic Lactone, C. P.	7.50			
a-d-Glucoheptose, C. P.	20.00			
Glucosamine Hydrochloride, C. P. (Chitosamine) (*out of stock*)				
Glucosazone, C. P.	10.00	20.00		
d-Glucose, C. P. (*anhydrous*) (Dextrose)		.35	1.00	4.00
d-Glucose, C. P. for Intravenous Injection (*specially tested*)				4.25
Glucose, Pure (*anhydrous*)			.75	2.50
beta-d-Glucose, C. P. (*extremely rare*)	7.50			
Glucosum (*Dextrose*) *syrupy* (42°) (*Ask for special price in bbl.*)				.85
Glutamic Acid, C. P.	5.00	10.00	34.00	
Glutamic Acid Hydrochloride, C. P.	3.00	6.75	25.00	
Glycerol, C. P., Sp. G. 1.25 (*Glycerin*)				1.00
Glycine, C. P. (*Glycocoll*)	5.00	11.50	45.00	
Glycogen, Pure		7.50	25.00	120.00
Clycyl—Tryptophan, C. P. (10.00 per g.)				
Glycerol, C. P., . G.1.25p				
Glycogen, C. P. (3.75 per g.)	30.00			
Grape Sugar (*See Glucose*)				
d-Gulonic Acid Lactone, C. P.	9.00			
a-d-Guloheptose, C. P.	40.00			
Hystamine (Ergamine Acid Phosphate). ($8.50 per g.)				
Histidine Dichloride, C. P. ($5.00 per g.)	45.00	105.00	400.00	
Inositol, C. P. (Inosite)	12.50	25.00		
Inulin, C. P.	2.00	4.10	15.00	49.50
Inulin, Pure			2.00	9.25
Invert Sugar, Pure			.30	1.10
Lactoglucose (*See* Galactose)				
Lactose, C. P. (hydrate)		.25	.60	2.00
Lactose, Pure, (*Ask for special price in bbl.*)				.75
Lactose Octacetate, C. P.	10.00			
Lactositol, C. P. (Lactosite)	1.00			
Leucine, C. P.	10.00	24.50	95.00	
iso-Leucine (*in research*)				

	10 g.	25 g.	100 g.	500 g.
d-Levulose from Invert Sugar, C. P.	1.25	2.70	10.00	33.00
d-Levulose from Inulin, C. P.	2.90	6.10	23.00	88.00
Levulose, Pure (*crystal*)			5.00	20.00
Levulose, 90%, (*crystal*)			1.00	4.25
Levulose for Diabetics (*crystal*)			1.10	4.50
Levulose, Syrupy			2.25	8.25
Lysine Picrate, C. P. ($5.00 per g.)	45.00	105.00	400.00	
d-Lyxose, C. P. ($4.00 per g.)				
Maltobiose (*See Maltose*)				
Maltose, C. P. (hydrate)	.50	1.15	3.75	15.40
Maltose, Technical				1.90
d-Mannitol, C. P. (Mannite)	.35	.70	2.25	8.25
d-Mannitol, Special for Fertilizer Analysis.			1.50	6.00
Mannitol, Pure (Mannite)				4.50
a-d-Mannoheptitol (*See perseitol*)				
a-d-Mannoheptonic Lactone, C. P.	15.00			
a-d-Mannoheptose, C. P.	30.00			
d-Mannoketoheptose (*in research*)				
d-Mannose, C. P.	3.60	8.75	34.00	132.00
Melezitose, C. P.	2.00		17.00	80.00
Melezitose (Glucose free) (.90 per g.)				
Melibiose, C. P. (*in research*)				
Melitose (*See Raffinose*)				
Methyl Rhamnoside, C. P.	10.00			
Nutrose, Pure (*Sodium Caseinate*)			4.00	19.00
Pectin Sugar (*See Arabinose*)				
Pectinose (*See Arabinose*)				
Perseitol, C. P. (*a-d*-Mannoheptitol)	8.00			
Phenylalanine, C. P. (*racemic*)	10.00	24.00	90.00	
Quercitol (Quercite, Acorn Sugar) (*in research*)				
Raffinose, C. P. (*hydrate*)	5.00	11.50	44.00	165.00
Rhamnose, C. P. (*hydrate*)	3.00	7.20	28.00	110.00
d-Ribose, C. P. (*provisional*—price approximately $28.00 per g.)				
Saccharose (*see* Sucrose)				
Salicin, Highest Purity		.70	2.50	8.75
Starch Soluble (*improved Lintner method*) free from *erythrodextrin*			1.00	3.85

	10 g	25 g.	100 g.	500 g.
d-Sorbitol, C. P. (Sorbite)	10.00	22.50	75.00	
Sucrose, C. P. (Saccharose)		.25	.60	1.50
Trehalose, C. P.	10.00	22.50	75.00	250.00
Tryptophan, C. P. ($7.00 per g.)	65.00	150.00	500.00	
Tyrosine, C. P.	10.00	22.50	80.00	
d-Xylose, C. P. (*designated l Xylose by Fischer*)	2.50	6.00	22.50	99.00

Carried in stock by the leading distributors

CLASSIFICATION OF STEREO-ISOMERS.

