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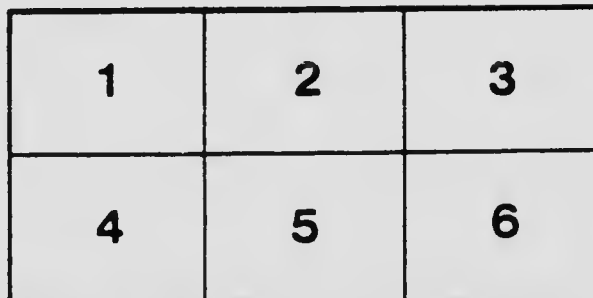
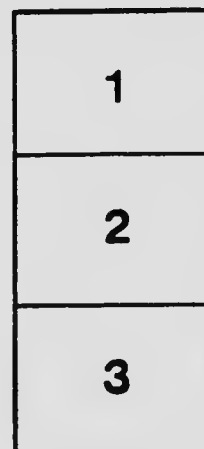
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LABORATORY
OF THE
INLAND REVENUE DEPARTMENT

OTTAWA, CANADA

1908

BULLETIN No. 89

FLAVOURING EXTRACTS

W. J. GERALD, Esq.,
Deputy Minister of Inland Revenue.

OTTAWA, September 8, 1903.

SIR,—I beg to transmit herewith enclosed a report by Mr. McGill on the samples of flavouring extracts which were collected in accordance with your instructions of March 27 last. The nature of these samples, together with the names of the vendors and manufacturers, are detailed in Table I which is appended to this report. The numbers of the samples, as collected by the food inspectors, are also given in this table, and by means of these numbers the results of the examination of each sample may be traced in Mr. McGill's report and tabulated statements. The latter are six in number and bear the following titles:—

- II. Commercial Extract of Lemon.
- III. Commercial Extract of Vanilla.
- IV. Flavouring Essences.
- V. Essence of Peppermint.
- VI. Essence of Raspberry.
- VII. Essence of Strawberry.

I have the honour to be, sir,
Your obedient servant,

THOMAS MACFARLANE,
Chief Analyst.

I.—List of Samples of Flavouring Extracts as collected in 1903.
DISTRICT OF HALIFAX.

Date of Collection	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Qua.	Cost.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1903.					\$ cts.	
April 16.	Extract of lemon	20236	Cain Bros., Yarmouth.	3 bottles.	0 30	Dearborn & Co., St. John.
" 16.	"	20237	J. A. Craig, Yarmouth	3 "	0 30	Vendor.
" 20.	rose	20250	Murphy & Demont, Windsor.	3 "	0 30	Simson Bros., Halifax.
" 20.	raspberry	20251	"	3 "	0 30	H. Jones, Montreal.
" 20.	lemon.	20254	Shand Bros., Windsor.	3 "	0 30	J. B. Black, Truro, N.S.
" 20.	vanilla	20255	"	3 "	0 30	"
" 20.	almond.	20258	Wentworth Stores, Ltd., Windsor.	3 "	0 30	Dearborn & Co., St. John.
" 22.	"	20305	A. F. Ross, Truro, N.S.	3 "	0 30	H. Jones, Montreal.
" 22.	vanilla.	20308	R. T. Forristall, Halifax.	3 "	0 30	Imperial Extract Co., Toronto.
" 22.	vanilla.	20309	"	3 "	0 30	"
" 17.	lemon.	4321	Geo. Reckham, Charlottetown.	3 "	0 30	"
" 20.	vanilla.	4323	J. A. Gourlis, Summerside	6 ounces	0 60	"
" 20.	vanilla.	4326	"	6 "	0 60	"
" 20.	almond.	4328	John Knight, Georgetown.	6 "	0 75	"
" 20.	vanilla.	4338	"	6 "	0 54	"
" 20.	lemon.	4339	"	6 "		"

DISTRICT OF NEW BRUNSWICK.

April 11.	Extract of vanilla.	17897	E. Williams Co. Ltd., cor. Princess and Charlotte streets, St. John.	3 bottles.	0 60	McLarin's, Hamilton.
" 11.	"	17898	J. War. Bros., cor. Duke and Charlotte streets, St. John.	3 "	0 60	Seeley Manufacturing Co., Detroit, U.S.
" 16.	"	17899	reg. Ashbell Co., Broad street, Sussex	3 "	0 60	Toronto Coffee and Spice Co.
" 14.	vanilla.	17900	James Collins, Union street, St. John	3 "	0 60	Seeley Manufacturing Co., Detroit.
" 17.	almond.	1788	J. G. Bell, 314 Main street, Moncton.	3 "	0 45	Bennett Chemical Co., Toronto.
" 18.	peppermint.	1789	Robertson & Givan, Main and Duke streets, Moncton	3 "		
" 18.	Flavouring extract.	17883	"	3 "		
" 21.	Extract of lemon.	17907	S. C. Stewart, King street, St. Stephen	3 "	0 60	Seeley Manufacturing Co., Detroit.
" 22.	"	17902	H. R. Hill, King street, St. Stephen	3 "	0 90	Baird Co., Ltd., Woodstock, N.E.
" 25.	"	17912	W. R. Logan, Fredericton.	3 "	0 60	H. Jones, Montreal.
" 25.	pineapple.	17914	H. C. Jewett, Regent street, Fredericton	3 "	0 45	Pure Gold Manufacturing Co., Toronto.
" 25.	wintergreen.	17914	"	3 "	0 30	Baird Co., Ltd., Woodstock, N.E.

