

This Week's Citation Classic

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Craig B M & Murty N L. Quantitative fatty acid analysis of vegetable oils by gas-liquid chromatography. *J Amer. Oil Chem. Soc.* **36**:549-52, 1959. [Prairie Regional Lab., National Res. Council, Saskatoon, Saskatchewan, Canada]

The fatty acid composition of a number of vegetable oils and two synthetic mixtures of methyl esters are compared by gas-liquid chromatography and by standard methods. The results of GLPC are considered to be accurate to within one percentage unit. Thermal stability of the polyester polymers can be improved by using 1,4 butanediol or ethylene glycol. [The SC[®] indicates that this paper has been cited over 95 times since 1961.]

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"In December 1957, the Prairie Regional Laboratory purchased an A-90 Aerograph gas chromatography device to investigate this new technique for the analysis of the long chain fatty acids and in particular to measure the long chain fatty acids, elcosenoic and erucic, in rapeseed oil. The nonpolar liquid phases gave separations by chain length which could be quantitated and this replaced the tedious high vacuum distillations. Combining the gas chromatographic results with chemical analysis gave us an analysis in two days compared to a week. A commercial polyester showed fatty acid separations by both chain length and degree of unsaturation in a published paper and appeared to be the answer to our problem and prayers.¹ An order for the polyester was immediately dispatched along with the fervent hope that delivery would not be longer than four to six weeks.

"The anticipated delay prompted a visit to the library and a short search brought out

a textbook on polyesters which were simply linear polymers of dicarboxylic acids and dihydric alcohols. We had experience in the synthesis of glycerol esters of fatty acids and decided that synthesizing the new esters presented no great challenge during the waiting period. By the time the commercial product arrived, we had synthesized some ten polyesters and tested these for ability to separate the fatty acids. Two compounds, ethylene glycol succinate and butanediol succinate were particularly effective and were the subject of this highly cited paper. The butanediol succinate gave a complete separation of the fatty acids in rapeseed oil with no overlap of chain length by unsaturation and it became the workhorse. The polyester was tested by Wilkens Aerograph and appeared in their catalogue under the name 'Craig polyester.'

"The development of this polyester and gas chromatography made possible the rapid analysis of fatty acids in rapeseed oil, hydrogenated rapeseed oils, food products, and tissue fats. It also opened the way for research programs at the Prairie Regional Laboratory and other Canadian research institutions on industrial uses, nutrition, and biosynthesis of rapeseed oil and on the inheritance of fatty acids in the developing seed. Further improvements made it possible to analyze the oil from one half of a rapeseed while the other half was used to produce a plant, a technique which was used in a selection program to select the first rapeseed which had an oil devoid of erucic acid. The seven seeds out of a sample of 700 produced the first 'zero erucic rapeseed oil' and over the next 15 years led to a changeover of commercial rapeseed production in Canada to the new type. The crop is still called the 'Cinderella' crop, and has grown to the status of second place in Canadian agricultural production. Although the plants in the field look the same as at first, the vegetable oil and meal have been so changed through plant breeding and selection that the crop has been renamed as Canola instead of rapeseed."

1. **Craig B M & Murty N L.** The separation of saturated fatty acids by gas-liquid chromatography. *Can. J. Chem.* **36**:1297-99, 1958.