ACIDS

0. *Oxalic.*
1.-1, *Tartronic*
2.-2. *Meso-Tartaric*
3, *Tartaric*
4,-4. *Ribo-Trioxy-Glutaric.*
5,-7. *Trioxy-Glutaric. [Active]*
6,-6. *Xylo-Trioxy-Glutaric.*
7.-5, *=5, 7.*
8,-8. *Allo-Mucic.*
9,-15. *Talo-Mucic.*
10,-12. *+Saccharic.*
11. *Manno Saccharic.*
12,-10. *— Saccharic.*
13. *Ido-Saccharic.*
14,-14. *Mucic.*
15,-9. *=9, 15.*

ALCOHOLS:

0. *Ethylene-Glycol.*
1,-1. *Glycerin·*
2,-2. *Meso-Erythrite.*
3. *Erythrite.*
4,-4. *Adonite.*
5,-7. *Arabite.*
6,-6. *Xylite.*
7, 5. *= 5, 7.*
8,-8. *—*
9,-15. *Talite.*
10,-12. *Sorbite [—]*
11 *Mannite,*
12,-10. *Sorbite[+]*
13. *Idite.*
14,-14. *Dulcite*
15, 9. *=9, 15*

SUGARS:

0. *Glycolose; Dioxy-Acetone.*
1. *Glycerose; Erythrulose.*
2. *Erythrose; Arabo-Ketose.*
3. *Threose; Xylo-Ketose*
4. *Ribose*
5. *Arabinose; Fructose*
6. *Xylose; Sorbinose.*
7. *Lyxose; Tagatose.*
8. *Allose*
9. *Altrose*
10. *Glucose*
11. *Mannose*
12. *Gulose*
13. *Idose*
14. *Galactose*
15. *Talose*

Pfanstiehl Laboratory Reagents

Pfanstiehl Chemicals, the Standard for Research

In the last few years there has sprung up in America a rare chemical industry. This fact is interestingly observed in the catalogues of the leading distributors. No catalogue without a list of PFANSTIEHL RESEARCH CHEMICALS is now complete.

As with PFANSTIEHL SUGARS and PFANSTIEHL AMINO ACIDS, so with PFANSTIEHL ANALYZED RESEARCH CHEMICALS we set a standard guaranteed to equal or surpass the highest published at home or abroad. "C. P. PFANSTIEHL" upon the label is the designation of highest integrity.

It is our ideal, that to be of real service with chemicals of the highest degree of purity, will eventually bring its own reward. We are therefore building for the future with fair and reasonable prices. The Special Chemicals Company pledges itself to special service, special quality and fair prices.

Containers are included in the prices quoted.

In 5 lb. bottles, price 5 cents less per lb.

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	25 g.	1 oz.	1 lb.
Acetamide		.35	4.55
Acetic Anhydride (highest purity)			1.20
Acetone, C. P.			.60
Acetonitrile (tech.)	2.10	2.30	23.00
Acetophenone	1.40		15.00
Acid, Acetic Glacial, C. P. (99½%)			$0.80
Acid, Acetic, 99.5% (glacial), C. P. ($0.27 in 5 lb. lots, $0.25 in returnable carboys)			.38
Acid, Aminobenzoic		2.25	
Acid, Anthranilic (refined)	.50		5.00
Acid, Boric, C. P. (*crystal*)			.65
Acid, Bromic, Sp. G 1. 12		.75	2.50
Acid, *n*-Butyric (tech., abs.)		.42	4.20
Acid, *n*-Caproic (purified)		1.80	18.00
Acid, Cinnamic	.75		8.00
Acid, Citric, C. P. (crystals)			1.35
Acid, Formic, 85-90%			1.25
Acid, Fuchsin S. (*bacteriological*)	1.30		
Acid H			3.25
Acid, Hippuric C. P.	2.70	3.00	
Acid, Lauric	5.25		
Acid Maleic		.50	3.00
Acid, *l*-Malic (active)		3.00	36.00
Acid Malic, Highest Purity (inactive)		.50	3.00

	25 g.	1 oz.	1 lb.
Acid, Malonic	2.95	3.25	
Acid, Molybdic, C. P. (85%)			4.00
Acid, Molybdic Anhydride, C. P. *(ammonia free)*			5.00
Acid, Monochloracetic, Cryst.		.25	1.25
Acid, Mucic	1.20		12.50
Acid, *p*-Nitrobenzoic		.75	7.50
Acid, Nucleic from Yeast		2.90	35.00
Acid, Osmic ($4.25 per g.)			
Acid, Oxalic, C. P. *(crystal)*			1.25
Acid, Perchloric, C. P. (50%)			3.00
Acid, Phosphoric, C. P. (85%) *(Sp. G. 1.71)*			1.15
Acid Phosphotungstic, C. P.		.85	10.00
Acid, Rosolic C. P.		.85	10.00
Acid, *d*-Tartaric, C. P.			1.10
Acid, Uric, C. P.	1.30	1.45	14.50
Acid, *n*-Valeric			7.00
Acriflavine		8.00	90.00
Aesculin, Highest Purity (5.00 per 10 g.)	12.00		
Aldol	.75		10.00
Alizarine Paste (20%)	.50		
Aluminum Chloride, C. P.			2.00
Amidoazobenzol, C. P.	1.00		
Amidoazotoluene, C. P.	1.00		
Ammonia Water, C. P. (27-29% NH_3)			.70
Ammonium Acetate, C. P.			1.15
Ammonium Carbonate, C. P.			.70
Ammonium Chloride C. P., granular (ask for special price in bulk)			.65
Ammonium Chloride, 99%, fine, white (bulk)			.17
Ammonium Molybdate, C. P.			4.05
Ammonium Nitrate, C. P.			.90
Ammonium Persulphate, Pure			1.25
Ammonium Thiocyanate, C. P. (Ammonium Sulpho-cyanide)		.24	1.45
Ammonium Valerate			7.00
Amygdalin, Highest Purity		2.40	28.50
Amyl Acetate, C. P.			3.25
Amyl Alcohol (refined)			2.15
Amyl Butyrate			2.80
Amyl Formate			2.85
Amyl Nitrite, C. P.		1.75	
***iso*-Amyl Propionate**			4.00
Amyl Valeriate			7.00
Amylene		1.50	15.00
Aniline (oil) C. P.,		.25	1.50
Anisaldehyde (Aubepine)	1.25		16.00
Anthraquinone (sublimed) 98-100%.			6.00