DISTRICT OF QUEBEC.

April 17	Extract of vanilla	23344	H. Robert, St. Hyacinthe	3 bottles	0 30	J. V. Boudrias, Montreal
" 20	"	23348	Victor Trudeau, St. Lambert	3 "	0 45	A. Huchels & Co., Ottawa
" 21	"	23356	Gerard Hasbines, Lacolle	3 "	0 30	Mayville & Co., Toronto
" 22	peppermint	23356	Smalinas & Vana, Lacolle	3 "	0 45	Brayley & Sons, Montreal
" 26	"	23360	"	3 "	0 30	Davis-Lawrence Co., Montreal
" 28	cloves	23375	L. S. Plamondon, South Durban	3 "	0 30	Hudson & Orsoli, Montreal
" 28	"	23374	"	3 "	0 30	Hudson & Orsoli, Montreal
" 29	orange	23380	Ronaudi Piette, Berthiersville	3 "	0 30	Hudson & Orsoli, Montreal
May 1	raspberry	23387	J. E. Pichette, Joliette	3 "	0 75	F. F. Dalby Co., Ltd., Hamilton

DISTRICT OF MONTREAL.

April 26	Extract of vanilla	21307	A. Archambault, 2045 St. James st., St. Henri	5 bottles	0 50	H. Jones, Montreal
" 28	" lemon	21306	Z. Trudeau, Notre Dame street, St. Henri	5 "	0 25	"
" 29	raspberry	21309	A. Leung, 2023 Notre Dame, Montreal	5 "	0 40	Laporte, Martin & Co., Montreal
April 29	Extract of strawberry	21310	"	5 "	0 40	Laporte, Martin & Co., Montreal
" 29	" vanilla	21311	A. Leung, 2023 Notre Dame street, Montreal	5 bottles	0 40	"
May 6	"	21312	Keddy & Kenny, Hemmingford	5 "	0 50	L. Silverman, Montreal
" 7	Cochineal	21313	C. Bisson, St. Vincent de Paul	5 "	0 50	Jos. Constant
" 7	Extract of lemon	21314	"	5 "	0 50	"
" 7	cinnamon	21315	W. P. Brennan, St. Thérèse	3 "	0 60	H. Jones
" 7	vanilla	21316	"	3 "	0 60	"

DISTRICT OF KINGSTON.

April 20	Extract of pineapple	23147	H. T. Hamly, Walton street, Port Hope	5 bottles	0 40	Imperial Extract Co., Toronto
" 20	"	23148	D. J. McDonald, Pitt street, Cornwall	3 "	0 60	F. F. Dalby Co., Hamilton
" 20	vanilla	23149	"	3 "	0 50	"
" 20	raspberry	23150	"	5 "	0 50	"
" 20	strawberry	23151	"	5 "	0 50	"
" 20	vanilla	23152	W. H. Dunkin	5 "	0 50	"
" 20	lemon	23153	"	5 "	0 75	Sealey Manufacturing Co., Detroit
" 20	"	23154	"	5 "	0 50	"
" 20	cochineal	23155	"	5 "	0 50	"
" 20	raspberry	23156	"	5 "	0 50	"

I.—Last of Samples of Flavouring Extracts as collected in 1903—Continued.

DISTRICT OF TORONTO.

Date of Collection	Nature of Sample.	Number of Sample.	Name and Address of Vendor.	Quantity.	Cost.	Name and Address of Manufacturer or Furnisher as given by Vendor.
1903.					\$ cts.	
April 15.	Extract of lemon	22431	F. Padiene, 429 Yonge street, Toronto	5 bottles.	0 38	Imperial Extract Co., Toronto.
" 15.	" vanilla	22432	" "	5 "	0 35	J. M. Lowe, Toronto.
" 15.	" strawberry	22433	Hobley Bros., Dunlop street, Barrie.	5 "	0 50	Typical Extract Co., Toronto.
" 17.	" raspberry	22434	C. H. Peebles, Market Square, Hamilton	5 "	0 40	F. F. Dalley Co., Hamilton.
" 17.	" lemon	22435	" "	5 "	0 40	" "
" 17.	" "	22436	" "	5 "	0 60	" "
" 18.	" vanilla	23102	Bradley & Son, St. Paul street, St. Catharines.	5 "	0 25	Pure Gold Manufacturing Co., Toronto.
" 18.	" wintergreen	23104	" "	5 "	0 42	Todhunter & Mitchell, Toronto.
" 18.	" "	23106	" "	5 "	0 42	" "
" 20.	" lemon	23115	E. Brown, George street, Peterboro.	5 "	0 60	F. F. Dalley Co., Hamilton.

DISTRICT OF WINNIPEG.

