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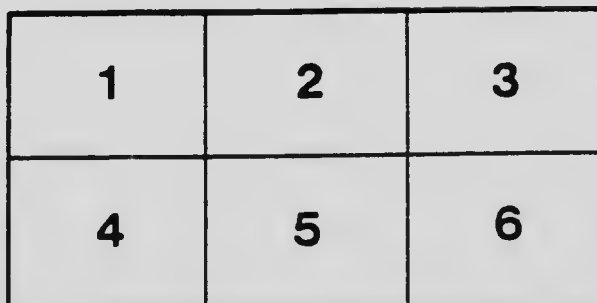
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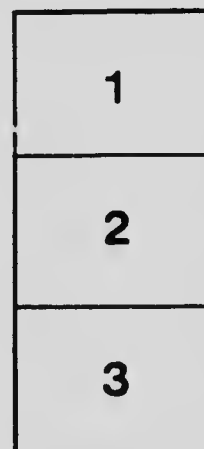
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LABORATORY

OF THE

INLAND REVENUE DEPARTMENT

OTTAWA, CANADA

BULLETIN No. 401

LIQUOR ARSENICALIS

NOTES AND COMMENTS

Under this heading, as occasion arises, the Bulletins issued by this Department will contain, as an appendix, such comment as may seem necessary or advisable upon matters relating to the work of the Department in connection with the administration of the Adulteration Act, the Fertilizers Act, the Feeding Stuffs Act or the Proprietary Medicines Act.

It frequently happens that correspondents ask information regarding the above Acts, of such a nature that the matter in question possesses general interest, and comment upon it would prove acceptable and useful to others than the immediate questioner. In such cases the reply may find a place in these columns. For convenience of reference these notes will be numbered in series.

A. MCGILL,
Chief Analyst.

LABORATORY
OF THE
INLAND REVENUE DEPARTMENT
OTTAWA, CANADA

BULLETIN No. 401

LIQUOR ARSENICALIS

OTTAWA, May 4, 1918.

J. U. VINCENT, Esq., K.C., B.A., L.Ph.,
Deputy Minister of Inland Revenue.

SIR,—I beg herewith to hand you a report upon ninety-one samples purchased by our inspectors throughout Canada as *Liquor Arsenicalis*, or *Fowler's Solution*, in October, November, and December of last year.

The last inspection of this drug, under the Adulteration Act, was made in 1909, and is reported in Bulletin No. 175 of this series. It dealt with seventy-five samples, which were judged by the standards for this article as defined by the British Pharmacopœia, edition of 1898.

The arsenic solution of the 1914 edition is essentially identical with that of 1898, and is of 1 per cent strength. No recognized variation from theoretical values was indicated in 1898, except in so far as this might be inferred from the fact that 25 cubic centimetres (mils) should discharge the colour of 50.8 to 50.9 cubic centimetres of deci-normal iodine. Theory requires 50.53 mils of the iodine solution, so that the instructions of this edition permitted the liquor arsenicalis to be slightly stronger (1.007 instead of 1.000) than 1 per cent. The edition of 1914 requires that only 50.4 mils of deci-normal iodine should be decolourized by 25 mils of the liquor, thus permitting a trace less than 1 per cent of arsenious acid. The error, if any, is on the side of safety.

I made a suggestion to the effect that a variation in arsenical strength not to exceed 0.020 per cent should be allowed in the drug. The United States Pharmacopœia (revision of 1916) permits a variation of 0.025 per cent in either direction, thus requiring the arsenic content to vary from 0.975 per cent to 1.025 per cent.

It is upon this basis, which in my opinion is very reasonable, that I have judged the ninety-one samples now reported. The results are very disappointing. I find that only twelve samples meet legal requirements, the British Pharmacopœal requirements being even more stringent than those of the United States Pharmacopœa.

Many of the samples are so far from accurate as to compel the conclusion that great and culpable carelessness is shown in their preparation. While the perfectly definite limits of variation permitted by the pharmacopœias compel me to declare adulterated all samples showing excess of arsenic amounting to 0.025, or deficiency to the same amount, it is proper to point out that while many samples depart quite widely from these limits, a considerable number are but slightly over or under strength in arsenic. The following synopsis shows the variation:—

<i>Deficiency in Arsenic.</i>			<i>Samples.</i>
From	0.025 to 0.050..	.....	13
"	0.050 0.075..	.....	12
"	0.075 0.100..	.....	10
"	0.100 0.200..	.....	25
"	0.200 0.300..	.....	7
"	0.300 0.400..	.....	4
"	0.400 0.500..	.....	3
Above	0.500 ..	.....	1
Total..			75

<i>Excess of Arsenic.</i>			
From	0.025 to 0.050..	.....	2
"	0.050 0.075..	.....	3
Above	0.100 ..	.....	2
Total..			7

The work of analysis of this collection was placed in the hands of Mr. Westman assisted by the analysts in charge at Halifax (Mr. Forward) and Winnipeg (Mr. Forster), and I have pleasure in submitting his carefully prepared report, as follows:—