	25 g.	1 oz.	1 lb.
Antiformin		.20	.70
Arsenic Metal 99%			.75
Asparagin, Pure (Amino-succinamic Acid)		1.95	24.00
Azobenzene	2.25		
Balsam, Canada (Natural, filtered)	.36	.40	3.30
Barium Chloride, C. P.			.75
Barley Flour			.90
Benzaldehyde, Pure	.35		3.50
Benzene, Monochloro (redistilled)			.75
Benzidine, C. P.	.90	1.00	9.00
Benzene, Paradichloro (redistilled)			3.00
Benzidine Sulphate, C. P.			6.25
Benzil, C. P.		2.25	22.50
***a*-Benzil Dioxime**			9.00
Benzophenone (Dichloride free)	3.50		
Benzoyl Chloride (redistilled)		.75	6.25
Benzyl Acetate	.65		7.00
Benzyl Alcohol			4.50
Benzyl Butyrate	1.35		15.00
Benzyl Chloride (redistilled)			1.90
Benzyl Cinnamate	2.00		22.50
Benzyl Ethyl Aniline, C. P.		1.00	10.00
Benzyl Formate	1.75		19.00
Benzyl *iso*-Valerate	2.25		25.00
Benzyl Valerate	2.25		25.00
Beryllium Nitrate, C. P. (basic)		2.20	22.00
Beryllium Nitrate, Pure		2.00	20.00
Bornyl Acetate	1.50		16.00
Bromobenzol			2.50
Bromostyrene	1.65		17.00
***iso*-Butyl Acetate**			3.00
-Butyl Alcohol (refined)			2.10
***iso*-Butyl Butyrate**			6.00
***n*-Butyl Cyanide** (*n*-Valeronitrile)	1.50		
***iso*-Butyl Formate**			3.00
Butyl Nitrite		1.00	
***iso*-Butyl Propionate**			4.50
***iso*-Butyl *iso*-Valerate**			15.50
Cadmium Nitrate, C. P.			2.00
Caesium Chloride, Pure	12.00		
Caesium Nitrate		6.50	65.00
Calcium Caseinate, Soluble		1.00	10.00
Calcium Chloride, C. P. (*crystal*)			.65
Calcium Metal			10.00
***iso*-Caproic Ester**		3.50	40.00
Capryl Alcohol			12.00
Carbon Disulphide, C. P.			1.00
Carbon Tetrachloride (99.7%)			.75
Casein, C. P.		.30	3.00
Casein (tech.)			.45

	25 g.	1 oz.	1 lb.
Catechol	1.25		
Cedarwood Oil (for immersion of objectives. Refractive Index 1.515 at 18° C.)			4.75
Cerium Nitrate, C. P.			8.50
Cerium Sulfate, C. P.	2.25	2.50	25.00
Chloracetamide	.80	.85	10.00
Cholesterol, C. P. (1.75 for 10 g)	4.00	4.50	55.00
Cinnamaldehyde	.90		10.00
Cinnamyl Alcohol	3.50		36.00
Cinnamyl Butyrate	2.50		26.00
Cinnamyl Propionate	8.50		
Citronellal	.50		6.00
Citronellyl Acetate	4.50		
Congo Red	.25		3.00
Copper Acetate, C. P.			1.50
Copper Lactate, C. P.		1.00	12.00
Copper Metal (turnings)			.75
Copper Sulphate, C. P. (*crystal*)			1.00
Creatine, C. P. (35.00 per 10 g.)			
Creatine, C. P. (4.50 per g., 38.00 per 10 g.)			
Creatine Zinc Chloride, C. P. (30.00 per 10 g.)			
Cuminic Aldehyde	5.00		
Cupferron, (Ammonium nitroso-*b*-phenylhydroxylamine)		2.50	25.00
Cyclocitrylidyl Alcohol	18.00		
Cyclocitrylidyl Ester	14.00		
Decolorizing Carbon (Pfanstiehl)			.80
Decyl Alcohol	20.00		
Decyl Aldehyde	22.00		
Dextrine precipitated by alcohol		.35	3.50
Diethyl Oxalate	1.00		
Diethyl Phthalate			3.60
Diethyl Sulphate, Pure (Ethyl Sulphate)		.30	3.00
Diethylamine		1.30	16.00
Diethyl Aniline, C. P.			3.75
***b*-Diethylaminoethyl Alcohol**		2.00	29.00
Diethylmalonic Ester		1.00	11.00
Dimethylamine Hydrochloride	1.75		
Dimethylaminobenzaldehyde, para, (highest purity) (2.50 per 10 g.)	5.40	6.00	
Dimethyl Aniline			3.00
Dimethyl Anthranilate	2.70		28.00
Dimethylglyoxime, C. P.		3.00	39.00
Dimethyl Phthalate	.45		4.50
Dinitrobenzene, Refined	.50		5.50
Diphenylamine, Base	.60		
Diphenylcarbamine Chloride	1.25		

	25 g.	1 oz.	1 lb.
Dysprosium Oxalate...(19.00 per g.)			
Edestine, Highest Purity		4.00	
Erbium (Neo-erbium) Oxalate .....(19.00 per g.)			
Ether, Oenanthic (Oil of Cognac)...		.35	4.00
Ether, Pelargonic		6.50	76.00
Ethyl Acetate (anhydrous) C.P. (99.7 — 100%).....			.75
Ethyl Acetoacetate (refined).....			7.50
Ethyl Anthranilate	2.65		28.00
Ethyl Benzyl Aniline..... (see Benzyl Ethyl Aniline)			
Ethyl Benzoate			2.75
Ethyl Bromide, C.P......			1.95
Ethyl *n*-Butyrate			2.80
Ethyl Carbonate			3.50
Ethyl Cinnamate	2.40		25.00
Ethyl Formate		.30	2.10
Ethyl Lactate			4.50
Ethyl Laurate	2.00		
Ethyl Methyl Ketone (tech.).....			
Ethyl Oxalate			2.50
Ethyl Phthalate (Diethyl Phthalate)			3.60
Ethyl Propionate (Ask for Special Price in drums)		.50	4.00
Ethyl Salicylate			3.00
Ethyl Sulphate (See Diethyl Sulphate)			
Ethyl Valeriate			7.50
Ethyl *iso*-Valerate			15.00
Ethylene Bromide, C. P......			4.00
Ethylene Dichloride			5.00
Ethylene Glycol	1.40		15.00
Ethylene Oxide (tech.).....			14.00
***iso*-Eugenol**	1.75		18.00
Eugenol Benzoate	4.00		
***iso*-Eugenol Benzoate**.....	3.75		
***iso*-Eugenol Ethyl Ether**.....	4.75		
Eugenol Methyl Ether.....	3.00		
***iso*-Eugenol Methyl Ether**.....	4.75		
Europium Oxalate (Price on request)			
Fuchsin (basic for bacteriology)....	1.25		
Furfural, C. P.		.45	4.00
Furfural, Technical (special price in 100 lb. lots).....			.95
Gadolinium Acetate, C. P......		35.00	
Gadolinium Chloride, C. P......		35.00	
Gadolinium Nitrate, C. P......		35.00	
Gadolinium Oxalate	5.40	6.00	60.00
Galactonic Lactone, C.P., (prepared for treating root canals) 5 g. vial $5.00; 10 g. vial $9.50.....			

