DAILY OUTPUT.

20,000 pounds bleaching powder, at 1½ cents	$300.00	
7,000 pounds caustic soda, at 1½ cents	105.00	
	405.00	
Less freight to market and commission	55.00	
Total daily income		$360.00

Local conditions effecting cost of raw material, freight, and power, and changes in market price of product, would greatly influence the value of this estimate. With these figures, however, any one may readily calculate the probable cost in any locality when the conditions affecting it are known.

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[CONTRIBUTION FROM THE CHEMICAL LABORATORY OF THE CASE SCHOOL OF APPLIED SCIENCE.]

COMPOSITION OF OHIO WINES.

BY ALBERT W. SMITH AND NORMAN PARKS.

Received September 2, 1898.

NORTHERN Ohio is one of the most important grape-growing regions in the United States, and produces no inconsiderable quantity of wine from the yearly growth, but, so far as we are aware, no systematic study of the chemical composition of these wines has ever been undertaken. In order to determine whether a sample of wine is pure or not, it is often necessary to know what is the average chemical composition of samples of guaranteed purity, made from the same kind of fruit and grown in the same region. An examination of a large number of Ohio wines, bought in this market, showed a considerable variation in composition from the average of French, German, and California wines. It was thought desirable to ascertain if this was due to a very universal sophistication of Ohio-made wines in this market, or whether it was due to an actual difference in the nature of the fruit grown here, or possibly in the method of manufacture and fermentation.

In the fall of 1894, and of 1895, samples of most of the prominent varieties of Ohio grapes were collected, the juice expressed

and converted into wine according to the manner generally practiced in this locality. Both seasons were favorable to the growth of fine fruit, and, as nearly as possible, an average quality of each sample was selected. In every case the fruit was mature and fully ripened when gathered. No fermentation was allowed to take place between the times of grinding and the pressing of the juice from pulp and stems.

Fermentation was carried on in jugs, at the temperature of the outside air, until freezing weather, when the jugs were placed in a cool cellar until February. The wine was then carefully siphoned into bottles and further fermentation arrested by Pasteurizing at 160° F. The bottles were then corked and stored until wanted for analysis. In all cases except two, the samples were about one year old when analyzed. The samples made from Concord and Catawba grapes were two years old. The methods of analysis used were those published in Bulletin 43, U. S. Department of Agriculture, Division of Chemistry.

The results are expressed in Table I as grams per 100 grams of wine, or per cent. by weight. In Table II are the results of analyses of a number of typical samples of wine sold in the markets of Northern Ohio.

Comparing the results of analyses of these twelve samples of pure wines with those of European origin, made from similar fruit,[1] it is noticeable that gravity, acidity, and proportion of alcohol, potassium acid tartrate, and tartaric acid are quite similar. The average of solids in the Ohio samples is slightly lower than that of the foreign-grown wines. These latter contain usually somewhat more than two per cent., though individual cases occur which fall below this limit.

The most important differences are in the percentages of glycerol and ash. Published reports of European samples indicate the ash usually above two-tenths per cent. and from five-tenths to eight-tenths per cent. glycerol, while the maximum and minimum for those analyzed here are 0.15 and 0.10 for ash, and 0.95 and 0.29 per cent. respectively, for glycerol.

Since these two constituents, together with the solids, are of most importance and general use in determining the genuine-

[1] Fresenius: *Ztschr. anal. Chem.*, 36, 413.

TABLE I.

Variety of grapes.	Grams per 100 grams wine.											
	Concord.	Ives.	Hayse.	Catawba No. 1.	Centennial.	Werden.	Hartford.	Delaware.	Riesling.	Niagara.	Catawba No. 2.	Catawba No. 3.
Specific gravity	0.9921	0.9971	0.9959	1.0010	0.9934	0.9970	0.9977	0.9909	1.0060	0.9931	0.9918	0.9972
Total acid as acetate	0.27	0.29	0.23	0.32	0.30	0.36	0.91	0.30	1.46	0.26	0.26	0.37
Alcohol	12.0	8.45	7.90	10.5	8.20	7.40	5.10	11.5	3.30	8.77	11.4	8.82
Glycerol	0.55	0.42	0.36	0.51	0.40	0.42	0.29	0.45	0.39	0.50	0.50	0.95
Solids	1.93	1.61	1.51	3.66	1.28	1.81	1.55	1.65	2.29	1.58	2.00	3.86
Ash	0.14	0.14	0.14	0.15	0.11	0.13	0.15	0.12	0.12	0.10	0.12	0.12
Phosphoric anhydride	0.004	0.005	0.008	0.003	0.001	0.009	0.003	0.005	0.004	0.007	0.005	0.008
Sugar	0.11	0.12	0.11	1.54	0.11	0.92	0.12	0.10	0.10	0.11	0.07	...
Nitrogen	0.007	0.009	0.008	0.007	0.005	0.011	0.005	0.017	0.008	0.008	0.013	...
Volatile acid as acetic	...	...	...	0.031	0.20	0.11	0.12	0.07	...	0.12	0.21	0.30
Potassium bitartrate	0.31	0.28	0.40	0.30	0.23	0.24	0.31	0.24	0.20	0.16	0.25	0.20
Free tartaric acid	0.05	0.10	0.12	0.11	0.08	0.09	0.10	0.08	0.07	0.05	0.03	0.05
Tannin	0.04	...	...	0.04	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.03
Glycerol as parts per 100 parts alcohol	4.5	4.8	4.6	4.9	4.8	5.7	5.7	3.9	11.8	5.6	4.4	10.7

TABLE II.