SIR,—I beg to submit to you the following report dealing with the examination of ninety-one samples of Liquor Arsenicalis, commonly known as Fowler's Solution. These samples were collected in October and November of last year, and are reported from the laboratories as follows:—

Halifax	10	samples
Winnipeg	33	"
Ottawa	48	"
	—	
Total	91	"

Liquor Arsenicalis is essentially a 1 per cent (1%) solution of arsenious acid (As_2O_3) and should contain 3 per cent by volume of compound tincture of lavender, B.P. 1914, p. 213. The powdered arsenious acid is completely dissolved in potassium carbonate, equal proportions by weight being specified in the official preparation. The limitations of the official solution may be derived from the following characters and

tests quoted from B.P. 1914: "A reddish liquid, alkaline to litmus, and having the odour of lavender, 25 millilitres, neutralized with hydrochloric acid, discharge the colour of 50.4 millilitres of N/10 solution of iodine, the presence of a slight excess of sodium bicarbonate being maintained throughout the operation."

The United States Pharmacopoeia IX, p. 251, describes Fowler's Solution as an aqueous solution containing potassium arsenite, corresponding in amount to not less than 0.975 per cent. nor more than 1.025 per cent of As_2O_3 (197.92). The solution is to be free from arsenate compounds and is made up originally with potassium bicarbonate and titrated with standard iodine solution in the usual manner.

Examination of Samples of Arsenious Acid.

Samples of Liquor Arsenicalis may reach the public in unofficial strength for at least four reasons:—

(1) A properly made up and standardized solution may deteriorate or change slightly in strength on long standing if not kept in a proper container under constant seal.

(2) The retailer may sell a solution of his own manufacture carelessly prepared and unstandardized.

(3) A wholesale firm may furnish the retailer with a carelessly prepared and unstandardized solution.

(4) If accurate weighing of the arsenious acid be taken as the only method of standardization, slight impurities in the acid along with incomplete solubility would account for solutions being slightly below standard.

The last of these possibilities will be considered first. From the nature of its manufacture it was considered improbable that any great variation would be shown in the quality of different samples of arsenious acid found on the market. With this in view, samples were taken from various retail stores and from wholesale houses. One per cent solutions of these samples were made by weighing 1g. of a powdered arsenic, without previous drying, and making the volume up to 100 mls in the manner described in the official method. No extraordinary care was taken with this work and the volumetric glassware was such as is found on the present market. By carrying out the work in this manner it was hoped to duplicate the conditions obtainable in any ordinary laboratory or drug store. Ten mls of the solution thus made up was acidified with concentrated hydrochloric acid, and on further dilution with water to about 50 mls, was neutralized by the addition of considerable excess of sodium bicarbonate. This solution was then titrated with standard iodine solution, using fresh soluble starch solution as indicator. All solutions used were carefully prepared, being standardized with repurified potassium bichromate and iodic acid. Samples of arsenious acid examined in this manner were found to give fairly close approximations to standard 1 per cent solutions. Twenty-three samples in all were collected from leading wholesalers and from some retail stores. The detailed analysis of solutions made as above from these samples is given below. In some cases these were given a regulation sample number; in other cases they were simply procured in a semi-official manner by our inspectors.

Designation of Sample	Wholesaler.	Vendor.	Place Sold at.	P.C. below Standard.
Arsenic.....	Not given.....	D. J. Stalker, 163 Rideau St.	Ottawa.....	4.0
Arsenious Acid.....	".....	J. Skinner & Son, 321 Wellington St.	".....	3.8
".....	".....	Hull Medical Hall.....	Hull.....	4.0
C.P. Arsenic.....	Mercks.....	Harrison's Pharmacy.....	Ottawa.....	1.3
Arsenious Acid.....	Not given.....	Allen & Cochrane.....	".....	1.8
White Arsenic Commercial.....	Nat. Drug.....	Nat. Drug.....	".....	2.0
Arsenious Acid C.P.	".....	".....	".....	1.4
74096	Lymans Ltd.....	Lymans Ltd.....	Montreal.....	3.6
74093	Not given.....	McEwen, Cameron & Watt, Ltd.	".....	3.6
74094	".....	Chapman, Dart & Co., Craig St. W.	".....	2.6
74095	Nat. Drug.....	Nat. Drug.....	".....	1.4
78297	Canada Drug Co. Ltd.	Canada Drug Co.....	St. John, N. B.	1.0
78299	Nat. Drug Co.....	Ross Drug Co.....	".....	1.6
78300	Mercks.....	E. Clinton Brown, Union and Water Street.....	".....	1.0
78298	Nat. Drug.....	S. B. Whitmore, South End Pharm.	".....	1.6
78296	".....	Nat. Drug.....	".....	1.5
Arsenic.....	Red Cross Pharmacy.....	Red Cross Pharmacy.....	Quebec.....	3.0
".....	Dr. Morin & Co.....	Dr. Morin & Co.....	".....	2.0
81227	Not given.....	W. E. Saunders.....	London.....	1.5
81226	Parke Davis & Co.....	Parke Davis & Co.....	Walkerville.....	0.6
79722	Nat. Drug.....	Nat. Drug.....	Winnipeg.....	3.0
Arsenic Trioxide U.S.P. IX.....	Mercks.....	".....	Montreal.....	2.0
Arsenious Acid C.P.	".....	".....	London.....	1.0