	25 g.	1 oz.	1 lb.
Gelatin (for culture media) in sheet form			2.50
Gentian Violet	1.60		
Geraniol	.85		9.00
Geranyl Acetate	1.30		14.00
Geranyl Butyrate	2.75		
Geranyl Formate	2.75		
Geranyl Propionate	3.00		
Germanium Dioxide (15.00 per g.)			
Germanium Oxide (16.00 per g.)			
Glycine Ester Hydrochloride	3.00		
Glycerine, C. P.			.90
Glycerol Dichlorohydrin	1.25		
Glycerol Monochlorohydrin	.75		
Haemoglobin		2.25	
Hematoxylin		5.25	
Heptaldehyde (Oenanthol)		1.35	16.00
***n*-Heptyl Alcohol**		17.50	200.00
***n*-Hexyl Alcohol** (in research)			
Hydroxylamine Hydrochloride, Pure		1.45	17.40
Hydroxylamine Sulphate, C. P.		3.00	30.00
Iodine (highest purity)			5.75
Ionone	3.00		
Isatin, C. P. (.90 per g.)			
Lacmoid	2.00		
Lanthanum Ammonium Nitrate		7.50	75.00
Lecithin ($1.50 per 10 g.)	2.70	3.00	
Limonene	1.75		19.00
Linalool	1.00		10.00
Linalyl Acetate	1.25		13.50
Linalyl Butyrate	3.00		
Linalyl Cinnamate	3.50		
Linalyl Formate		2.00	24.00
Linalyl Valerate	4.50		
Litmus, Pure	.35	.40	3.25
Lutecium Oxalate (tech) (24.00 per g.)			
Magnesium Chloride, C. P.			1.00
Magnesium Shavings for Grignard Reaction		.40	4.00
Magnesium Sulphate, C. P.			.75
Malonic Ester		.75	7.50
Manganese Chloride, C. P.			1.25
Manganese Sulphate, C. P.			1.30
Manna Flakes			1.20
Mercuric Thiocyanate, tech			3.25
Mercury Bichloride, C. P.			3.00
Methyl Acetate, C. P.			1.60
Methyl Alcohol (absolute)—acetone free			1.20
Methylamine Hydrochloride	1.25		
Methyl Anthranilate	2.15		22.50

	25 g.	1 oz.	1 lb.
Methyl Benzoate			3.90
Methyl Formate			2.00
***d*-Methyl Guanidine**	4.00		
Methyl Iodide, C. P.		1.00	12.00
Molybdenum Metal, C.P. (powder)		1.95	19.50
Molybdenum Metal, 95%		1.00	10.00
Monoethylaniline	.65		6.00
***a*-Naphthol** (refined)		.35	3.50
***a*-Naphthylamine** (base)	1.00		
***a*-Naphthylamine Hydrochloride**	.95		
Neodymium Oxalate (tech.)		8.50	85.00
Nerol	11.00		
Neryl Acetate	12.00		
Ninhydrin (1/10 g. 1.20)			
Nitraniline, meta	.65		
Nitraniline, para	.50		
Nitro-acetanilid, para		1.35	13.50
Nitrobenzoyl Chloride	1.95		
Nitromethane	2.00		
Nitron (1 g. .75)	7.50		
Nitroso-Beta-Napthol		.75	9.00
Nitroso R. Salt for detecting Cobalt.		2.00	
Nonyl Alcohol	30.00		
Nonyl Aldehyde	50.00		
Norit A (Special price for 10 lb., 100 lbs., etc.			.80
Nutrose		1.75	17.10
Oenanthol (see Heptaldehyde)			
Orcinol (Orcin)	12.00		
Phellandrine		15.00	
Phenolsulphone Phthalein (bacteriological) (2.00 per g.)			
Phenolsulfonephthalein (Bacteriological) (3.00 per g.)			
Phenylacetaldehyde	3.25		33.00
Phenylenediamine, para	1.75		
Phenylethyl Acetate	2.85		30.00
Phenylethyl Alcohol	2.75		28.00
Phenylglycol Acetal	10.50		
Phenylglycol Valerate	12.00		
Phenylhydrazine Acetate, C. P.	1.22	1.35	16.00
Phenylhydrazine (base) **C. P.**	.90	1.00	13.25
Phenylhydrazine Hydrochloride, C. P.	.95	1.00	13.50
Phloroglucinol, C. P. (3.00 per 10 g.)	5.40	6.00	78.00
Phloroglucinol Solution		2.00	20.00
Phthalic Anhydride, C. P.			1.50
Phthalimide			2.25
Platinum Chloride Platinic chloride) (2.75 per g.; 25.00 for 10 g.) (subject to market).			

