investigation. Consideration of this subject and also of the action of salts of other metals than aluminum and salts of other acids than tartaric and citric, as well as the theoretical points involved are reserved for a following paper.

ANN ARBOR, MICH.,
December, 1901.

THE ANALYTICAL CONSTANTS OF NEATSFOOT, TALLOW AND HORSE OILS.

BY AUGUSTUS H. GILL AND ALLAN W. ROWE.

Received February 3, 1902.

OF the commonly occurring oils, fewer data are to be found about these three than about any of the others; this work was undertaken to supply this need.

The various tests were applied as described in a book published by one of us;[1] that is, the specific gravity was taken with a correct Westphal balance at 15° C. or 100° C.; the Valenta test was done with an equal quantity of glacial acetic acid, proved to be 100 per cent. by titration; the Maumené test was performed with 100 per cent. sulphuric acid, its strength also determined by titration, in a jacketed beaker, the acid being run into the oil drop by drop from a burette; the iodine number, with the solutions after having been mixed twenty-four hours, and the oils allowed to stand for four hours with it. The titer test was carried out as prescribed by Lewkowitsch, the acid being melted in a 5″ test-tube held in a 100 cc. round-bottomed flask. The results given are usually the average of two closely agreeing determinations. The oils used were obtained from different dealers and guaranteed pure.

The constants are as follows:

	Sp. gr. 15° C.	Valenta. °C.	Maumené. °C.	Sp. temp. reaction.	Iodine. No.	Titer test. °C.	Iodine No fatty acid
Neatsfoot oil, 1	0.915	70.0	42.2	87.9	72.9	19–20	68.6
" " 2	0.914	75.5	42.2	87.9	72.9	18–19	64.6
" " 3	0.919	51.0	49.5	103.1	67.1	17–18	67.3
" " 4	0.916	61.5	42.2	87.9	72.1	16	69.5
" " 5	0.916	75.5	42.2	87.9	66.0	25.5–26.5	63.6
Usual figures ...	0.915	....	48.0	....	70.0	26.0	....
	100° C.						
Tallow oil, 1	0.794	73.5	35.0	72.9	55.8	35–36	54.6
" " 2	0.794	71.0	35.0	72.9	56.6	36.5–37.5	57.0
" " 3	0.794	75.7	35.0	72.9	56.7	34.5–35.5	56.6
	15° C.						
Usual figures ...	0.916	47.0	43.0	....	57.0	39	....

[1] Gill: "A Short Handbook of Oil Analysis."

Horse oils and fats.	Color, etc.	Sp. gr. at 15° C.	Valenta. ° C.	Maumené. ° C.	Sp. temp. reaction.	Iodine No.	Iodine No. of clear oil.	Titer test. ° C.	Iodine No. of fatty acids.
1	White-brown semi fluid	0.919	80.2	46.0	95.8	75.1	....	32.5–33.5	72.9
2	Dark brown semi liquid	0.916	54.0	52.1	108.5	82.5	82.0	30.0–31.0	72.3
3	Yellow-brown liquid	0.922	71.0	54.7	114.0	86.3	83.7	25.0–26.0	78.7
		100° C.							
4	Golden brown nearly solid	0.798	48.0	54.2	112.9	79.9	81.8	30–31	80.4
5	Very like. 4	0.799	61.0	53.5	111.5	78.8	78.2	34–35	82.1

Neatsfoot oils: the samples are fairly concordant with the exception of No. 3; the gravity and Maumené test are higher than those of the others; as no adulterant could be proved, it is supposedly genuine.

Tallow oils: the results here, upon oils from different sources, are remarkably concordant.

Horse oils: as was expected from their different appearance, these show a considerable variation; the Valenta test is of no use whatsoever here; No. 5 came from a young horse; nothing is known about the others.

Were either of these oils used to adulterate neatsfoot, the horse oil would raise the Maumené and iodine values, and the titer test; tallow oil would lower the Maumené, and iodine values, and raise the titer test quite considerably.

A TEST FOR THE GUMMING QUALITY OF LUBRICATING OILS.

By Augustus H. Gill.

Received February 3, 1902.

SOME years ago in studying the Elaïdin test for oils, a few of the mineral lubricating oils were included, and it was noticed that those which deposited the most "tar" apparently changed the most in use. The test, other than a repetition with different oils, lacked confirmation as to its value except in one case. It was noticed that with a 25° paraffin oil the outside of the can containing it—where it was exposed to the air in thin layers—was covered with a skin closely resembling that produced