It is quite evident from an inspection of the above results that the arsenious acid available in Canada is of such purity that most of it might well be weighed out directly and dissolved completely in the required volume of solvent, for preparation of Liquor Arsenicalis. The accuracy of the product made in this manner would be such as to bring it within the requirements of pharmacopœrial limitations in most instances. Seven samples in twenty-three were found to be beyond permitted limits of variation, due to impurities in the arsenic. Impurities great or small can never be accepted as legitimate reasons for placing solutions under strength upon the market. This work was undertaken simply to point out that when ordinary care is observed in weighing and in obtaining complete solution, the maximum error found in any sample arising from this cause does not exceed 4 per cent. The pharmacopœrias allow a variation, taken on the same basis as above, of 2.5 per cent. Organic matter and dust seem to constitute the major portion of the impurities found in those samples which ran from 3 to 4 per cent below strength. It is evident that the maximum error should not exceed 4 per cent or the percentage of arsenious acid in Fowler's Solution should never be less than 0.960, when reasonable care has been taken in preparing the solution from such materials as are obtainable on the market. In any case, even after the most careful weighing the final solution should be tested by titration. In this way no matter how impure the original arsenious acid may be, by reason of non-oxidizable materials, the error is reduced to the very small error of titration. The responsibility for this further standardization must be placed on the retail druggist and on the wholesale firms supplying this solution. The skill of any druggist should be equal to the task of standardizing such a solution to a high degree of accuracy and no excuse for gross errors should be accepted.

The Examination of Special Samples of Fowler's Solution.

It very often happens that much confusion arises when shifting of responsibility is attempted by retail firms by declaring that they have been supplied with improperly made solutions and undergrade products.

On the other hand the manufacturer may be called upon to defend himself from the retailer who has in some manner lowered the quality of goods originally supplied in their proper strength. In order to anticipate any such possibilities it was thought advisable to make a special collection of samples of liquor arsenicalis at the same time that an official collection was being made. This special collection consisted of samples taken directly from the manufacturing plants of wholesale firms or other of the larger firms. In this way it was hoped to trace out any discrepancies and find what the best practice in this connection was placing on the market. It was thought that the larger firms, of national reputation, might obtain a higher degree of accuracy in their products working under more uniform and standard methods. With certain exceptions, however, little difference was observed between the accuracy, or rather inaccuracy, obtained either by retail druggists or large firms. In this special collection some samples indeed show very fine work. Others are so far off standard requirements that it is evident due care was not taken in making them up. Definite data relative to these samples is tabulated below:—

Sample No.	Vendor.	Place Sold at.	P.C. Below Strength. 1% = Standard.	P.C. Above Strength. 1% = Standard.
No number.	National Drug Co.	Ottawa	0.031	
78291	" "	St. John, N.B.	0.179	
81221	" "	London		0.011
81108	" "	Toronto	0.103	
74091	" "	Montreal	0.048	
76397	" "	Vancouver	0.045	
79721	" "	Winnipeg	0.129	
81223	Parke Davis Co.	Walkerville		0.002
67565	" "	Montreal	0.098	
81126	Lyman Bros. & Co.	Toronto	6.00	
74092	Lyman, Ltd.	Montreal	0.006	
79725	Canada Drug Co.	Winnipeg		0.158
78292	" "	St. John, N.B.	0.087	
81220	W. E. Saunders & Co.	London	0.099	
78294	Royal Pharmacy	St. John, N.B.	0.093	
78293	Geo. K. Bell	" "		0.083
78295	H. J. Dick	" "	0.066	
81151	Ingram & Bell	Toronto	0.155	
81141	J. F. Hartz Co., Ltd.	" "	0.056	
81109	E. G. West & Co.	" "	0.124	
81135	E. B. Shuttleworth Co.	" "	0.056	
67564	McEwen, Cameron & Wait	Montreal	0.099	
67566	Chapman, Dart & Co.	" "	0.085	
76296	J. A. Teeporten	Vancouver	0.070	
79723	Martin, Bole & Wynne Co., Ltd.	Winnipeg	0.016	
No number.	Red Cross Pharmacy Co.	Quebec	0.095	
"	Dr. E. D. Morin & Cie.	" "	0.155	

Of the twenty-seven samples reported upon above only five come within the limits of pharmacopœial standards. When it is considered that these results were obtained upon samples sold by the best-known firms in Canada, it is remarkable that they should

vary from 17.9 per cent below strength in sample No. 78291 to 15.8 per cent above strength in sample No. 79725. It seems difficult to account for such a condition except through carelessness in manufacture. Had they been titrated with standard solutions, such an error would easily have been detected. When the poisonous nature of this solution is considered and the necessity of placing in the hands of medical practitioners a properly made up product is taken into account, the whole situation appears to be quite serious.