	25 g.	1 oz.	1 lb.
Potassium Acetate, C. P.			1.50
Potassium Bisulphate, C. P.			1.60
Potassium Bromide, C. P.			1.00
Potassium Carbonate, C. P.			.90
Potassium Chlorate, C. P.			.90
Potassium Chloride, C.P.			.65
Potassium Cyanide, C. P.			9.75
Potassium Cynate, Pure		.70	8.00
Potassium Cynade, Highest Purity			4.00
Potassium Dichromate, C. P.			1.00
Potassium Ferricyanide, C. P.			2.75
Potassium Hydroxide, C. P. (*sticks*)			2.00
Potassium Iodide, C. P.		.50	5.25
Potassium, Metallic		1.50	
Potassium Nitrate, C. P. (*crystal*)			1.25
Potassium Permanganate, C.P.			.90
Potassium Persulphate, C. P.			2.50
Potassium-Phosphate, Monobasic, C. P. (Anhydrous)			8.00
Potassium-Sodium Tartrate, C.P. (Rochelle Salt)			1.00
Potassium Sulphate, C. P.			.75
Potassium Thiocyanate, C.P. (Potassium Sulphocyanide)			1.75
Potassium Thiocyanate, Pure			1.00
Praseodymium Sulphate (3.00 per g.)			
Primuline	.75		
Proflavine		9.00	95.00
***iso*-Propyl Alcohol** (99-100%)			1.00
***n*-Propyl Acetate**			3.00
***n*-Propyl Alcohol** (refined)			2.10
***n*-Propyl *n*-Butyrate**			6.00
***n*-Propyl Propionate**			5.00
***n*-Propyl *iso*-Valerate**			15.00
Propylene Dichloride			3.20
Propylene Glycol			5.00
Pyridine, Technical			2.75
Quinoline, Highest Purity			13.50
Resorcinol, C. P.			4.50
Rhodinol	5.00		
Rhodinyl Acetate	5.50		
Salicin, Highest Purity		.75	8.00
Samarium Sulphate (3.00 per g.)		30.00	
Sarcosine (Methylamino Acetic Acid) (1.75 per g.)			
Selenium Oxychloride			5.25
Silver Nitrate, C. P. (*subject to market*)		.80	
Skatol ($12.50 per 10 g.)			
Sodium Bicarbonate, C. P.			.50
Sodium Borate, C. P.			1.25

	25 g.	1 oz.	1 lb.
Sodium Carbonate, C. P. (anhydrous)			.75
Sodium Chloride, C. P.			.60
Sodium Formate (*dry*)			1.50
Sodium Methylate (prepared for treating root canals)	1.00		3.50
Sodium, Metallic, 99%		.45	1.10
In 10 lb. sealed cans ($0.75 per lb.)			
Sodium Nitrite, C. P.			.75
Sodium Oxalate C. P.			2.50
Sodium Persulphate, Pure			1.80
Sodium Phenylhydrazine Sulfonate	2.00		
Sodium Phosphate, Monobasic, C. P.			.95
Sodium Thiocyanate, Pure (Sodium sulfocyanide) (*cryst.*)			1.15
Sodium Tungstate, C.P.		.30	1.80
Styryl Alcohol	9.50		
Styryl Acetate	9.50		
Styryl Propionate	12.00		
Tellurium Dioxide, C. P. (Tellurous anhydride)	5.00		
Tellurium Nitrate, Pure (basic)	4.25	4.75	45.00
Terbium Bromate (55.00 per g.)			
Terpinyl Acetate			4.50
Terpinyl Cinnamate	2.75		28.50
Terpinyl Propionate	3.50		36.00
Thiocarbanilide (Diphenylthiourea)			3.00
Thionyl Chloride	1.35	1.50	15.00
Thiophenol	3.00		
Thorium Nitrate, C. P.		.75	8.00
Thulium Oxalate (90.00 per g.)			
Thymol		.68	8.65
Titanium Oxide, C. P.			2.50
Trimethylamine (30% in alcohol)	2.00		
Trimethylamine Hydrochloride	.75		
Trimethylene Chlorohydrin	1.75		
Trypsin		1.50	15.00
Uranium Nitrate, C.P. (Sodium free)		.40	4.00
Urea, crystals		.25	1.75
Urea Hydrochloride, Pure	1.00		
n*-Valeronitrile** (n*-Butyl Cyanide**)	1.50		
Ytterbium Oxalate (30.00 per g.)			
Yttrium Oxalate (8.50 per g.)			
Zinc Iodide, Pure	.50		5.00
cine)			
Zinc, Metallic, C. P. (*gran.*) (*Free of Arsenic*)			.85
Zirconium Nitrate, C. P.		3.00	25.00
Zirconium Oxide, C. P.	2.25	2.50	20.00
Zirconium Oxide, 99%	.45	.50	5.00

Prices subject to change without notice.

Standard Solutions and Reagents For Blood Chemistry

Pfanstiehl Chemicals, the Standard for Research

The following are now supplied for the Folin blood methods, the Benedict methods and the Myers, Farmer and Gradwohl modifications. See Myers' "Practical Chemical Analysis of Blood" (C. V. Mosby Co., 1921), and Gradwohl's "The Newer Methods of Blood and Urine Chemistry (C. V. Mosby Co., 1920). Several of the reagents listed by Myers appear on preceding list.

	4 oz.	1 lb.
Acetic Anhydride (highest purity)	.50	1.20
Acid Picramic, C.P.	6.00	
Acid Picramic, Standard Solution	.75	2.50
Ammoniacal Silver Magnesium Solution (Benedict's)	.75	2.00
Benedict's Qualitative Solution	.60	1.75
Benedict's Volumetric Solution	.75	2.50
Colloidal Iron (5% Solution)	.35	1.00
Creatinine Standard Solution (1cc contains 1 mlg.)	1.75	5.00
Glucose Standard Solution (for sugar in normal urine)	.50	1.50
Glucose Standard Solution (for blood sugar)	1.25	3.00
Napthol Green B (10 g. 2.50; 25 g. 5.00)		
Nessler's Solution		2.50
Nitrogen Solution Standard	1.50	3.50
Picric Acid, Crystals, 10% moisture	.75	2.00
Picric Acid, Half Saturated Solution	.65	1.50
Picric Acid, Saturated Solution	.70	1.75
Silver Lactate Solution in Lactic Acid	1.25	3.00
Sodium Hydroxide, 10% Solution	.60	1.75
Sodium Picrate in Picric Acid	1.50	3.50
Sodium Hydroxide, 20% Solution	.60	1.75
Sodium Tungstate, 10% Solution	1.50	3.50
Sulphuric Acid, $\frac{2}{3}$N	.60	1.75
Uric Acid Reagent (solution)	1.50	3.50
Uric Acid, Standard (solution) (Benedict's)	1.50	3.50
Uric Acid, Standard (solution) (Folin and Wu's)	1.50	3.50

Prices subject to change without notice.