April 9.	Extract of lemon	22043	J. W. Irwin, Clinton, Ont.	3 bottles.	0 30	London Coffee and Spice Co.
" 9.	" vanilla	22045	Sturdy & Co., Goderich, Ont.	3 "	0 30	" "
" 13.	" "	22048	E. O'Flaherty, Stratford, Ont.	3 "	0 30	Imperial Extract Co., Toronto.
" 13.	Flavouring extract	22052	W. W. Hill, Mitchell, Ont.	3 "	0 30	Gorman & Eckhart, London.
" 13.	Extract of strawberry	22055	Wm. Stoneham, Mitchell	3 "	0 30	Warren Bros., Toronto.
" 15.	" vanilla	22061	Peter Dill, Seaforth, Ont.	3 "	0 30	Imperial Extract Co., Toronto.
" 16.	Flavouring extract	22066	Stuebing & Co., Berlin.	3 "	0 30	F. F. Dalley, Hamilton.
" 17.	" "	22075	John Sloan & Co., Galt.	3 "	0 30	Sceley Manufacturing Co., Detroit.
" 18.	Extract of vanilla	22076	J. A. McCrea, Guelph	3 "	0 30	Vendor.
" 18.	" "	22077	" "	3 "	0 75	McLaurin, Hamilton.

DISTRICT OF WINNIPEG.

April 15	Flavouring extract	17431	H. Heikle, Morden	8 cks.	1 95	Seeley Manufacturing Co., Hamilton.
" 17	"	17437	C. E. Guttridge, DeLoraine	"	0 75	Mayells & Co., Toronto.
" 21	"	17444	N. Rosen, Virden	"	0 75	F. F. Dalley, Hamilton.
" 23	"	17447	White & Co., Moosomin	3 bottles	0 60	Ralfour & Co., Hamilton.
" 24	"	17450	Muttar & Lynch, Brandon	3 "	0 75	Pure Gold Manufacturing Co., Toronto.
" 25	Strawberry extract	17456	Miss A. Jones, Carberry	3 "	0 75	Blue Ribbon Manufacturing Co., Winnipeg.
" 26	Extract of banana	17458	C. S. B. Busby, Portage la Prairie	3 "	0 30	Pure Gold Manufacturing Co., Winnipeg.
May 6	" lemon	17466	Bailey's Fair, Winnipeg	3 "	0 60	Dyson Co., Winnipeg.
" 6	vanilla	17468	Burke Bros., Winnipeg	3 "	0 75	Imperial Extract Co., Toronto.
" 6	Flavouring extract	17471	A. Hendry, Winnipeg	3 "	0 75	Sheriff, Toronto.

DISTRICT OF MANITOBA.

April 21	Extract of lemon	21714	Poncell & Co., Red Deer	3 bottles	1 20	Seeley Manufacturing Co., Hamilton.
" 23	" vanilla	21718	R. A. Dickson, Wetsaskiwin	3 "	1 80	" "
" 24	" lemon	21726	Ross Bros., Edmonton	3 "	1 35	Dalley, Winnipeg.
" 25	" "	21724	Bowers & Morrison, Strathcona	3 "	1 66	Eby & Blain, " "
" 29	" vanilla	21727	W. Pitman, Calgary	3 "	0 75	Dominion Extract Co.

DISTRICT OF BRITISH COLUMBIA.

April 16	Flavouring extract	21688	A. T. Charlton, Port Stanley	2 bottles	0 25	Snow Drift Baking Powder Co.
" 16	Extract of lemon	21694	H. Alder, Mount Lehman	3 "	0 75	D. S. Curtis, New Westminster.
" 17	" almond	21695	A. C. Henderson, Chilliwack	3 "	0 75	B. C. Fruit Canning and Spice Co.
" 17	" orange	21696	G. R. Ashwell & Sons, Chilliwack	3 "	0 75	Blue Ribbon Manufacturing Co., Hamilton.
" 17	" apricot	23001	Mrs. E. A. Farrer, Chilliwack	3 "	0 75	W. Tufts & Son, Vancouver.
" 18	" lemon	23005	Harrison River Mills Timber and Trading Co.	3 "	0 75	Dyson-Gilbert Co., Winnipeg.
" 18	" wintergreen	23010	J. Dushessay, Mission, B.C.	3 "	0 45	Langley & Henderson, Victoria.
" 22	" vanilla	23025	Marshall Smith, Ladner's Landing	3 "	0 75	Great West Spice Co., Winnipeg.
" 22	" lemon	23048	Panett & Gamo, New Westminster	3 "	0 45	Woods, Ladner's Landing.
" 28	" vanilla	23048	"	3 "	0 50	McLaren, Hamilton.

LABORATORY OF THE INLAND REVENUE DEPARTMENT.

OTTAWA, September 4, 1903.

THOMAS MACFARLANE, Esq., F.R.S.C.,
Chief Analyst.

SIR,—I have the honour to hand you, in tabular form, with appended notes, the results of work upon a large number of samples of flavouring essences; as also upon two samples of cochineal extract, which does not properly come under this head, being used for colouring rather than for flavouring.

Since no generally accepted standards exist for the preparation of these substances, I have thought it sufficient to ascertain the absence of matters dangerous to health; and I find nothing that can be condemned on this score. The question of foreign colouring matter, in its relation to health, must be considered an open one for the present.

The small quantity of material at my disposal has prevented fuller investigation in certain directions. In the event of another collection of like kind, I beg to recommend that officers be instructed to confine their samples to one particular essence or extract at a time, so that fuller justice may be done to it.