Kind.	Grams per 100 grams wine. Solids.	Alcohol.	Ash.	Acid as tartaric.	Glycerol.	Reducing sugar.	Sucrose.	Volatile acid as acetic.
Sour Catawba.....	1.42	8.19	0.20	0.45	0.57	0.15	none	0.30
" "	1.42	11.95	0.16	0.22	0.51	0.18	none	0.45
" "	1.54	9.86	0.15	0.27	0.57	0.14	none	0.20
" "	1.59	15.65	0.09	0.45	0.45	0.26	none	0.32
" "	1.45	10.24	0.24	0.30	0.38	0.20	none	0.20
" "	2.26	10.57	0.14	0.27	0.37	0.28	none	0.30
" "	1.75	9.24	0.10	0.20	0.27	0.25	none	0.17
" "	1.36	10.45	0.13	0.48	0.48	0.30	none	0.33
Sweet Catawba....	13.7	20.20	0.40	0.38	0.33	13.00	none	0.31
" "	14.0	13.80	0.27	0.23	0.46	12.7	none	0.19
" "	16.9	12.10	0.15	...	...	16.4	none	0.20
" "	15.9	9.80	0.15	...	...	14.2	none	...
" "	18.9	9.07	0.17	...	0.17	14.5	0.90	...
" "	15.0	9.92	0.21	...	0.24	13.6	none	...
Port Wine.....	14.8	19.3	0.20	0.15	0.28	14.7	none	...
" "	20.3	8.92	0.19	...	0.49	15.4	1.47	...
" "	10.8	18.7	0.24	...	0.31	9.1	none	...
California Port ...	11.6	16.7	0.30	...	0.39	13.2	none	...
" " ...	13.11	16.9	0.25	0.30	0.30	...	none	...
Old Angelica.....	15.1	17.3	...	0.25	0.31	14.2	none	...
Sherry	4.71	13.8	0.31	...	0.45	3.1	none	...
Niersteiner.....	1.57	9.29	0.22	0.30	0.97	...	none	...
Muscatel	16.2	17.2	0.22	0.08	0.09	...	none	...
"	15.1	20.7	0.21	0.20	0.33	13.2	none	...

ness and purity of a sample of wine, these differences are most important. Most authorities state that, in the natural process of alcoholic fermentation, glycerol and alcohol are produced in the ratio of from 7 to 14 parts of the former to 100 parts of the latter. If this be always true, the inference to be drawn, when this maximum is exceeded, is that glycerol has been added, while in case the ratio of glycerol to alcohol is below 7 : 100, that the sample has been fortified by the addition of alcohol foreign to the product of fermentation. Such conclusions in the case of these Ohio wines would be quite misleading. In the same manner, care must be exercised, when these wines are under considera-

tion, in drawing conclusions as to the addition of water, from the facts of low ash and solids.

The skilful adulteration of wine is extremely difficult to detect by chemical analyses, and these abnormally low results, obtained by analysis of perfectly pure and reliable samples, make such conclusions from these determinations all the more unsatisfactory.

It is of interest also to compare the composition of these samples with that of authentically pure California samples. Many such analyses have been made and reported by Prof. Hilgard,[1] and while they do not include determinations of glycerol, the contents of ash and solids are usually higher than those of European samples.

[CONTRIBUTIONS FROM THE HAVEMEYER LABORATORIES OF COLUMBIA UNIVERSITY, NO. 3.]

THE DETERMINATION OF SULPHUR IN ASPHALT.

BY E. H. HODGSON.

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THE numerous articles recently published on the analysis and chemistry of asphalts, and the wide range of opinion as to the relative values of the different methods in use for the determination of sulphur, have led me to make a comparison of results on some typical asphalts.

Dr. E. H. Miller, through the kindness of Mr. A. W. Dow, of Washington, was enabled to secure samples, the sources and natures of which were known. The samples were labeled Trinidad Lake, Trinidad Crude, Trinidad Lake Refined, Cuban Crude, Alcatraz Crude, and California Crude, and were described by Mr. Dow as follows:

Trinidad Lake.—Asphalt from the lake on the island of Trinidad, imported by Barber Asphalt Co. for paving.

Trinidad Crude.—Crude asphalt from Hadley's Diggings, about one mile from Trinidad Lake. It is known as "iron pitch," being the hardest asphalt found in Trinidad.

Trinidad Lake Refined. This is crude Trinidad Lake asphalt, melted up to drive out the water.

Alcatraz Crude.—From Ventura Co., California, used by

[1] Bulletin 13, Division of Chemistry, U. S. Department of Agriculture.