The Standard of Pfanstiehl

FOR the convenience of our patrons, many of whom have inquired for copies of it, we reprint here the article on tbe standardization of the rare sugars from "The Journal of Industrial and Engineering Chemistry," Vol. 13, No. 8, August, 1921, p. 685.

The Rare Sugars: Their Purity and Tests[1]

By Carl Pfanstiehl and Robert S. Black
Special Chemicals Co,, Highland Park, Illinois

Since the chief use[2] of the rare sugars at present is for differentiating microörganisms by means of fermentation reactions, the matter of developing standards and tests is a vital one to the bacteriologist. The microörganisms which it is desired to identify or differentiate either refuse to ferment or do ferment a special sugar, sometimes with the added indication of gas formed. Manifestly the presence of foreign sugars, the hindering actions of organic or inorganic impurities, certain pH concentrations, etc., are of the utmost significance to the scientist. While the development of standards and tests involves a long and arduous investigation requiring some years for its definitive completion, it is to be hoped that this attempt to formulate the requirements will assist others materially. Even this preliminary recommendation would not have been possible were it not for the helpful coöperation of many investigators in various research institutions whose interest has reflected the importance of this field of investigation.

In the first place, the standards for the sugars cannot be judged by the standards of reagent chemicals. For example, there is no chemical means which will detect 0.05 per cent of glucose in lactose (whose similar rotations, +52.5°, make it impossible for the polariscope to be of assistance), whereas *B. typhosus* will give this indication by a fermentation reaction. In fact, in differentiating the rare sugars, chemical method often has to give way to the delicacy of the polariscope or the selective action of yeasts and bacteria. Hence the tests for the purity of the rare sugars involve an extended and more difficult technique.

[1] Presented before the Section of Sugar Chemistry and Technology at the 61st Meeting of the American Chemical Society, Rochester, N. Y., April 26 to 29, 1921.

[2] The use and possibilities of the sugars are described by Edmund H. Eitel, THIS JOURNAL, 12 (1920), 1202.

It is difficult to come to the practical conclusion of when a sugar is pure enough. Manifestly, since repeated purifications are costly, the standard should be no more exacting than the bacteriologist requires, and yet in the present state of the bacteriologist's knowledge he is scarcely ready to state that any particular limits of impurities are admissible. Nevertheless, certain standards are gradually being evolved, and it has been our aim to develop these toward a goal similar to Murray's "Standards and Tests for Reagent Chemicals." While the bacteriologists themselves must decide what shall finally be required, those who manufacture the sugars can contribute information as to certain very high standards which are readily attainable through careful manufacture. In order for the manufacturer to produce sugars of the required purity for reliable bacteriological results, he must work side by side with the bacteriologist and ever strive to meet the severest demands of the scientist's minute and fastidious "bugs." It is even believed that some of these organisms, the filterable viruses, may be not much larger than the molecule of sugar and may seriously consider the actual shape of the molecule in their decision as to whether or not they shall use it.

FREEDOM FROM OTHER CARBOHYDRATES—To begin with, the most important requisite of purity is naturally that the specific sugar be free from all other carbohydrates. The carbohydrates which may potentially be present should be known. The well-known chemical means for detecting foreign sugars present in a nonreducing sugar is Fehling solution. By this means nonreducing carbohydrates, such as the sugar alcohols and starches, can readily be shown free from, or contaminated with, reducing sugars. (Here it may be well to add the caution that Fehling solution, when boiled for a sufficient time with either sucrose or inulin, will hydrolyze it and indicate reducing sugars when none were originally present.) This chemical method is very evidently limited in its application. The most important means of detecting foreign sugars is the polariscope. If their presence is not detectable by rotation, we must turn to fermentation reactions. With the variable-sensibility polariscope, the use and accuracy of this instrument has been greatly extended, eliminating dependence on certain fermentation reactions formerly necessary.

HEAVY METALS—The test for heavy metals is important, since certain heavy metals will inhibit the action of certain bacteria. It is interesting to note here that distilled water drawn through a copper faucet has been known to inhibit the growth of certain organisms.

ALUMINIUM AND CALCIUM—Aluminium and certain calcium compounds will cloud the solution, upon whose clarity and brilliance the bacteriologist depends in making observations. The intensity of turbidity is an index to the amount of growth.

H-ION CONCENTRATION—The pH concentration is important within limits, since alkali destroys or transforms the carbohydrate or transforms it to another by molecular rearrangement, and 0.1 per cent of a free mineral acid will kill bacteria, a smaller per cent of course retarding their growth.

CHLORIDES AND SULFATES—Chlorides and sulfates, the bacteriologists believe, may be present in small amounts without deleterious effect upon fermentation reactions, but a high standard is recommended. A high standard offers greater accuracy for calculation and analysis, and at this stage of knowledge it is better to maintain the highest possible standard in every particular. For example, neutral salts, which will not interfere with growth of bacteria, are objectionable since they will cause disaccharides to be hydrolyzed when the solution is sterilized. Ash usually indicates sulfates, chlorides, calcium, aluminium, or heavy metals, or nonvolatile impurities, and must be kept extremely low.

MOISTURE—While moisture is not harmful in itself, it is practicable, from the manufacturing point of view, to keep this to a small fraction of 1 per cent. The low moisture content makes for accuracy in calculation and rotation and in the preparation of the sugar solutions by the bacteriologist. It is well known that certain sugars will deteriorate if moisture is present.

COLOR—The color of the sugars will be pure white unless foreign matter is present to an objectionable degree. Organic coloring matter interferes with the brilliancy of the solution and the detection of delicate color reactions.

