



Application note:

Chloride (MCT) in Fatty Acids, Animal Fats and Vegetable Fats

The amount of chloride in fatty acids, animal fats and vegetable fats is analyzed because it affects the devices used during the production process.

SAMPLE INFORMATION

Sample Type	Fats
Component	Chloride
Matrix	Fatty Acids, Animal Fats, Vegetable Fats
Concentration	0.1 – 100 mg Cl/L
Method Applicable	-

SUMMARY

The XPLOER-TX elemental combustion analyzer, equipped with boat introduction module, has been used to perform the analysis of chloride in all kind of fat samples like fatty acids, animal fats, vegetable fats and palm oil. Various samples were introduced by the ARCHIE liquids autosampler equipped with heated sample tray into the XPLOER-TX. The achieved results show a RSD well below 5%.

RESULTS

Sample	Concentration Cl (mg/L)	RSD (%) n=5
Methylester	0.22	3.12
Methylester blend	0.13	4.40
Mascol Lauryl Myristyl Alcohol	0.26	3.99
Crude Palm Oil	0.53	4.99
Animal Fat 1	0.78	4.57
Animal Fat 2	1.42	3.68
Fat A	4.19	1.27
Fatty Acid B	0.13	4.12

Detailed results can be found in the Appendix.

CONCLUSION

The XPLOER-TX equipped with boat introduction module is able to measure the total amount of chloride in all kind of fat samples like fatty acids, animal fats, vegetable fats and palm oil with excellent repeatability (RSD). The heated sample tray and specially developed boat program are key to proper sample introduction and a complete combustion.

CONFIGURATION



XPLOER-TX with boat introduction module



Collision flow tube with boat cooling



ARCHIE liquids autosampler with conditioned sample tray

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METHODS

TE Instruments carried out an application to demonstrate that the XPLOERER-TX is an excellent solution for the analysis of Total Chloride content in fatty acids, animal fats and vegetable fats. This elemental combustion analyzer fully complies with, but is not limited to, the following international norms:

For Sulfur:

- ASTM D4929
- ASTM D5194
- ASTM D5808
- ASTM D6721
- ASTM D7457
- UOP 779
- GB/T 18612

SYSTEM DESCRIPTION

All samples were introduced automatically into the Boat Module of the XPLOERER-TX by the ARCHIE liquids XYZ autosampler. The ARCHIE picks up sample from the assigned vial position and delivers it into the Boat Module. In between analysis of samples, standards, and blanks, the syringe and needle are cleaned in a special dual wash & drain station tray to avoid cross contamination. The proprietary easy-to-use TEIS software controls sample introduction from the sample queue, processes the detector signal and calculates the Total Chloride concentration.

The heated sample tray (50 °C) of the ARCHIE assure that the fat samples can be aspirated and injected as a liquid. The boat module is utilized for samples that are difficult to oxidize or with a final boiling point higher than 420 °C. A custom made boat program facilitates a complete and controlled combustion of these highly viscous samples.

The XPLOERER-TX is fitted with a dual-zone furnace, which enhances combustion performances. The temperature is adjustable up to 1150 °C. The Collision Flow combustion tube with boat cooling has a secondary oxygen flow to assures the sample is fully combusted. Collision of the combusted gases creates a dynamic turbulence of the oxidizing gas stream and replaces some of the depleted oxygen. Resulting in more oxidation power for samples which are difficult to oxidize. The improved cooling mechanism for boat introduction makes it unique. It suits all industrial applications; the most all-round combustion tube available in today's market.

The combustion gas, carrying halide ions is led into a sulfuric acid scrubber for rapid water and interference removal. The clean and dry gas is led into the temperature controlled titration cell which detects the amount of total halogens.

Measuring chloride, by use of microcoulometry is an absolute technique. No calibration required. The dried and clean gas is led into the temperature controlled titration cell, where the halide ions react with the silver ions, present in the titration cell. The amount of charge (the integral of the regeneration current over the measuring time) used to regenerate the lost silver ions, is directly related to the Chloride content of the sample.

*System settings & Boat program can be found in the Appendix.



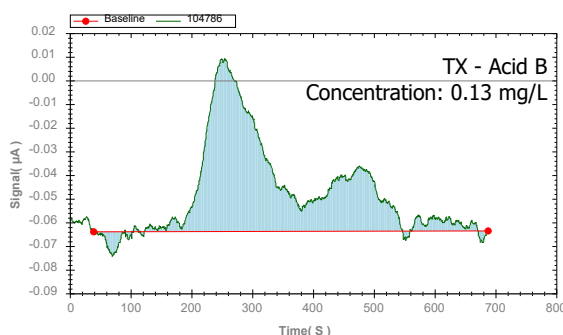
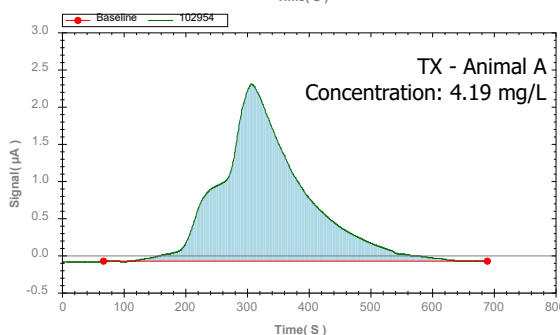
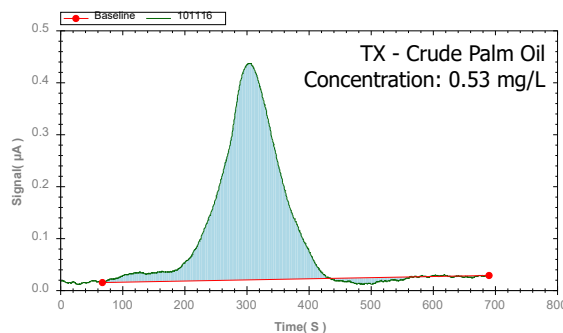
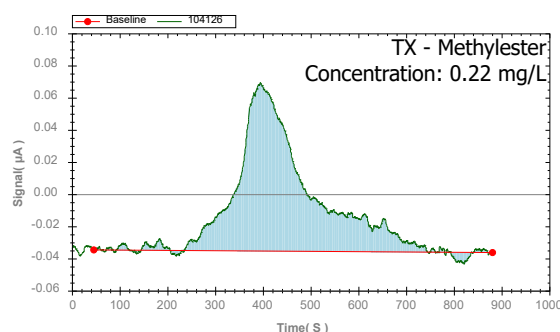
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APPENDIX A EXAMPLE PEAKS



APPENDIX B BOAT PROGRAM

Position (mm)	Speed (mm/s)	Pause (s)
0	5	0
75	5	30
95	5	30
100	5	60
120	5	45
150	5	30
200	5	60
0	10	240

APPENDIX C SYSTEM SETTINGS

System settings	
Oxygen Injection	300 mL/min
Argon Injection	100 mL/min
Oxygen Collision flow	100 mL/min
Oxygen Bypass	50 mL/min
Furnace Temperature I	750 °C
Furnace Temperature II	1000 °C
Tracing	200 °C
Internal System Temperature	30 °C
Gain	Auto gain
Cell Cooling	15 °C
Pick-up Speed	3 µL/s
Injection Speed	5 µL/s
Injection Volume	30 µL