

ASTM D 6751 – 02
Standard Specification for
Biodiesel Fuel (B 100)
Blend Stock for Distillate
Fuels

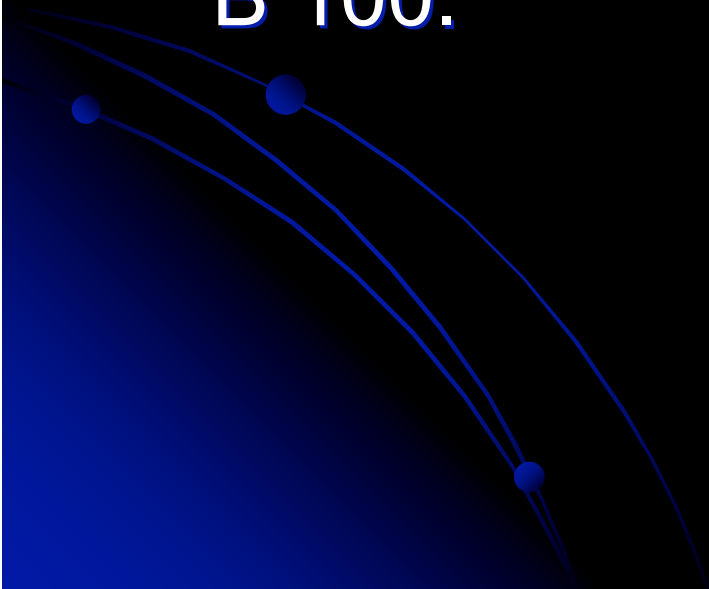


Summary

- This module describes the key elements in ASTM Specifications and Standard Test Methods
- ASTM Specification D 6751 – 02, the specification of B 100 (biodiesel) fuel is described in detail.
- Key properties of B 100 are discussed in terms of their tests and specifications.

Definition of “Biodiesel”


- Biodiesel – a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B 100.



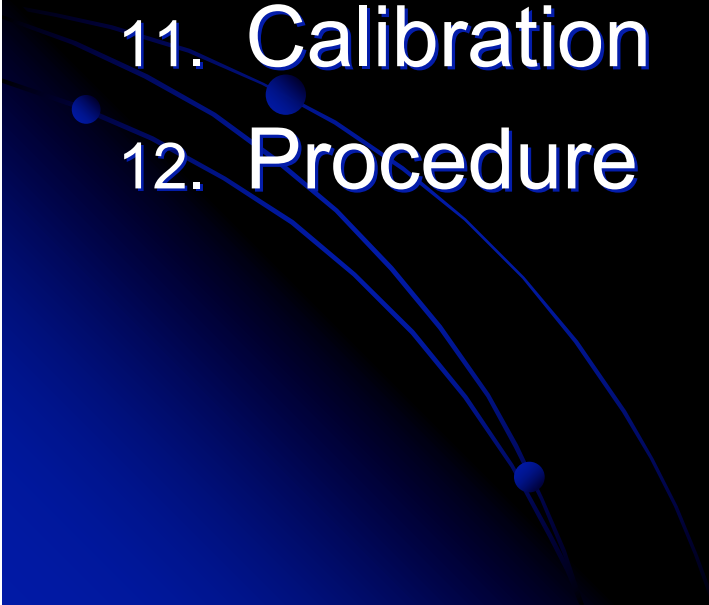
ASTM Testing Procedures

- ASTM Standards are based upon the use of a number of ASTM Methods to perform the property measurements.
- The Methods provide very explicit directions with respect to the equipment, the measurements, and the data analysis.
- Standardization of procedure and reproducibility of results among laboratories is the goal of the process.