MELTING POINTS—The melting points of the sugars are not to be relied upon as a test of purity, except in the case of the sugar alcohols.

GENERAL TESTS FOR PURITY APPLICABLE TO ALL SUGARS

The general tests suggested for all the sugars, based on continuous experience, will first be given, and then the specific data for the sugars in order, as rotation, other sugars liable to be present, etc.

HEAVY METALS—Dissolve 1 g. in 20 cc. of distilled water. hould not give a precipitate or change color with hydrogen ulfide solution.

CALCIUM AND ALUMINIUM—Make a 10 per cent solution faintly ammoniacal, add a few cc. of ammonium oxalate solution. No precipitate should form.

SULFATES—Dissolve 1 g. in 10 cc. of distilled water, add a

drop or two of hydrochloric acid, followed by a few cc. of barium chloride solution. No turbidity.

CHLORIDES—Dissolve 1 g. in 10 cc. of distilled water, acidify with nitric acid, followed by silver nitrate. At most a faint opalescence.

ACIDITY—Dissolve in distilled water. Should be neutral to methyl red.

ALCOHOL—Dissolve 1 g. in 5 cc. of distilled water, add 1 cc. of potassium hydroxide solution, and 1 cc. iodine test solution, warm to 60°. Should give no more iodoform than a blank.

A positive reaction does not prove the presence of ethyl alcohol, since many other compounds such as acetone, aldehydes, and the propyl and butyl alcohols, also give it. The determination and identification of small amounts of alcohol have been studied by Bacon[1] with special reference to its application in demonstrating alcoholic fermentation in food products. The weak alcoholic solution is three-fourths saturated with sodium chloride, and distilled. The saturation and distillation are repeated and the alcohol is then determined by refractometer or density method. Bacon recovered 96 per cent of a 0.100 per cent solution.

ASH—(Given under the specific carbohydrates following. Should be as low as practicable.)

MOISTURE—(Same as with ash.)

SOLUBILITY—All the carbohydrates except the starches should be completely soluble in water and give a perfectly clear and brilliant solution. The starches, inulin and glycogen, should be completely soluble in an excess of hot water.

ROTATION—A caution must be observed with sugars which contain free aldehyde or ketone groups, since the phenomenon of mutarotation is observed with them. Time must be given for rotation to become constant.

Specific Tests

l-ARABINOSE:

Aldopentose, $C_5H_{10}O_5$

Specific rotation $[\alpha]_D^{20}$	+ 104.6° (9.73 g. per 100 cc.)
Ash	0.10 per cent
Moisture	0.10 per cent

Free from glucose: Determined by accurate rotation

DULCITOL:

Hexahydric alcohol, $C_6H_{14}O_6$

M. p.	188°
Ash	0.05 per cent
Moisture	0.10 per cent

Free from reducing sugars: Test with Fehling solution

ERYTHRITOL:

Tetrahydric alcohol, $C_4H_{10}O$

M. p.	126°
Ash	0.10 per cent
Moisture	0.10 per cent

Free from reducing sugars

d-GALACTOSE:

Aldohexose, $C_6H_{12}O_6$	
Specific rotation $[\alpha]_D^{20}$	+ 80.3° (10.000 g. per 100 cc.)
Ash	0.05 per cent
Moisture	0.10 per cent

Free from glucose and lactose: Determined by accurate rotation

d-GLUCOSE (DEXTROSE) ANHYDROUS:

Aldohexose, $C_6H_{12}O_6$	
Specific rotation $[\alpha]_D^{20}$	+ 52.5° (9.097 g. per 100 cc.)
Ash	0.05 per cent
Moisture	0.10 per cent

Free from dextrin, maltose, etc.. Determined by accurate rotation. Free acid: A solution of 5 g. in 15 cc. of distilled water, mixed with 5 drops of phenolphthalein T. S., requires not more than 0.6 cc. of 0.1*N* potassium hydroxide V. S. to produce a pink color. (The use of *d*-glucose (dextrose) anhydrous for intravenous injection has made advisable the inclusion of this special test from U. S. P. IX.)

GLYCOGEN:

Polysaccharide, $6(C_6H_{10}O_5) + H_2O$, or multiple thereof	
Ash	0.10 per cent
Moisture	0.10 per cent

Free from reducing sugars

INOSITOL:

Hexoxyhexamethylene, $C_6H_6(OH)_6$	
M. p.	224°
Ash	0.10 per cent
Moisture	0.10 per cent

INULIN:[1]

Polysaccharide, $6(C_6H_{10}O_5) + H_2O$, or multiple thereof	
Specific rotation $[\alpha]_D^{20}$	—38° (Average)
Ash	0.10 per cent
Moisture	0.10 per cent

Free from levulose: Since inulin will hydrolyze to levulose with boiling, any reduction tests involving boiling or the use of strong alkalies, as in Fehling solution, is apt to be misleading. Alkalies or acid salts will hasten the hydrolysis. The inulin solution in media should not be sterilized in the Arnold, though a purely inulin solution may be sterilized in the autoclave if made up with distilled water. This inulin solution can then be added to the media with a sterilized pipet as required. The bacteriological test of inulin for purity is more sensitive than any chemical test. Inulin should show no acid or gas production with *B. paratyphosus B.* or *B. proteus.*

C. S. Mudge[2] has found that it is not so much a question of intensity of heat as it is the length of time which the carbohydrate is exposed to the heat. A 10 per cent solution of a sugar can be sterilized in the autoclave, if made up with distilled water, while it may not be possible to sterilize a 0.5 per cent solution of the same sugar, in media, in the Arnold. This is probably due to small traces of acids and also salts in the media. Whenever there is danger of hydrolysis, the media and a 10 per cent solution of the carbohydrate should be sterilized separately. The sugar can then be added to each tube with a sterilized pipet, 0.5 per cent or 1 per cent as required. The above technique should be used in testing the inulin.

Make up a 10 per cent solution of the inulin by pouring 50 cc. of boiling distilled water on 5 g. of inulin. Sterilize at 100° C. for 15 min.