Discussion on General Collection of Liquor Arsenicalis.

This subject was given attention in Bulletin No. 175 of this series, published February, 1909. At that time it was suggested that a variation of 0.020 per cent of arsenic be allowed. The assay prescribed by the pharmacopœia would demand an accuracy of 0.002 per cent according to 1898 edition. In the 1916 edition U.S.P. limits of variation run from 0.975 per cent to 1.025 per cent. The B.P. 1914 states that 25 mls of Liquor Arsenicalis should discharge the colour of 50.4 mls of deci-normal iodine. A 1 per cent solution of pure arsenious acid should (using 25 mls) react completely with 50.53 mls of deci-normal iodine. Any samples showing a greater variation than this may rightly be termed adulterated.

It has been claimed that Fowler's solution falls off in strength from a one per cent arsenious acid solution on standing. Statements of this nature occur in such texts as Lucas' Practical Pharmacy, p. 166. It is recognized here that oxidation of the arsenious acid to arsenic acid, or an equivalent valence change, may take place in partly filled or exposed solutions containing excess carbonate, after a lapse of time. The rate at which this reaction will take place depends on the care used in handling the stock solution. The etching of glass by alkaline solutions of carbonates should not be confused with deposits of arsenic in any form. These etchings are the result of slow action between the alkali and the glass, and may be contaminated sufficiently with arsenic to give a test after superficial washing. When properly sealed a Fowler's solution will keep for years, and during that time will show only slight losses in arsenious acid content. Over a period of from three to four months this loss is not such as may readily be detected by titration. The responsibility in every case should remain with the manufacturer and vendor. They should titrate their solutions with standard iodine and assure themselves of their correct strength by this means, rather than by the incorrect method of trusting only to the proper weighing and complete dissolving of definite amounts of arsenious acid. In this way, impurities in the arsenious acid used, cease to become factors in the accuracy of the final product as far as ordinary commercial and pharmacopœial work is concerned. If impurities were to be considered in more minute detail, a review of the literature would show that the following may be present in small amounts: Si O_2 , $\text{Sb}_2 \text{O}_3$, $\text{Fe}_2 \text{O}_3$, Ni O , Co O , Ca O , SO_2 , Cu , Pb , Zn , $\text{As}_2 \text{S}_3$, Sb , Cd , Bi , and S . For a discussion covering the importance and elimination of these very slight impurities, and dealing in particular with the possible presence of antimonous oxide reference is made to an article by R. M. Chapin (J. Ind. and Eng. Chemistry vol. 10, No. 7, p. 522, 1918) on "The Preparation and Testing of Pure Arsenious Oxide."

The average accuracy of this preparation as found on the market at the present time shows a striking decrease when compared with conditions as they were found in 1909. The table which follows gives a comparative synopsis of these conditions. Although the condition of this drug was extremely bad when first collected in 1909, it is obviously worse at the present time. The table contains the results of analysis of samples collected in the general collection as well as those forming the special collection which was examined entirely at Ottawa.

Liquor Arsenicalis.	Samples 1909.	Samples 1918.
Within 0.019 of absolute accuracy.....	15	7
From 0.019 to 0.050 absolute accuracy.	21	22
" 0.050 to 0.100 " "	21	33
" 0.100 to 0.200 " "	10	34
Above 0.200 absolute accuracy	8	22
Total	75	118

Samples meeting B.P. and U.S.P. requirements of not more than 0.025 variation from standard 1.00 per cent solution of arsenious acid given in percentages of total samples examined:—

Year.	Percentage of Samples Meeting Requirements.
1909	21.3
1918	6.8

Summary.

1. Solutions of Liquor Arsenicalis as sold in Canada at the present time are on the average much below their proper strength and 93.2 per cent of samples examined failed to meet pharmacopœal requirements.

2. The accuracy with which solutions of this drug are being prepared is notably on the decrease.

3. Both the larger wholesale firms and retail druggists are guilty and responsible for this condition.

4. The purity of the chemicals used is such that only carelessness in preparation may hope to account for this situation.

5. If this may be taken as significant of general practice in many instances it is indeed time that certain reforms were introduced and radical changes made in the testing laboratories of many firms.

I have the honour to be, Sir,

Your obedient servant,

L. E. WESTMAN,

Public Analyst.

I present this report to you, because I find that Mr. Westman's conclusions are based upon fact.

Section 7 of the Act makes the pharmacopœias the standard for drugs, and I am compelled, for this reason, to declare more than 90 per cent of these samples adulterated under the Act.

There are, however, considerable differences in the amount of deviation from standard requirements; and it is possible that a deficiency or excess of arsenic in liquor arsenicalis, within limits, may be considered as involving no danger to the health of the consumer.