In the work recorded I have received very material help from Mr. Lemoine and Mr. Valin.

I have the honour to be, sir,
Your obedient servant,

A. MCGILL.

COMMERCIAL EXTRACT OF LEMON.

Essence of Lemon.—The B. P. defines a tincture of lemon to be prepared from fresh lemon peel and alcohol of 90 per cent. The finished product would contain about 70 to 80 per cent alcohol by volume.

The U. S. P. defines an essence or spirit of lemon to be made from oil of lemon and lemon peel, macerated with alcohol of 95 per cent. The finished product would in this case contain a somewhat higher percentage of alcohol; probably from 80 to 90 per cent by volume.

Extract of lemon, as used for flavouring pastry, custards, &c., is a preparation which, so far as I know, has no legally defined composition. It is popularly supposed to be prepared like the pharmacopoeal tinctures, by extracting lemon peel with alcohol, or by dissolving oil of lemon in alcohol.

Oil of lemon is the oil expressed from fresh lemon peel. It consists chiefly of hydrocarbons of the terpene series, but its characteristic flavour is due mainly to an aldehyde, or to a mixture of aldehydes, present to the extent of from 4 to 8 per cent. The principal aldehyde (citral) occurs in commerce under that name; and much of the lemon extract sold for flavouring purposes is made directly from citral. A very small quantity of citral suffices to give the lemon flavour and an economy of alcohol results from the substitution of citral for oil of lemon; this last requiring strong alcohol for its solution.

Commercial citral contains a trace of oil of lemons. A sample reported in the accompanying table contained 0.5 per cent. This minute amount of oil of lemon, accidentally present, cannot be held to make the use of citral equivalent to the use of oil of lemon in the manufacture of extract or essence of lemon. While the flavour of lemon is chiefly due to the citral which it contains, it is certain that other substances are involved in the total natural flavour, and these must, of course, be absent from a so-called extract made from citral. A German Imperial patent (No. 134,788)¹ recently granted to Heine & Co., prepares an artificial oil of lemon "by adding to a mixture of

92 parts of limonene and phellandrine, a mixture of citral, linalol, geraniol, geranyl acetate, linalool and linalyl acetate, also 1 part of a mixture of nonylic and oetyllic aldehydes. The exact amount of the aldehydes depends upon the character and strength of the lemon odour desired.' I quote this formula in order to emphasize the fact that it is not alone to citral that lemon extract or essence owes its true flavour.

A recent decision in the Supreme Court of Michigan, rendered April 7, of this year, reversed a decision of a lower court, by which a so-called extract of lemon, made from citral, and artificially coloured, had been held to be adulterated. The manufacturers of terpeneless extracts claim better keeping qualities for such preparations, and less tendency to oxidize, thus developing disagreeable taste. It is also claimed that the full characteristic flavour of the lemon is conserved. Final opinion in this matter lies beyond the domain of the chemist, and an appeal must be made to the palate of the connoisseur. But it will be seen, from the accompanying tables, that whenever any considerable amount of oil of lemon is present at least 75 per cent of alcohol is present. This alcohol is the chief item of cost in manufacture, and it is reasonable to infer that the disuse of oil of lemon is at least in part accounted for by the possibility of employing weaker alcohol.

Most of the samples examined are coloured by coal-tar dyes—chiefly naphthol yellows and tropaeolin. A normal extract of lemon has little or no colour, and it is regrettable that there should be a popular demand for lemon extract of a decided yellow. While I have no proof that these dyes, used in the minute amounts necessary to colour the extracts, are actually injurious to health, it has been clearly proven (Bulletin 83, p. 14) that they are poisons in considerable doses.

A. J. Windowgradow (*) has demonstrated by recent experiments that so little as 1 milligramme (= 0.015 grain) of certain coal-tar dyes entirely prevents the digestion of egg albumen by pepsin.

*Pharmaceutical Review, 1908, p. 24.

(*) Zeitschrift, Untersuchung Nahr. u. Genussmittel 1908, 580-592.