Sugar-free broth (free from muscle sugar by fermentation with *B. coli*)

1 The standard here given is more particular than the standard of Killani. *Ann.*, 205 (1880), 147.

2 *J. Bact.* 2 (1917), 403.

must be used, titrated to pH 7.6. Add 0.5 cc. of a 0.02 per cent solution of phenol red (phenolsulfonephthalein and 0.5 cc. of a 0.02 per cent solution of bromocresol purple (dibromo-*o*-cresolsulfonephthalein). Pour into fermentation tubes and sterilize. Three cc. of the sterilized inulin solution are added to the broth in a sterile manner. Mix and inoculate with *B. paratyphoid B.* Examine tubes after 24 hrs., 48 hrs., and one week for

(1) Acidity as indicated by change in color of indicator. (H-ion concentration may be determined by the Clark and Lubs method.)

(2) Gas production. Uninoculated controls are to be kept at incubator temperature at same time.

Inulin free from reducing sugars should not show acid production and of course no gas. The rotation of inulin has not been accurately determined, different investigators reporting rotations varying in range 10°. A 10 per cent solution of high grade inulin made from dahlias should have a specific rotation of not less than —35°.

The production of reducing sugars in inulin by boiling seems to depend upon the condition of the original substance from which the inulin is taken. The inulin in dahlias dug in the fall begins immediately to change over into compounds analogous to the long series of dextrins intermediate between starch and glucose. On boiling, these compounds, or at least some of them, especially in the presence of salts from the juice and traces of organic acids found in the juice, will hydrolyze to levulose. Therefore, boiling inulin, especially with Fehling solution, can give reducing sugars. The only reliable method for testing the reducing sugar in inulin therefore is bacteriological.

LACTOSE:

Disaccharide, $C_{12}H_{22}O_{11}$

Specific rotation $[\alpha]_D^{20}$	+52.42° (2.000 g. per 100 cc.)
Ash	0.05 per cent
Moisture	0.15 per cent

Free from glucose: Detect by acid production (and if present in sufficient amount by gas production) with *B. typhosus* or *paratyphosus B. B. proteus* may be used in preference to the two foregoing as it is nonpathogenic and easy to obtain

Free from spores: Make a solution, sterilize under ordinary precautions, incubate 48 hrs. No bacterial growth should result

d-LEVULOSE:

Ketohexose, $C_6H_{12}O_6$

Specific rotation $[\alpha]_D^{20}$	— 92.3° (10.000 g. per 100 cc.)
Ash	0.10 per cent
Moisture	0.10 per cent

Free from glucose: Determine by accurate rotation. Levulose when made from inulin should be uncontaminated with glucose; when made from invert sugar, glucose is removed only with the greatest difficulty

MALTOSE (HYDRATE):

Disaccharide, $C_{12}H_{22}O_{11} + H_2O$

Specific rotation $[\alpha]_D^{20}$	+131° (26 g. per 100 cc.)
Ash	0.05 per cent
Moisture	0.15 per cent

Free from dextrin: Determine by accurate rotation. Free from glucose: Test with Barfoed's solution, which is not reduced to any extent by maltose

d-MANNITOL

Hexahydric alcohol, $C_6H_{14}O_6$

Specific rotation (with borax) $[\alpha]_D^{20}$	+22.5° (10 g mannitol + 12.8 borax per 100 cc.)
M. p.	166.5°
Ash	0.05 per cent
Moisture	0.10 per cent

Free from reducing sugars

d-MANNOSE:

Aldohexose, $C_6H_{12}O_6$

Specific rotation $[\alpha]_D^{20}$	+14.25° (10.000 g. per 100 cc.)
Ash	0.05 per cent
Moisture	0.10 per cent

PERSEITOL:

Heptahydric alcohol, $C_7H_{16}O_7$

Rotation (0.4 g. substance in 5 cc. saturated borax solution in a 1-dm. tube) $[\alpha]_D^{20}$	+ 0.39°
M. p.	188° C.
Ash	0.10 per cent
Moisture	0.10 per cent

RAFFINOSE (HYDRATE):

Trisaccharide, $C_{18}H_{32}O_{16} + 5H_2O$

Specific rotation $[\alpha]_D^{20}$	+104.5° (26.00 g. per 100 cc.)
Ash	0.10 per cent
Moisture	0.15 per cent

RHAMNOSE (HYDRATE):

Methyl pentose, $C_6H_{12}O_5 + H_2O$

Specific rotation $[\alpha]_D^{20}$	+8.37° (6.948 g. per 100 cc.)
Ash	0.05 per cent
Moisture	0.10 per cent

SORBITOL:

Hexahydric alcohol, $C_6H_{14}O_6$

M. p. (1 molecule H_2O)	55°
(0.5 molecule H_2O)	75°
(anhydrous)	110°
Ash	0.05 per cent
Moisture	0.15 per cent

Free from reducing sugars

SUCROSE:

Disaccharide, $C_{12}O_{22}O_{11}$

Specific rotation $[\alpha]_D^{20}$	+66.5° (4.275 g. per 100 cc.)
Ash	0.05 per cent
Moisture	0.05 per cent

Free from reducing sugars

XYLOSE.

Aldopentose, $C_5H_{10}O_5$ (called by Fischer *l*-xylose, more properly *d*-xylose.)

Specific rotation $[\alpha]_D^{20}$	+18.5° (10.239 g. per 100 cc.)
Ash	0.05 per cent
Moisture	0.10 per cent

Pfanstiehl Chemicals

The Standard for Research

"PFANSTIEHL *rare sugars and amino acids, to the development of which the Special Chemicals Company of Highland Park, Ill., has given special attention, are now used by investigators around the world, from China and Japan through every land in the new world to Ireland, England, Denmark, France, and now to Germany. Because of their purity they have become a world standard, and to America's credit it can now be said that another important contribution has been made to scientific accuracy and precision by means of materials of a new standard embodying the latest requirements of bacteriology." The Journal of Industrial and Engineering Chemisty, February,* 1922 (*Vol.* 14, *No.* 2).