standardized permanganate being added from time to time. Apparently the temperature was too high, for it has been shown quite recently by Sarkar and Dutta[1] that at or above 81°, permanganate is decomposed by manganous sulphate, with formation of manganese peroxide, even in the presence of considerable sulphuric acid.

BUREAU OF STANDARDS,
September 29, 1910.

COMPARATIVE ANALYSES OF WATER FROM GREAT SALT LAKE.

By W. C. EBAUGH AND WALLACE MACFARLANE.

Received September 5, 1910.

From about 1900 until 1904 fears were expressed that the Great Salt Lake was doomed to extinction, and that it would be a matter of only a few years until its site would become a salt desert. The recession of the shore line and sinking of the lake level continued until the autumn of 1903. Since that time there has been a rise in the level of the lake, and during the year just ending new fears have arisen—fears that large engineering works like the Lucin cut-off of the Southern Pacific and the roadbed of the Western Pacific railroad would have to be abandoned. A succession of years with abnormally high rainfall is responsible for the condition now existing.

TABLE I.

	Date of collection.	Specific gravity.	Total solids, Per cent. by weight.	Grams per liter.	Authority.
	1850	1.170	22.282	260.69	L. D. Gale
Summer,	1869	1.111	14.9934	166.57	O. D. Allen
Aug.,	1873	1.102	13.42	147.88	H. Bassett
Dec.,	1885	1.1225	16.7162	187.65	J. E. Talmage
Feb.,	1888	1.1261			J. E. Talmage
June,	1889	1.148			J. E. Talmage
Aug.,	1889	1.1569	19.5576	226.263	J. E. Talmage
Aug.,	1892	1.156	20.51	238.12	E. Waller
Sept.,	1892	1.1679	21.47	250.75	J. E. Talmage
	1893		20.05		J. T. Kingsbury
Dec.,	1894	1.1538	21.16	244.144	J. E. Talmage
May,	1895	1.1583	21.39	247.760	J. E. Talmage
June,	1900	1.1576	20.90	241.98	H. N. McCoy and Thos. Hadley
July,	1900	1.1711	22.89	268.09	H. W. Sheley
Aug.,	1900	1.1805	23.36	275.765	H. W. Sheley
Oct.,	1900	1.1860	24.03	285.020	H. W. Sheley
Sept.,	1901	1.1979	25.221	302.122	L. J. Seckles
Oct.,	1903	1.2206	27.72	338.36	Wm. Blum
June,	1904	1.1905	25.196	299.96	J. E. Talmage
Nov.,	1904	1.2120	26.71	323.71	Wm. Blum
Oct.,	1907	1.1810	22.92	270.685	W. C. Ebaugh and Kenneth Williams
Oct.,	1909	1.1561	20.887	242.25	Wallace MacFarlane
Feb.,	1910	1.1331	17.681	200.32	Wallace MacFarlane

NOTE.—The above values are taken in part from "The Great Salt Lake," by J. E. Talmage, and all the analyses during recent years have been made in the laboratories of the University of Utah.

An inspection of the results of analyses of the lake water will be of interest. In Table I are shown the specific gravity and total solids obtained by investigators at various times during the last forty or more years, and in Table II more complete results of the latest analyses are recorded. In this connection it should be remembered that the annual variation of the lake water shows a minimum of total solids in the spring, following the winter and spring precipitation, and a maximum in the autumn.

[1] *Z. anorg. Chem.*, **67**, 225 (1910).

TABLE II.

Sample collected.....	Oct., 1903	Nov., 1904	Oct., 1907	Oct., 1909	Feb., 1910
Specific gravity.....	1.2206	1.2120	1.1810	1.1561	1.1331
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Total solids.....	27.72	26.71	22.92	20.88	17.68
Constituents.					
Chlorine (Cl).....	15.27	14.54	12.67	10.91	9.48
Sulphate (SO_4).....	1.86	1.82	1.53	1.39	1.05
Magnesium (Mg).....	0.155	0.43	0.45	0.447	0.391
Calcium (Ca).....	0.045	0.055	0.04	0.080	0.055
Sodium (Na).....	9.58	8.77	7.58	7.25	5.79
Potassium (K).....	0.73	0.89	0.72	0.76	0.88

UNIV. OF UTAH,
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[CONTRIBUTION FROM THE TEXAS AGRICULTURAL EXPERIMENT STATION.]

CONSTITUENTS OF CANDELILLA WAX.

By G. S. FRAPS AND J. B. RATHER.

Received September 16, 1910.

The wax is from the Candelilla, or Mexican wax plant, which grows in a number of Mexican states. The sample was secured for us by Dr. H. H. Harrington, Director of the Texas Experiment Station. It is a hard wax, opaque, and almost colorless. A description and constants of this wax have been given by Hare and Bjerregaard.[1] According to an editorial in the *Journal of the Royal Society of Arts*,[2] the following uses have been suggested for it; candles, shoe polish, phonographic records, insulation of electric wires, and as a bees' wax substitute.

Constants.—The following constants were determined by A. C. Deiler in the spring of 1909. For the sake of comparison, the same constants as ordinarily secured for bees' wax are given, and also those obtained by Hare and Bjerregaard.[3]

	Candelilla wax.		
	Deiler.	Hare.	Bees' wax.
Specific gravity at 100° C..	0.870	....	...
Specific gravity at 15/15° C.	...	0.9825	...
Iodine number.....	14.0	36.8	6–13
Acid number.....	19.0	12.4	19–21
Ester number.....	40.7	....	73–76
Saponification number.....	59.7	64.9	...
Melting point.....	66° C.	67–8° C.	...
Unsaponifiable matter, per cent.....	....	91.17	...

Our sample of wax was completely soluble in chloroform and carbon bisulphide. Ether dissolved 0.12 gram in 100 cc. and alcohol 0.048 gram, wax and solvent being brought together for fifteen minutes at room temperature.

Isolation of a Hydrocarbon.—The wax was powdered and saponified with alcoholic potash and the alcohol evaporated off. It was then transferred to a Kutscher and Steudel extraction apparatus with hot water and extracted with ether. After extracting

[1] THIS JOURNAL, **2**, 204 (1910).
[2] **57**, 644.
[3] *Loc. cit.*