If this be the case, the line of safety must be drawn by the medical profession; and for this reason I am submitting copies of this report to the official medical advisers of this department, Prof. Blackader of McGill College, Montreal and Prof. Rudolf of the University of Toronto. Their opinions will be furnished to you when received; but delay must be expected, since Professor Rudolf is "somewhere at the front" on military duty.

Section 32 of the Act distinguishes between adulteration of a kind injurious to health, and that which is not injurious to health; and for this reason, the point submitted for a medical opinion is of importance.

I beg to recommend publication of this report as Bulletin No. 401.

I have the honour to be, Sir,

Your obedient servant,

A. MCGILL,
Chief Analyst.

BULLETIN No. 401—LIQUEUR ARSENICALIS.

Date of Collection.	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer or Furnisher as given by the Vendor.		Inspector's Report. (Is not an expression of opinion.)	Results of Analysis.			Remarks and Opinion of the Chief Analyst.
				Quantity.	Cents.	Manufacturer.	Furnisher.		Equivalent Aromatic p.c. 1000.	Below Standard and p.c. Arsenic.	Above Standard and p.c. Arsenic.	

DISTRICT OF NEW BRUNSWICK—JOHN C. FERGUSON, INSPECTOR.

1917.												
Nov 20	Liquor Arsenicalis.	78221	Wm. Hawker & Son, St. John, N.B.	St. 6 ozs.	60	Nat. Drug & Chem. Co., St. John, N.B.			0.750	0.210		78221 Adulterated
" 22	"	78222	The Canadian Drug Co., St. John, N.B.	6 "	60	Vendors			0.800	0.200		78222 "
" 26	"	78223	E. Clinton Brown, St. John, N.B.	6 "	60	Vendor			0.938	0.062		78223 "
" 29	"	78224	Nat. Drug & Chem. Co., Ltd., St. John, N.B.	6 "	45	Vendors			0.790	0.210		78224 "
Dec. 6	"	78225	C. A. Burchill, Fredericton, N.B.	6 "	75	Vendor			1.043		0.043	78225 "

DISTRICT OF QUEBEC CITY—F. X. W. E. BELAND, INSPECTOR.

Oct. 5	Liquor Arsenicalis. (Fowler).	70774	J. J. Laroché, 735 St. Valier, Quebec.	6 ozs.	75	Nat. D. & C. Co., Ltd., of Canada.			0.888	0.112		70774 Adulterated.
" 5	"	70775	Pharmacie Nationale, St. Valier, Quebec.	6 "	30	Dr. Ed. Morin & Cie	Unknown		0.849	0.151		70775 "
" 5	"	70776	Pharmacie St. Sauveur, St. Valier, Quebec.	6 "	20	Jos. Masson	Mfr.		0.598	0.402		70776 "
" 5	"	70777	Jos. Masson, 734 St. Valier, Quebec.	6 "	30	"	Pharmacie Braun.		0.967	0.033		70777 "
" 5	"	70778	Jos. Masson, 243 St. Joseph, Quebec.	6 "	30	Dr. Ed. Morin & Cie	Mrs.		0.908	0.092		70778 "

BULLETIN No. 401—LIQUOR ARSENICALIS.

Date of Collection.	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer or Furnisher, as given by the Vendor.	Inspector's Report. (Is not an expression of opinion).	Results of Analysis.			Remarks, and Opinion of the Chief Analyst.
				Quantity.	Cents.			Equivalent Aromatic p.c. 1,000.	Below Stand. and p.c. Ar. semic.	Above Stand. and p.c. Ar. semic.	

DISTRICT OF QUEBEC PROVINCE—N. CADIEUX AND J. H. RIGUX, TEMPORARY INSPECTORS.

1917.											
Oct. 27	Liqueur Arsenicale.	5691	Eugene Fournier, St. Jerome.	6 ozs.	50	Nat. Dr.	.....	0.887	0.113	.....	5691 Adulterated.
" 27	" (Fowler.)	5516	Ed. Grignon, Ste. Agathe des Monts.	6 "	30	Lynan-Knox	.....	1.004	.....	0.004	5516 Meets legal requirements.
" 27	"	5524	Omer St. Amour, Ste. Agathe des Monts.	6 "	75	Nat. Drug	.....	0.975	0.025	.....	5524 " "
" 24	Liqueur Arsenicale.	7769	Dr. LePage, Rimouski.	6 "	1.00	Dr. Morin, Quebec.	.....	0.658	0.342	.....	7769 Adulterated.
Nov. 6	"	7774	Dr. Moreault, Rimouski.	6 "	30	.....	.....	0.845	0.155	.....	7774 " "
" 7	"	7775	Dr. Ross, Mont Joli.	6 "	30	Crux Rouge, Quebec.	.....	0.796	0.204	.....	7775 " "

DISTRICT OF THREE RIVERS—DR. V. P. LAVALLEE, INSPECTOR.

