Derivatographic detection of pig's fat in other animal fats

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Introduction

Lard is characterised by being the only animal fat whose triglycerides contain a higher percentage of saturated fatty acids at the B-position (1, 2).

On heating fats, they melt and decompose. In general no decomposition of fats occurs below about 200 °C, but above this temperature slow de-esterification occurs leading-through monoglycerides- to the formation of fatty acids. Decomposition is complete at about 370 °C. (3)

In investigations of fats, simultaneous DTA (Differential thermal analysis), (Thermogravimetry) TG and DTG (Derivative thermogravimetry), determinations serve two useful purposes. TG and DTG enable the determination of water content of butter, margarine and monoglycerides, whereas DTA permits the analysis of fat mixtures and hence allows the detection of adulterations (3).

In an earlier series of papers, *Haighton* (4), *Hannewijk* (5) and *Lavery* (6) have considered the value of applying DTA in the study of pure glycerides and the investigations of the melting behaviour of oils and fats.

Further, DTA offers a rapid method suitable for routine control purposes, and for a general information of the types of glycerides present in a fat or a fat mixture (7).

Experimental

Materials Used:

1 – Pig's fat (Lard)
2 – Gamoase's fat
3 – Cow's fat
4 – Sheep's fat (mutton)
These fats were prepared according to the procedure of Hilditch (8).
5 – Butter fat
6 – Hydrogenated Oil (le sultan, Egyptian Co, for Salt of soda production U. R. A.)
7 – Mixed samples: mixtures prepared from lard with each of the above mentioned fats in different ratios down to 5% lard. above mentioned fats in different ratios down to 5% lard.
8 – A sample of fat obtained from imported canned meat by extraction, (BULL BRAND, Luncheon meat, exported by Dimex, Hamburg. West-Germany).

* Szerzők tanulmányaikat és vizsgálataik egy részét Magyarországon végezték (szerk.)

Table 1

Temperatures of endothermic peaks of fat samples

Fat Sample	Peak temperature °C
1 – Pig's fat (lard)	49
2 – Gamoase's fat	39
3 – Cow's fat	52
4 – Sheep's fat (mutton)	28
5 – Butter fat	40
6 – Hydrogenated oils .	35

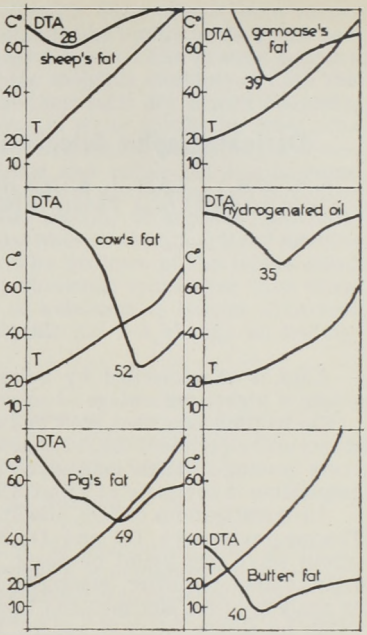

Fig. 1

These samples were dried for 2 hours in an oven at 100 – 105 °C, filtered while hot through folded filter paper and allowed to cool overnight at room temperature (16 – 20 °C) before examination in order to ascertain an analogous treatment and way of cooling of the different samples.

Apparatus:

A *Paulik – Erdey* derivatograph No (085838) was used for this study.

Procedure:

1 g amounts of the samples were examined under the following conditions:

Sensitivity of the DTA galvanometer = 1/3

Heating rate = 2.5 °C/minute

Time = 50 minute

The temperature of the sample to be examined was raised linearly starting from room temperature (16 – 20 °C).

Results

The DTA (Differential thermal analysis) curves for the different fat samples each examined alone) are considerably different.

All samples show an endothermic peak in the low temperature range indicating the melting process. This melting process is not accompanied by weight loss as indicated by examining their TG and DTG curves. DTA curves of the fats examined alone are presented in Figure (1). Table (1) shows the temperatures of the endothermic peaks of the different fats examined alone. These peaks are considered to correspond to their melting point.

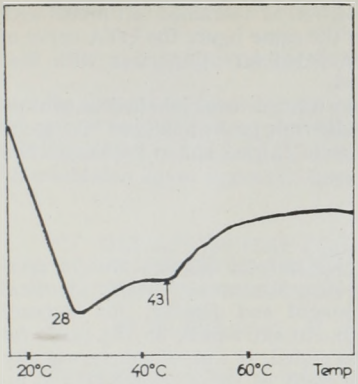

Fig. 3.

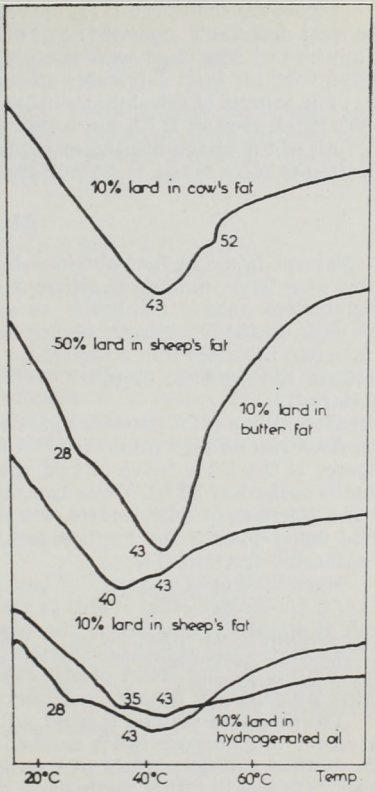

Fig. 2.