ASTM Methods Structure

1. Scope
 2. Referenced Documents
 3. Terminology
 4. Summary of Test Method
 5. Significance and Use
 6. Interferences
 7. Apparatus
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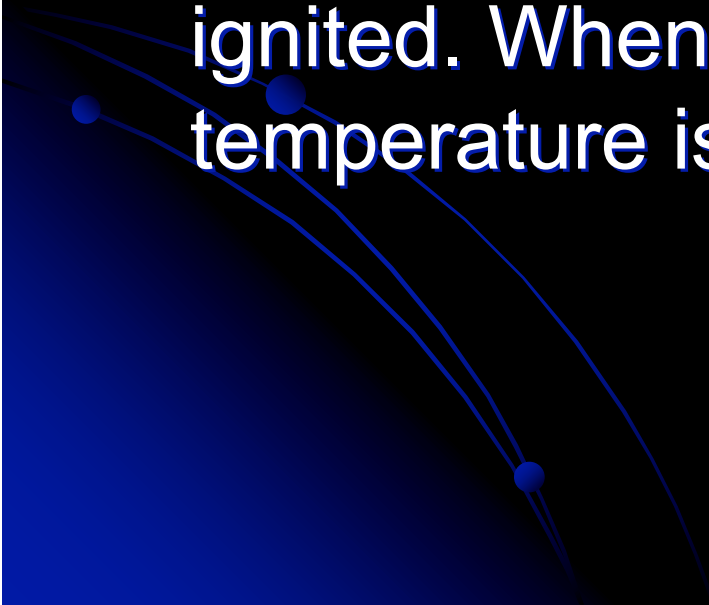
ASTM Methods Structure, cont.

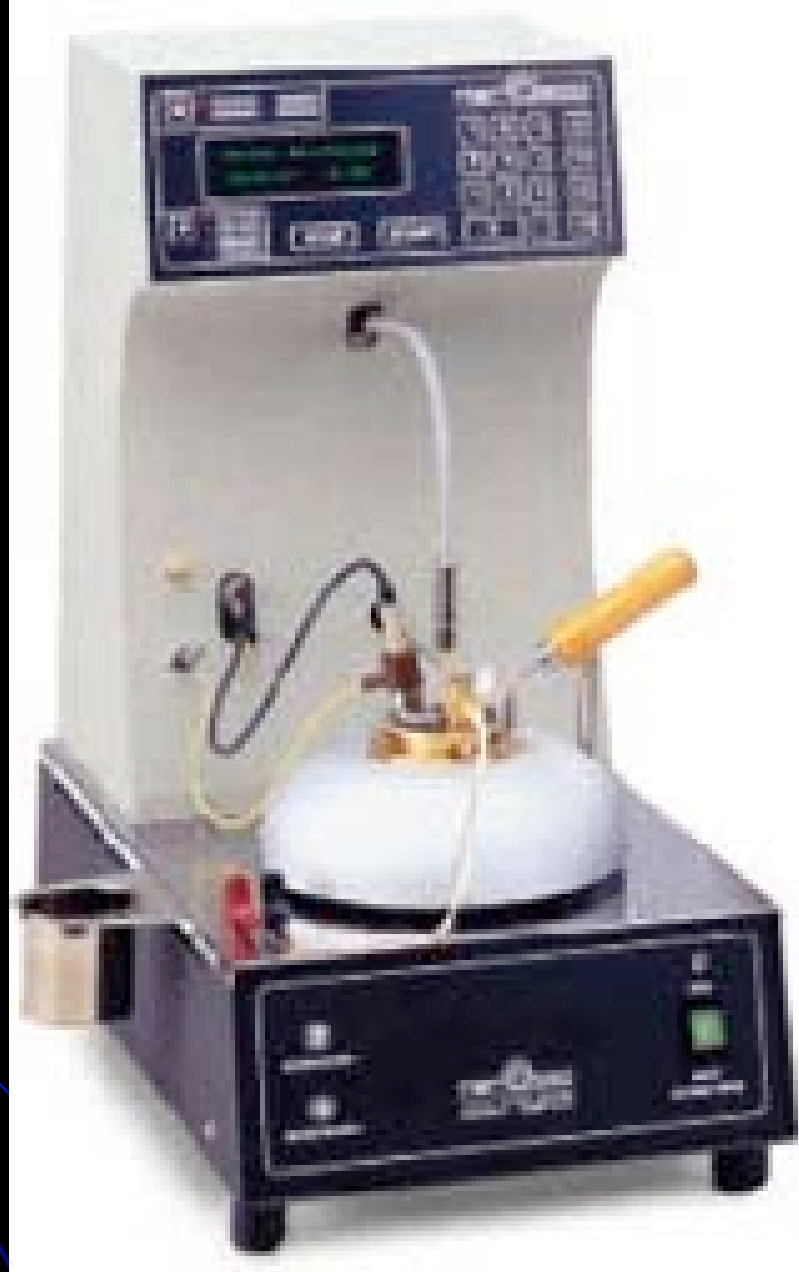
8. Reagents and Reference Materials
 9. Sampling
 10. Apparatus Standard Operating Conditions or Preparation of Apparatus
 11. Calibration
 12. Procedure
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ASTM Methods Structure, cont.