Oct. 24	Liqueur Arsenicale, (Fowler.)	7575	Pharmacie Geoffrey, Joliette.	6 ozs.	30	Vendor	.....	0.505	0.495	.....	7575 Adulterated.
" 25	"	7579	A. Louis Boucher, Joliette.	6 "	50	"	.....	1.053	.....	1.053	7579 " "
" 25	"	7580	L. C. Rivest, Joliette.	6 "	60	"	.....	0.600	0.400	.....	7580 " "
" 27	Liqueur Arsenicale.	7590	J. A. Sarrazin, St. Gabriel.	6 "	30	Lymans, Ltd., Montreal.	.....	0.935	0.074	.....	7590 " "

DISTRICT OF MONTREAL—J. J. COSTIGAN, INSPECTOR.

Oct. 30	Liquor Arsenicalis.	78981	M. Freeman, 43 St. Catherine	6 ozs	30	.....	.....	.....	0.885	0.115	.....	78981	Adulterated.
" 30	"	78982	W., Montreal.						0.986	0.014	.....	78982	Meets Legal requirements.
" 30	"	78983	J. A. Godbout, 54 Craig St.	6	75	Lynans Ltd	.....	.....	0.796	0.214	.....	78983	Adulterated.
" 30	"	78984	L. Getz, 565 St. Lawrence	6	75	Nat. Drug & C. Co. Ltd.,	.....	.....	0.835	0.145	.....	78984	"
" 30	"	78985	J. Edlow, 807 St. Lawrence	6	75	Vendor	.....	.....	0.831	0.149	.....	78985	"
	"		Boul., Montreal.										
	"		Lippens Pharmacy, 1238 St. Lawrence	6	25	.....	.....	.....		
	"		Boul., Montreal.										

DISTRICT OF VALLEYFIELD—J. J. COSTIGAN, ACTING INSPECTOR

Nov. 10	Liquor Arsenicalis.	74196	P. P. Sabourin, St. John, P.Q.	6 ozs	25	Lynan Knox Ltd	.....	.....	1.168	.....	0.168	74196	Adulterated.
" 10	"	74197	A. Bourgeois, St. John, P.Q.	6	60	Lynans Ltd	.....	.....	0.940	0.060	.....	74197	"
" 10	"	74198	Dr. A. Comeau, Farnham	6	75	.....	.....	.....	0.966	0.034	.....	74198	"
" 10	"	74199	F. C. Saunders, Bedford	6	60	Vendor	.....	.....	0.974	0.026	.....	74199	Meets legal requirements
" 29	"	74200	Dr. Larocche, Valleyfield	6	50	Lynans Ltd	.....	.....	0.945	0.055	.....	74200	Adulterated.

DISTRICT OF OTTAWA—J. A. RICKEY, INSPECTOR.

Oct. 26	Liq. Arsenicalis.	80451	W. T. Kingston, Cardinal	6 ozs	60	Unknown	.....	.....	0.594	0.006	.....	80451	Meets legal requirements.
Nov. 3	"	80474	Dr. H. Irwin, Pembroke	6	60	Lynans Ltd., Montreal	.....	.....	0.954	0.046	.....	80474	Adulterated.
" 9	"	80483	B. F. Smith, Winchester	6	60	Vendor	.....	.....	1.039	.....	0.030	80483	"
" 14	"	80499	Geo. Watson, Westboro	6	60	Nat Drug & C. Co., Ottawa	.....	.....	0.833	0.157	.....	80499	"
" 20	"	80511	J. Skinner & Son, Ottawa	6	60	"	.....	.....	0.926	0.074	.....	80511	"

BULLETIN NO. 401—LIQUOR ARSENICALS.

Date of Collection.	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Coat.		Name and Address of Manufacturer or Furnisher as given by the Vendor.		Inspector's Report. (Is not an expression of opinion.)	Results of Analysis.			No. of Sample.	Remarks and Opinion of the Chief Analyst.
				Quantity.	Cents.	Manufacturer.	Furnisher.		Arsenic p. c. B.P. requires 1/1000	Below Standard p. c. Ar.	Above Standard p. c. Ar.		

DISTRICT OF KINGSTON—JAMES HOGAN, INSPECTOR.

1917.	Nov.	6	Liq. Arsenicalis.	81921	Green's Drug Store, Belle ville.	6	ozs.	60	Vendor.....	.....	.....	.....	81921	Adulterated,
"	"	6	"	81922	J. H. Dickey, Trenton, Ont.	6	"	45	Nat. Drug Co. Toronto.	.....	.....	.....	81922	"
"	"	6	"	81923	James Shurie, " "	6	"	60	E. G. West, Toronto	.....	.....	.....	81923	"
"	"	6	"	81924	H. W. Mitchell, Port Hope	6	"	65	Vendor. ....	.....	.....	.....	81924	"
"	"	8	"	81925	F. C. Weber, Peterboro.	6	"	60	Unknown. ....	.....	.....	.....	81925	"

DISTRICT OF TORONTO—H. J. DAGER, INSPECTOR.