II.—COMMERCIAL

ARRANGEMENT of Samples in order

Serial Number.	Name of Manufacturer.	Departmental number of samples.	Specific gravity of the sample, 15° C.	Specific gravity of the distillate to equal volume.	* ALCOHOL BY VOLUME. (APPROXIMATE).		Fixed residue at 100° C. Grammes per 100 CC.
					As alcohol	As proof spirit.	
1	Unknown	20237	0·8260	.....	92·36	161·86	0·39
2	Schilling	23525	0·8273	.....	91·96	161·16	0·50
3	Dyson, Gibson Co., 'White Star'	23506	0·8444	.....	86·80	152·11	0·14
4	Davis & Lawrence.....	23363	0·8513	.....	84·51	148·09	0·19
5	Dalley.....	17444	0·8577	.....	82·30	144·23	0·09
6	Dearborn	21720	0·8666	.....	78·89	138·25	0·17
7	Black	20254	0·8758	.....	75·53	132·36	0·06
8	Jones	21314	0·8758	.....	75·53	132·36	0·08
9	Seely.....	21714	0·8974	.....	66·94	117·32	0·91
		23153					
		17858					
10	Unknown	21694	0·9016	.....	65·17	114·20	0·05
11	Simson Bros.....	4839	0·9097	.....	61·53	107·84	0·13
12	Baird.....	17897	0·9186	.....	57·64	101·02	0·13
13	Sherriff	17471	0·9380	.....	48·21	84·49	0·08
14	McLaren	23115	0·9412	.....	46·48	81·45	0·08
15	Robt. Greig Co.....	4321	0·9428	.....	45·53	79·79	0·18
16	Dalley.....	23148	0·9698	.....	34·69	60·79	.....
17	Mayell.....	17137	0·9698	0·9612	33·64	58·97	0·07
18	Hudon & Orsali.....	23374	0·9650	.....	30·57	53·56	0·08
19	Unknown.....	21308	0·9663	.....	29·40	51·53	0·07
20	Peebles.....	23436	0·9682	.....	27·68	48·50	0·04
21	Unknown.....	23103	0·9685	0·9688	27·13	47·55	0·09
22	London Coffee and Spice Company.....	22043	0·9688	.....	27·13	47·55	0·07
23	Dyson, Gibson Co., 'Jewel Ext.'	17466	0·9702	.....	25·86	45·31	0·12
24	Eby Blain Co.....	21724	0·9712	.....	24·88	43·60	0·07
25	Unknown	23431	0·9722	0·9721	23·88	41·85	0·06
26	Wright (Detroit).....	23154	0·9751	.....	21·09	36·95	0·04
27	Unknown	23432	0·9752	.....	20·99	36·78	0·13
	Oil of lemon.....		0·8583	.....			3·00
	Citral.....		0·8950	.....			58·00

* Owing to the very small amounts of solids in solution, I have considered that a sufficiently close

Ottawa, August 25, 1903.

EXTRACT OF LEMON.

of Specific Gravity (Density).

Reaction on pouring a few drops into water.	Rotation, 2 dm. tube. Degrees of sugar scale.	Equivalent volume per cent of lemon oil.	Wool-test for colouring matters. Dyes.	Reaction with dilute hydrochloric acid.	Remarks.
Turbid.....	+ 15.1	4.7	Uncoloured.	None.....	Genuine.
"	+ 49.5	15.5	"	"	(Genuine, and of exceptionally high strength.
"	+ 10.9	3.4	Yellow	Bleached..	Contains 3.4 p.c. oil of lemons; is artificially coloured.
"	+ 20.0	6.2	Uncoloured.	.....	Genuine, and above usual strength.
"	+ 11.1	3.5	Yellow	Bleached..	Contains 3.5 per cent oil of lemons; is artificially coloured.
"	+ 7.0	2.2	"	" ..	Contains 2.2 per cent oil of lemons; is artificially coloured.
"	+ 1.5	0.5	Deep yellow	" ..	Contains 0.5 per cent oil of lemons; is artificially coloured.
"	+ 7.0	2.2	Orange	Reddish ..	Contains 2.2 per cent oil of lemons; is artificially coloured.
"	+ 4.0	1.3	Deep yellow	Bleached..	Contains 1.3 per cent oil of lemon; is artificially coloured.
"	+ 1.5	0.5	Uncoloured.	None.....	Contains 0.5 per cent oil of lemons.
"	+ 1.4	0.4	"	"	" 0.4
"	+ 1.3	0.4	Deep yellow	Bleached..	Contains 0.4 per cent oil of lemons; is artificially coloured.
Slightly turbid	+ 0.4	0.1	Yellow	Red	Contains a trace of oil of lemons; is artificially coloured.
Clear	+ 0.4	0.1	"	No change	" ..
"	+ 0.2	0.1	"	Bleached..	" ..
"	+ 0.3	0.1	Deep yellow	" ..	" ..
"	+ 0.2	0.1	Yellow	" ..	" ..
"	+ 0.3	0.1	Deep yellow	" ..	" ..
"	+ 0.2	0.1	Yellow	" ..	" ..
"	+ 0.3	0.1	"	" ..	" ..
"	+ 0.3	0.1	"	Red	" ..
"	+ 0.3	0.1	Deep yellow	No change	" ..
"	+ 0.2	0.1	Light yellow	Bleached..	" ..
"	+ 0.3	0.1	"	Red	" ..
"	+ 0.0	0.0	Yellow	Bleached..	Contains no oil of lemons; is artificially coloured.
"	+ 0.3	0.1	Deep yellow	" ..	Contains a trace oil of lemons; is artificially coloured.
.....	+ 322.0	100.0			
.....	+ 1.6	0.5			

approximation to the alcohol content was obtainable from the specific gravity of the sample.