Gamoase and cow fats show curves of nearly similar shape which are relatively asymmetric, however the peak is sharper for cow's fat than that of gamoase fat. For butter fat the curve is more flattened, and less asymmetric than in the above two cases.

For mutton the peak is relatively lower than in the above cases and more asymmetric. Lard shows a relatively larger, flattened DTA curve with an endothermic peak at 49 °C. The curve shows a slight flattened peak at 32 °C.

The hydrogenated oil sample shows the most symmetric DTA curve with the smallest area among the different samples examined.

Mixtures of lard with each of the other samples examined shows a further endothermic peak at 43 °C beside that of the original fat (40, 28, 52 and 35 °C for butter fat, mutton, cows fat and hydrogenated oils, respectively) the detection was attained down to 10% of lard in the other fats. For the smaller proportions the detection was somewhat difficult. Examining lard when found in admixtures with a mixture of other animal fats (as cow's fat, gamoase's fat and mutton), an endothermic peak was noticed at 43 °C together with peaks corresponding to the fats incorporated in the mixture.

Figure (2) shows the DTA curves of the different examined fats mixed with the least detectable amount (10%) of lard. In the same figure the DTA curve of a mixture of 50% lard with sheep's fat is included for comparison with that mixed with the least detectable amount of lard.

The sample of fat obtained from imported canned meat labelled to contain cow's meat, shows a DTA curve with two endothermic peaks at 28&43 °C (fig, 3).

All of the above mentioned experiments were carried out in triplicates and the results were found to be reproducible.

Discussion

Natural fats and fats obtained by hardening natural oils are always mixtures of a large number of different triglycerides. Mixtures of nearly identical triglycerides behave physically as one component and display, for instance one peak on the DTA curve during heating (9). An extra-peak on the curve for a fat often indicates that a foreign fat has been added. It can, of course, equally indicate the presence of other contaminants; such as the so-called crystal inhibitors (10).

Generally a DTA curve can give some idea as to the identity of an unknown fat. As it can be seen from the DTA curves of the fat samples examined alone, (figure, 1) the DTA curve of lard shows a main peak at 49 °C. Another small peak is noticed at 32 °C. These two peaks are assumed to be due to the presence of two fractions of triglycerides, the low-temperature peak is due to the disaturated mono-unsaturated fraction and the highertemperature peak is due to the trisaturated fraction (11).

Examination of mixtures of lard with other fats has proved the suitability of DTA for the detection of lard in other fats by the appearance of an additional peak at about 43 °C whatever the type of the other fat ad mixed. The lowering of the temperature of the endothermic peak for lard when mixed with other fats may be due to the effect of the other constituents of the mixture examined which are generally of lower endothermic peaks.

The proposed method is more suitable than other methods previously introduced for this purpose which need special treatments and are time consuming. The method can detect lard in hydrogenated fat, a matter which could not be easily attained by other methods.

However, the most surprising is the detection of lard in the sample of canned meat labelled to be completely free from pig's fat in order to be consumable by moslems.

As a conclusion, the above method is suitable for the qualitative detection of lard when admixed with other fats. The method appears to be suitable also for quantitative determination (fig, 2), a problem whose study is now in progress by the same authors.

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SERTÉSZSÍR DERIVATOGRÁFIÁS KIMUTATÁSA MÁS ÁLLATI ZSÍROKBAN

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Egyszerű és gyors módszert írnak le a sertészsír kimutatására más állati zsírokban vagy hidrogénezett növényi olajokhoz keverten. Az eljárásnál nincs szükség előzetes elválasztásra, és alkalmasnak bizonyult a sertészsír jelenlétének kimutatására egyes importált húskonzervekben.

ОБНАРУЖЕНИЕ СОДЕРЖАНИЯ СВИНОГО ЖИРА В ПРОЧИХ ЖИРАХ ЖИВОТНОГО ПРОИСХОДЕНИЯ С ПОМОЩЬЮ ДЕРИВАТОГРАФИИ

Ф. Й. Кхаттаб., Й. А. Хароун., А. Абоу Эл – Кхеир

Разработали простой и быстрый метод для обнаружения свиного жира в прочих жирах животного происхождения и в гидрогенизированных растительных масглах. Этот метод не требует предварительного определения и является подходящим для выявления наличия свиного жира в некоторых импортных мясных консервах.

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Eine einfache und rasche Methode wird zum Nachweis des Schweinefet ts in anderen tierischen Fetten oder in Fettgemischen mit hydrierten Pflanzenöl en eschrieben. Bei der Methode wird keine vorangehende Abtrennung benöti gt, und dieMethode erwies sich als geeignet, in einigen importierten Fleischkons erven die Gegenwart von Schweinefleisch nachwuweisen.

KÜLFÖLDI LAPSZEMLE

S. EHRENSTORFER; H. O. GÜNTHER

Peszticidmaradékok tyúktojásban és tojásporban

(Pestizidrückstände in Hühnereiern und Eipulvern)

Deutsche Lebensmittel-Rundschau *70*, 3, 105, 1974.

A szerzők friss tojásban és tojásporban különböző mennyiségű klórozott szénhidrogént találtak, amelyek részben a takarmányból származtak. Gáz- és vékonyrétegkromatográfiával nyert peszticideket egy példában azonosították infravörös spektrum segítségével. Az azonosítás alapján a klórozott difenilén jelenléte e mintában kizárható volt.

A szerzők a követelményeket az élelmiszerellenőrzés gyakorlata szempontjából elemzik.

Bálint Mihály
Zalaegerszeg