Nov.	8	Fowler's Solution.	81021	F. H. Page, 185 Carlton St., Toronto.	6	oz.	25	The E. B. Shuttleworth Chem. Co., Ltd., Toronto.	.....	.....	.....	.....	81021	Adulterated.
"	8	"	81022	W. H. Robson, 296 Gerrard St. E., Toronto.	6	"	25	Vendor.....	.....	.....	.....	.....	81022	"
"	8	"	81023	Tamblyn & Ltd., 563 1/2 Bloor St. W., Toronto.	6	"	50	Lyman Bros. & Co., Ltd., Toronto.	.....	.....	.....	.....	81023	"
"	8	"	81024	Scruthers & Sons, 610 Bloor St. W., Toronto.	6	"	50	Vendors.....	.....	.....	.....	.....	81024	"
"	9	"	81025	Owl Drug Store, 770 Queen St. E., Toronto.	6	"	25	Unknown.....	.....	.....	.....	.....	81025	"

DISTRICT OF HAMILTON - H. J. DAGER, ACTING INSPECTOR.

Oct. 23	Fowler's Solution.	80970	Boyle's Drug Store, Brantford, Ont.	50	The Nat. Drug and Chem. Co., Toronto.	0.855	0.145	80970	Adulterated.
" 24	"	80971	F. Bogardus, Guelph.	6 "	Vendor.	0.921	0.079	8 971	"
" 25	"	80972	E. O. Ritz & Co., Kitchener.	15	Lynard Bros. & Co., Ltd., Toronto.	0.940	0.060	80972	"
" 26	"	80973	L. Gourlay, Galt.	20	"	0.996	0.004	80973	Meets legal requirements.
" 27	"	80974	E. W. Cameron, Brantford.	40	"	0.930	0.070	80974	Adulterated.

DISTRICT OF WINDSOR - JOHN TALBOT, INSPECTOR.

Nov. 5	Fowler's Solution.	65330	J. E. Richards & Co., Aymer, Ont.	50	Nat. Drug Co., London.	0.935	0.065	65330	Adulterated.
" 7	"	65346	E. H. Jackson & Co., Simcoe.	20	Unknown.	0.718	0.282	65346	"
" 8	"	65354	A. T. Stewart, Tillsonburg.	30	"	0.881	0.119	65354	"
" 14	"	65377	J. B. Dale, Petrolia.	30	Parke, Davis, Walkerville.	0.941	0.059	65377	"
" 14	"	65381	Geo. G. Ingersoll, Sarnia.	60	"	0.901	0.099	65381	"

DISTRICT OF NORTHERN ONTARIO - THOS. E. ARMSTRONG, INSPECTOR.

Oct. 26	Liquor Arsenical.	78676	Strong Drug Co., Hailey.	40	"	0.889	0.131	78676	Adulterated.
" 26	"	78677	P. H. Jory, Ltd., Hailey.	50	"	0.891	0.109	78677	"
" 13	"	78694	C. A. Wismer, New Liskeard.	40	Lymap Bros., Toronto.	0.954	0.046	78694	"

BULLETIN No. 401—LIQUOR ARSENICALIS.

Date of Collection.	Nature of Sample.	No. of Sample.	Name and Address of Vendor.	Cost.		Name and Address of Manufacturer or Furnisher as given by the Vendor.		Inspector's Report. (Is not an expression of opinion.)	Results of Analysis.			Remarks and Opinion of the Chief Analyst.
				Quantity.	Cents.	Manufacturer.	Furnisher.		Arsenic p.c. B.P. requirement 1.000.	Below Stand. and p.c. Ar.	Above Stand. and p.c. Ar.	

DISTRICT OF MANITOBA—J. B. COSGROVE, INSPECTOR.

1917.												
Nov. 6	Liquor Arsenicalis.	79641	Minto Drug Store, Minto, Man.	6 oz	40	Nat. Drug. & Chem. Co., Winnipeg.				p.c. 0.634	p.c. 0.366	79641 Adulterated.
" 7	"	79642	McPherson & Burnett, Elgin, Man.	6 "	35	Vendors				1.014	0.014	79642 Meets legal requirements.
" 7	"	79643	Dunrea Pharmacy, Dunrea, Man.	6 "	30	Martin, Bole & Wynne Co., Winnipeg.				0.925	0.075	79643 Adulterated.
" 8	"	79644	Dr. Cleghorn, Balduf, Man.	6 "	30	Nat. Drug. & Chem. Co., Winnipeg.				0.872	0.128	"
" 9	"	79645	Belmont Pharmacy, Belmont, Man.	6 "	30	"				0.933	0.067	"

DISTRICT OF SASKATCHEWAN—L. H. HALL AND J. M. DAVIS, INSPECTORS.