III.—COMMERCIAL

Serial Number.	Name of Manufacturer.	Departmental Number.	Specific Gravity of the Sample.	Spirit Gravity.	Alcohol—by Volume.		Specific Gravity of de-alcoholized residue.
					Alcohol.	Proof Spirits.	
					p. c.	p. c.	
1	Black.....	20255	1.0465	0.9847	11.87	20.81	1.0603
2	Dalley.....	23149	1.0485	0.9746	21.50	37.83	1.0825
3	Dull.....	23061	0.9844	0.9781	18.14	31.80	1.0066
4	Gourlie.....	4326	0.9400	0.9337	50.47	88.44	1.0064
5	Huckels.....	23348	1.0058	0.9865	10.30	18.04	1.0190
6	Imperial Extract Co.....	20309 23048	0.9985	0.9787	17.48	30.64	1.0070
7	Jonas.....	21307 21316	0.9919	0.9640	31.40	55.03	1.0300
8	Knight, John.....	4338	0.9718	0.9520	40.14	70.34	1.0219
9	Laporte & Martin.....	21311	1.1060	0.9924	5.47	9.58	1.1115
10	London Coffee & Spice Co.....	22045	1.0440	0.9811	15.21	26.66	1.0631
11	Mayell.....	23358	1.0470	0.9841	12.40	21.73	1.0719
12	McLaren.....	17857 22077 23548	0.9906	0.9648	30.73	53.86	1.0270
13	Peerless Extract Co.....	23510	1.0164	0.9853	11.35	19.89	1.0312
14	Seely.....	17431 21718 22075 23152	1.0185	0.9741	22.09	38.71	1.0440
15	Tropical Extract Co.....	20309 22048	1.0302	0.9865	10.30	18.04	1.0443
16	Toronto Coffee & Spice Co. (Silver Label).	17875	1.0169	0.9792	16.98	29.76	1.0377
17	"	23344	1.0262	0.9857	11.00	19.27	1.0376
18	"	22076	0.9932	0.9832	13.24	23.21	1.0107
19	"	21312	0.9997	0.9844	12.13	21.27	1.0160
20	"	21727	1.0344	0.9841	12.40	21.73	1.0484
21	"	23104	1.0576	0.9768	19.49	34.14	1.0602

August 27, 1903.

Extract of Vanilla.

Polarimeter reading of residue in 2 dm. tubes. — Corrected for Volume.	Cane Sugar.	Vanillin.	Coumarin.	Sum of these.	Remarks.
		Per 100 Volumes.			
	p. c.				
+ 32.8	8.5	0.028	0.056	0.084	
+ 52.5	13.7	0.060	0.036	0.116	
+ 4.2	1.2	0.040	0.040	0.080	
+ 3.0	0.8	0.044	0.060	0.104	Unusually high content in alcohol.
+ 2.4	0.6	0.060	0.060	0.120	
+ 3.6	0.9	0.048	0.040	0.088	
+ 18.5	4.8	0.108	0.040	0.148	
+ 19.2	5.0	0.032	0.016	0.048	Filtrate after clarifying with lead acetate is quite colourless. Unusually high content in alcohol.
+ 96.0	25.0	0.012	0.144	0.156	Very low content of alcohol. Flavour chiefly due to coumarin.
+ 51.6	13.4	0.076	0.024	0.100	
+ 45.6	11.9	0.076	0.062	0.138	
+ 18.5	4.8	0.048	0.036	0.084	
+ 24.0	6.2	0.268	0.036	0.304	Contains a red dye of coal tar origin. Notably high content of vanillin.
+ 26.1	6.8	0.080	0.028	0.108	
+ 31.4	8.2	0.024	0.112	0.136	Flavour chiefly due to coumarin.
+ 31.6	8.2	0.028	0.072	0.100	" "
+ 2.4	0.6	0.040	0.092	0.132	" "
+ 7.8	2.0	0.104	0.064	0.168	
+ 6.0	1.6	0.086	0.032	0.068	
+ 34.2	8.9	0.028	0.036	0.064	
+ 43.8	11.4	0.028	0.160	0.188	" "

COMMERCIAL EXTRACT OF VANILLA.

This should be made from the dried fermented pod of *vanilla planifolia*, a plant which is cultivated in Mexico, Java and elsewhere. This fruit, as it comes into commerce, varies greatly in quality, the best coming from Mexico.

The flavour is chiefly due to a substance called *vanillin* (the aldehyde of methyl proto-catechuic acid) which occurs to the extent of from 1 to 2.75 per cent in the fruit.

Artificial *vanillin* is made on an industrial scale in Germany, and there is no doubt that much of the extract of vanilla of commerce is prepared directly from artificial vanillin. Regarding artificial vanillin, P. Carlos (1) 'Considers that, although synthetic vanillin may reproduce the odour of vanilla, it has not by any means the same delicacy of flavour; for flavouring chocolate and similar confectionery it is stated not to possess the same softness of flavour.'

Vanilla is not mentioned in the British Pharmacopœia. A tincture is defined in the U. S. P. to be made from vanilla, sugar and diluted alcohol. The finished tincture contains about 50 per cent (volume) of alcohol.

Coumarin is a substance having much the same flavour as vanillin, and is therefore capable of being substituted for this last in the manufacture of a *soi-disant* extract of vanilla. Coumarin (the anhydride of ortho-coumaric acid) occurs in the tonka-bean and in many other plants. It is also prepared artificially from salicylic aldehyde by several methods. However legitimate a substance, for use as a flavour, coumarin may be,—it is certainly to be considered as an adulterant when substituted for the more expensive vanillin, and sold under the name of vanilla.

Methods for the estimation of vanillin and coumarin in admixture have been worked out by several chemists. Those of Hess and Prescott, as modified by Winton and Silverman (1) have been employed in this laboratory.

