

No.	Starch.	Obtained from	Ash, per cent.	P ₂ O ₅ , per cent.
96128a	Potato starch	Eimer & Amend	0.292	0.151
" b	" "	" "	0.292	0.159
96129a	Corn starch	" "	0.548	0.036
" b	" "	" "	0.560	0.039
96130a	Bulk corn starch	Ridenour, Baker	0.116	0.043
" b	" "	Grocery Co., K. C.	0.124	0.047
96131a	Table corn "	Early Breakfast	0.104	0.032
" b	" " "	Coffee Co., St. L.	0.116	0.035
96132a	Wheat starch	Eimer & Amend	0.112	0.089
" b	" "	" "	0.124	0.093
96133a	Soluble starch	Kahlbaum	0.392	0.167
" b	" "	" "	0.410	0.169

While the amounts of phosphorus found are relatively small, they are thought sufficient to be considered where starch is employed as an accelerator for sodium peroxide fusions, especially when analyzing certain soils or other materials which contain but traces of phosphorus. As phosphorus was found in all samples of starches examined, sugar has been substituted in its place for the fusion work of this laboratory.

COLUMBIA, MO.

FIRE TEST AS GAUGE OF DANGER FOR KEROSENE.

To the Editor of "The Journal of Industrial and Engineering Chemistry."

There is a paper on "The Relation between the Temperature of Kerosene and the Explosive Pressure of the Supernatant Mixture of Air and Vapor" by W. P. Bradley and C. F. Hare in THIS JOURNAL, Vol. I, No. 6, June, 1909, p. 345. I read it with great interest. It begins to put the matter on a definite scientific basis.

They criticize fire test as a gauge of the danger of oil. Also I saw in the newspapers that an international committee was to report on methods of oil testing, and among other things on the taking of the firing point. Surely the one duty of scientific men to all present methods of taking the fire test is to condemn them as unscientific and misleading. In a test to indicate the safety or danger of an oil we require one that warns us of the beginning of danger like the Elliot closed flash point and not the much higher figures got in the fire tests. Neither of the fire tests given, Elliot and Tagliabue, "guarantee against danger while the oil is in bulk and kept at a temperature below that of the test." These tests are worse than useless, for the seeming guarantee suggests security and hinders natural precautions and thereby creates or increases danger. For bulk quantities the temperature of the close Elliot flash point is also the point of permanent ignition.

I took a shallow tin dish, circular, 9 inches in diameter, and covered it with a lid having circular holes to test by. An oil that in Abel close cup flashed at 78° F. (25.6° C.), not only flashed but ignited permanently, or fired, at 76° F. or 2° below the closed flash point. Using the same dish without the cover as an open test, applying the flame every 2° it ignited explosively at 88° F. (31° C.) and continued to burn furiously. Tested every degree the firing point was 87° F.¹ The point for flash or fire alters with the amount of oil, and the danger we wish to gauge is not that of cupfuls

¹ *Chemical News*, June 3, 1893, and *Journal of Society of Chemical Industry*, 15, 173 (1896).

but the largest quantities in household use, say, large lamps or gallon tins.

The fundamental fact, then, is that for bulk quantities in circumstances where the vapors are allowed to accumulate on the surface of the oil, the closed flash point, Elliot or Abel, is also the fire point.

If the fire point determined in any way is more than 10° F. above the closed flash point then in my opinion the method ought to be condemned as misleading.

In England, shops and cellars have often been burned in hot weather by the kerosene, which was being sold, accidentally catching fire and burning furiously, flash point between 73° F. (23° C.) and 80° F. (27° C.), and not infrequently the flame has run along the heavy vapor some distance to the oil.

If an international or other scientific committee takes up the matter of fire test, I hope they fix on one that aims at what professes to be the *minimum* temperature of permanent ignition; and that for at least the largest quantities in common household use. But I think the fire test should be done away with and only the flash point used and all dangers referred to that standard.

D. R. STEUART.

BROXBURN, SCOTLAND,
July 5, 1909.

MOISTURE CONTENT OF BUTTER.

Editor, *Journal of Industrial and Engineering Chemistry*:

I have read with interest the Note of Mr. F. W. Robison in the May number of THIS JOURNAL, on "Variation of Moisture Content in Butter, Etc.," and as I differ quite decidedly would like to note a few points.

Butter, as every one knows, is not a homogeneous mixture, the content of water, curd, salt and fat varies in every portion of a mass of butter from any other portion of that mass. The better the butter is made, the closer will the different constituents agree. Butter containing more than 15.99 per cent. of water is considered adulterated by the Federal Government, and it is my experience that all butter handlers consider this a fair limit.

Thousands upon thousands of tubs of butter are sampled each year by the Revenue Officers, and the question of sampling has been a very important one. In the only case under the law where a creamery has sued the Government to recover the tax assessed for manufacturing adulterated butter, the testimony shows that the Revenue Agent in taking the samples used a trier for the first tub in the presence of the President of the Creamery and the butter-maker. The trier had been thrust one or more times into the tub when the creamery people objected and asked the officer to take the samples with a ladle, and not use the trier as the tubs of butter after being punched five or six times with a trier would not have much of a market value. The officer complied, and the remaining samples were taken with a ladle furnished by the creamery, yet when they protested against the assessment and the case came into the Federal Court, the cry was raised that the samples were not taken with the trier, and were unfair. (The Government won the case.)

While assisting a Revenue Agent take some samples with a trier, I asked the Commission Merchant if he had trouble selling butter which had been sampled with a trier; he said: "Oh I will sell this one tub but will never sell another to the same man."