Dec. 5	Liquor Arsenicalis.	76964	Carter & Wright, Assiniboia, Man.	6 oz	75	Nat. Drug. & Chem. Co., Toronto.				0.933	0.047	76964 Adulterated.
" 6	"	76975	H. D. Stephen, Assiniboia, Man.	6 "	75	Vendors				0.902	0.098	"
" 7	"	76976	Morrison & Nightingale, Shaunavon, Man.	6 "	50	Nat. Drug. & Chem. Co., Toronto.				0.264	0.736	"
" 18	"	76992	Eye-brow Drug Store, Eye-brow, Man.	6 "	40	Martin, Bole & Wynne, Winnipeg.				0.553	0.447	76992
" 19	"	77000	C. Ostrander, Moose Jaw, Man.	6 "	75	Vendors				0.902	0.098	77000

77000 C. Ostrander, Moose Jaw... 6 " 75 Vendor... 0.902 0.098 77000

Nov. 3	"	"	78569 J. H. Abbott, North Battleford.	6 "	35	.....	Fowler's Solution.	0.862 0.138	78569	"
" 3	"	"	78570 L. A. Brown, North Battleford.	6 "	60	.....	"	0.813 0.187	78570	"
" 3	"	"	78571 Harry W. Wright, North Battleford.	6 "	50	.....	"	0.963 0.035	78571	"
" 8	"	"	78575 J. A. Stewart, Prince Albert	6 "	50	.....	"	0.918 0.035	78575	"
" 8	"	"	78576 W. D. Mitchell, Prince Albert.	6 "	50	.....	"	0.994 0.006	78576 Meets legal requirements.	
" 8	"	"	78577 W. H. Rowe, Prince Albert	6 "	35	.....	"	0.974 0.026	78577	"
" 13	"	"	78586 C. S. Aston, Lloydminster.	6 "	60	.....	"	0.610 0.390	78586 Adulterated.	
" 20	"	"	81902 F. Angley, Radisson.	6 "	60	.....	"	1.004	81902 Meets legal requirements.	

DISTRICT OF ALBERTA—A. W. R. MARKLEY, INSPECTOR.

Oct. 24	Liquor	Arsenic.	52827 McDermid Drug Co., Calgary.	Cal. 6 oz	45	Vendors.	Fowler's Solution.	0.806 0.104	52827	Adulterated.
" 25	"	"	52828 Dean's Pharmacy, Calgary.	East Cal. 6 "	45	The Nat. Drug & Chem. Co., Ltd., Montreal.	"	0.827 0.173	52828	"
" 29	"	"	52829 R. H. Morris, Red Deer	6 "	75	Vendors.	"	0.846 0.154	52829	"
" 30	"	"	52830 A. Creighton, Lacombe.	6 "	45	Revillon Wholesale Ltd., Edmonton.	"	0.797 0.203	52830	"
" 30	"	"	52831 Northern Drug Co., Wetaskiwin.	6 "	.....	Vendors.	"	0.955 0.045	52831	"

DISTRICT OF ROCKY MOUNTAINS—THOS. PARKER, INSPECTOR.

Nov. 2	Liquor	Arsenic.	68528 Canada Book & Drug Co., Nelson, B.C.	6 oz.	75	Vendors.	.....	0.807 0.193	68528	Adulterated.
" 2	"	"	68529 Rutherford Drug Co., Nelson, B.C.	6 "	75	"	.....	0.974 0.026	68529 Meets Legal requirements.	
" 15	"	"	68544 A. W. Blasdell, Fernie, B.C.	6 "	60	Nat. Drug & Chem. Co., Vancouver.	.....	0.742 0.258	68544	Adulterated.
" 15	"	"	68545 McLean Drug & Book, Ltd., Fernie, B.C.	6 "	60	"	.....	0.982 0.118	68545	"
" 15	"	"	68546 N. E. Suddaby, Fernie, B.C.	6 "	75	Vendor	0.958 0.042	68546	"

BULLETIN No. 401—LIQUOR ARSENICALIS.

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				Quantity.	Cents.	Manufacturer.	Furnisher.		Equivalent arsenic p.c. 1,000.	Below Standard and p.c. arsenic.	Above Standard and p.c. arsenic.			
DISTRICT OF VANCOUVER—G. G. ARMYTAGE, INSPECTOR.														
1917.														
Nov. 23	Liquor Arsenicalis.	76251	David Newell, Nelson & 3 oz.	45	Vendor.				0.852	0.148		76251	Adulterated.	
" 24	"	76252	Granville Sts., Vancouver Owl Drug Co., Ltd., Hastings and Main Sts., Vancouver.	6 "	Vendors				0.961	0.039		76252	"	
" 26	"	76253	Cunningham Drug Store, f 1.50	"	Vendor				1.076		0.070	76253	"	
" 26	"	76254	Hastings and Granville Sts., Vancouver. Vancouver Drug Co., Ltd., 782 Granville St., Vancouver.	4 "	Vendors				0.837	0.163		76254	"	
" 26	"	76255	Georgia Pharmacy, Granville & Georgia Sts., Vancouver.	6 "	Nat. Drug & Chem. Co., Ltd.				0.980	0.020		76255	Meets Legal requirements.	