Reference to the accompanying tables will show that coumarin is present, to some extent, in all the samples analysed, while in some of them it constitutes by far the greater portion of the aromatic ingredient of the extract.

The great range of variation in these extracts of vanilla is noteworthy. The following statement may make this point clearer:—

In 21 samples analysed—

Vanillin varies in amount from	.....	0.012 to 0.268
Coumarin	“ “	.....0.016 to 0.160
Alcohol	“ “	.....5.47 to 50.47
Sugar	“ “	.....0.6 to 25.0

It follows from this variability that most perplexing results to the consumer must be found when the article as made by one manufacturer is substituted for that made by another. It would be interesting to know what degree of constancy may be expected in the output of any single manufacturer. On account of the large amount of work in hand, and the small quantity of material furnished for analysis in many cases, I have considered it best to mix the different samples bearing the same maker's name, and work them as one sample. This has been done in the case of numbers 6, 7, 12, 14 and 15 of the accompanying table.

(1) Repertoire de Pharmacie, 14, 5—through Year Book of Pharmacy, 1902, 297.

(1) Journal American Chemical Society—Vol. 21, 256 and 721, and Vol. 24.

IV.—FLAVOURING ESSENCES.

Serial Number.	Departmental Number.	Name.	Name of Manufacturer.	Specific Gravity of Sample.	Fixed resid., e.		Alcohol—(approximate) Volume per cent.		Remarks.
					Per 100c.	Per 100c.	Alcohol.	Proof Spirit.	
1	4328	Almonds	Lymans Sons	0.9244	0.070	55.0	98.3		
2	17870	"	Seely	0.9134	0.060	59.9	105.0		
3	20258	"	Dearborn	0.9584	0.080	37.1	65.0		
4	20806	"	Jonas	0.9006	0.080	65.6	114.9		
5	21695	"	Fruit Canning Co.	0.9357	0.170	49.5	86.7	Contains a yellow dye.	
1	17914	Wintergreen	Baird Co.	0.9164	0.100	58.6	152.7		
2	23105	"	Bradley & Son	0.9658	0.140	20.0	51.0		
3	23508	"	Langley & Hous-ton	0.9442	0.110	86.9	152.3		
1	21313	Cochineal	Constant	1.1478	30.460	None		Polarization = -8°	
2	23115	"	Imperial Extract Co.	1.3024	87.460	"		" = +16°. Contains sugars and a foreign dye.	
1	17898	Rose	Seely	0.9075	0.050	62.6	109.6		
2	20250	"	Simson Bros.	0.9583	0.060	35.8	63.8		
1	23501	A	Tufta & Son	0.9477	0.263	42.6	74.6	Contains a red dye.	
1	17458	B	Pure Gold Co.	0.9674	0.040	28.4	49.8	"	
1	17902	Cinnamon	Jonas	0.8754	0.680	75.5	132.2	yellow dye.	
2	21315	"	"	0.9202	0.520	57.0	100.0	"	
3	22066	"	Dalley Co.	0.9405	0.440	47.0	82.6	brown dye.	
1	23575	Cloves	Davin, Lawrence Co.	0.8517	1.010	85.0	149.0	"	
1	17912	Pineapple	Pure Gold Co.	0.9283	0.050	53.0	93.0	yellow dye.	
1	23147	"	Imperial Extract Co.	0.9613	0.240	33.8	59.3	red dye.	
2	21686	Oranges	Blue Ribbon	0.9539	0.060	39.0	68.0	yellow dye.	
2	23580	"	Hudson Hebert	0.9608	0.060	29.0	50.9	"	

Essence of Almonds.—The U. S. P. (1890) gives a formula for essence of bitter almonds which requires 75 per cent alcohol (volume) in the finished product which also contains 1 per cent of bitter almond oil.

Essence of Wintergreen, is not official in the B.P. The U.S.P. defines a spirit of wintergreen, made from dissolving 5 volumes of oil of gaultheria in 95 volumes alcohol (94% vol).

The U.S.P. distinguishes between natural and artificial oil of wintergreen directing the first to be prepared from the leaves of *Gaultheria procumbens* by distillation, while the latter is methyl salicylate. They are defined however, as being essentially the same.

Essence of Rose.—*Rosae Oleum*, Oil of Rose or Otto of Rose is defined in both B.P. and U.S.P. Rose water is made by distilling water from the flowers of *Rosa Damascena*. No essence of rose is mentioned.

Essences of Apricot and Banana.—No preparations from apricot or banana are mentioned in any pharmacopœia.

Cochineal.—Tincture of cochineal is defined by the B.P. to be made from cochineal (1 part) and alcohol of 45 p.c. strength (10 parts).

The essence or extract of cochineal is sold for giving colour to jellies, &c., and not like other extracts for flavouring purposes. So long as the colouring matter of cochineal is extracted and kept in solution in such a way that it shall not mould, the object of the manufacturer is served. A formula employing alum, cream of tartar, glycerine, alcohol and other ingredients is published in Part II of the U. S. Dispensatory, 17th Edn. It should be quite unnecessary to add a foreign colouring matter to cochineal.

Essence of Orange.—The B. P. defines a tincture of orange made from orange peel, with 90 per cent alcohol. The finished product would contain from 70 to 80 per cent alcohol.

The U. S. P. defines a spirit of orange made from oil of orange peel and alcohol of 95 per cent. The alcoholic strength would be about 10 per cent higher than in the former case.

The two samples examined show a much lower content than this.

Essence of Cinnamon.—The B. P. defines a spirit of cinnamon, containing 1 part of oil of cinnamon in 10 parts of the product; the solvent being 90 per cent alcohol.

Also, a tincture of cinnamon made from the bark, with 70 per cent spirit.

The U. S. P. *Spiritus Cinnamomi* is practically identical with that of the B. P. The tincture contains glycerine.

It does not follow that an essence prepared for the kitchen must come up to pharmacopœial standard.

Schimmel & Co. have recently taken out a patent for an artificial cinnamon oil.

Essence of Cloves.—The British Pharmacopœia defines an infusion of cloves; but neither essence nor tincture is defined in B. P. or U. S. P.

Pineapple Essence is not defined in any pharmacopœia.

V.—ESSENCES OF PEPPERMINT.

Serial Number.	Departmental Number.	Manufacturer.	Specific Gravity of Sample.	Fixed Residue, per 100cc.	Rotation in 2 dm. tube, Sugar Scale.	Alcohol (approximate) Vol. per cent.		Remarks.
						Alcohol.	Proof Spirit.	
1	17364	Bennett Chem. Co..	0.8667	9.360	-3.2	74.5	130.6	
2	21668	Snowdrift Co.	0.961	1.810	0.0	14.5	60.5	Contains a yellow dye.
3	22052	Gorman, Eckhart Co.	0.9622	0.190	0.0	33.1	57.9	" "
4	23350	Brayley Bros.	0.9305	0.150	0.0	52.2	91.0	" "
5	23380	Davis, Lawrence Co.	0.9117	0.800	0.0	61.4	107.6	" "

Essence of Peppermint.

The B. P. defines a spirit of peppermint, made from oil of peppermint, to contain 10 per cent of this last, dissolved in 90 per cent alcohol. The resultant tincture would contain approximately 80 per cent of alcohol (volume).

The U. S. P. defines an essence containing 10 per cent oil of peppermint and 1 per cent of leaves, with alcohol of 94 per cent. The resultant tincture would much resemble the above.

It will be noted that only one of the samples analysed approximates to either of the pharmacopoeal essences, and this is the only one showing presence of oil of peppermint by possessing optical activity. The oil of peppermint is laevo-rotatory, but appears to be very variable in the degree of rotation. A sample examined by me gave a reading -21.4° (sugar scale) in 2 dm. tube, on solution in alcohol to 10 volumes.

Owing to the presence of more or less sugar in the samples tabulated, the rotation observed cannot be taken as a safe guide to the oil present. The samples were too small to permit of fuller examination.

VI.—FLAVOURING ESSENCES—RASPBERRY.

Serial Number.	Departmental Number.	Manufacturer.	Specific Gravity of Sample.	Fixed Residue, per 100cc.	Rotation in 2 dm. tube, Sugar Scale.	Alcohol (approximate) Vol. per cent.		Remarks.
						Alcohol.	Proof Spirit.	
1	17450	Pure Gold Co.	0.9811	10.460	+25.6	43.9	76.9	Contains about 6.7% sugar and a red dye.
2	20251	Jones	0.9197	3.080	0.0	60.0	105.0	Contains a red dye.
3	21309	Laporte Martin....	0.9738	0.730	+1.8	25.0	44.0	" " and
4	23150	Dalley Co.	0.9904	3.400	0.0	16.0	28.0	about 0.5% sugar. Contains a red dye.
5	23387	"	1.0373	20.140	+46.4	35.0	57.0	" " and
6	23435	"	0.9778	10.890	0.0	40.5	70.0	about 12% sugar. Contains a red dye.
7	23166	Imp. Ext. Co.	1.0088	9.890	0.0	17.0	29.8	" "

NOTE.—These are all artificially coloured. There is no accepted standard for the article, and it is evident that while each manufacturer has his own formula, this formula shows great elasticity.

VII.—FLAVOURING EXTRACTS—STRAWBERRY.

Serial Number.	Departmental Number.	Manufacturer.	Specific Gravity of Sample.	Fixed Residue, per 100cc.	Rotation in $\frac{1}{2}$ dm. Sugar Scale.	Alcohol. (approximate) Vol. per cent.		Remarks.
						Alcohol.	Proof Spirit.	
1	17447	Whyte.....	0.9441	0.000	0.0°	44.8	78.5	Contains a lavender dye.
2	17455	Blue Ribbon.....	0.9753	4.870	+16.0°	35.0	61.4	" crimson " and about 4.2% sugar.
3	21310	Laporte Martin....	0.9705	0.170	0.0	25.0	44.0	Contains a purple dye.
4	22055	Warren Bros.	0.9900	7.950	0.0	18.0	31.5	" red "
5	23151	Dalley Co.	0.9845	4.160	0.0	26.0	45.5	" crimson "
6	23434	"	0.9820	0.990	+2.0	36.0	63.0	" purple " and about 0.5% sugar.

NOTE.—These essences are all artificially coloured. There is no accepted standard for this article.