13. Quality Control Checks
 14. Calculations
 15. Report
 16. Precision and Bias
 17. Keywords
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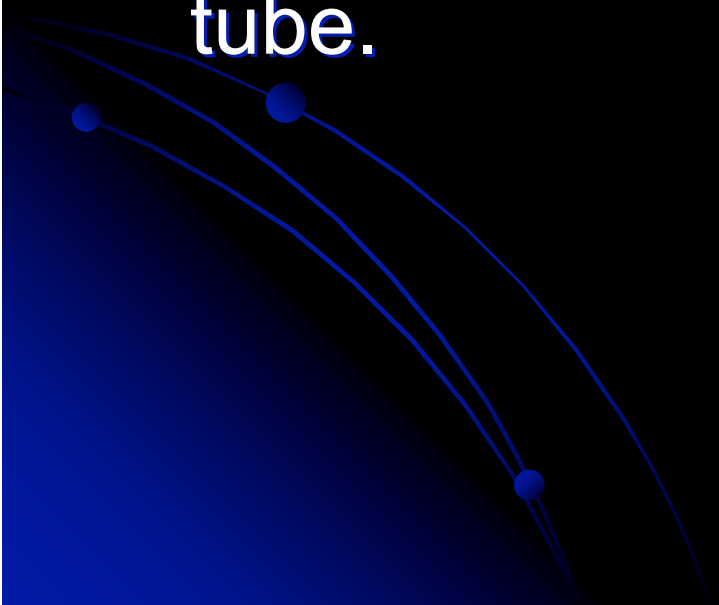
Flash Point

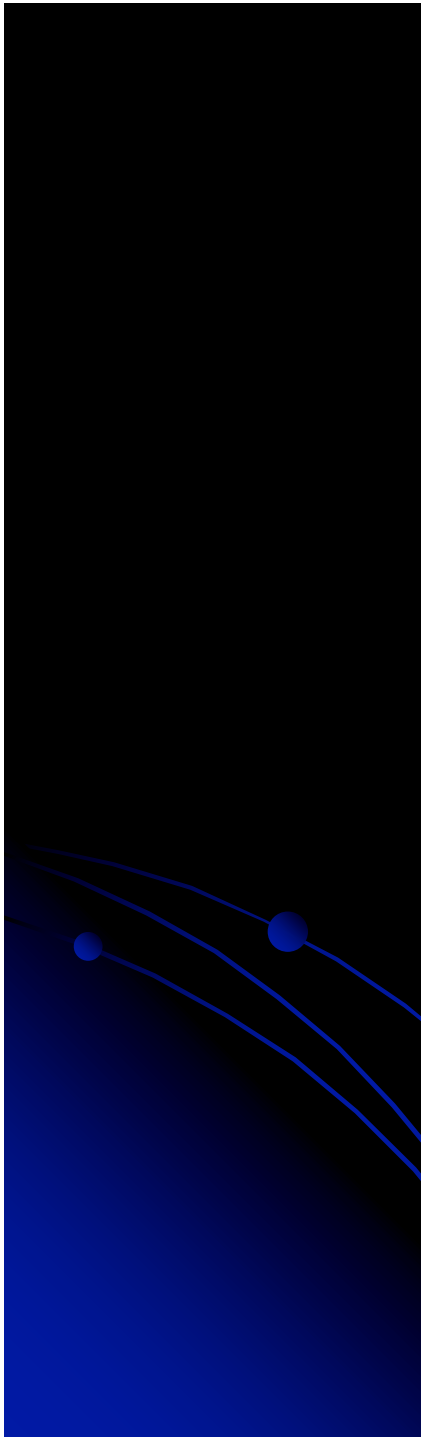
- Method ASTM D 93
 - Limit: 130°C minimum
 - Temperature
 - A sample is heated in a close vessel and ignited. When the sample burns, the temperature is recorded.
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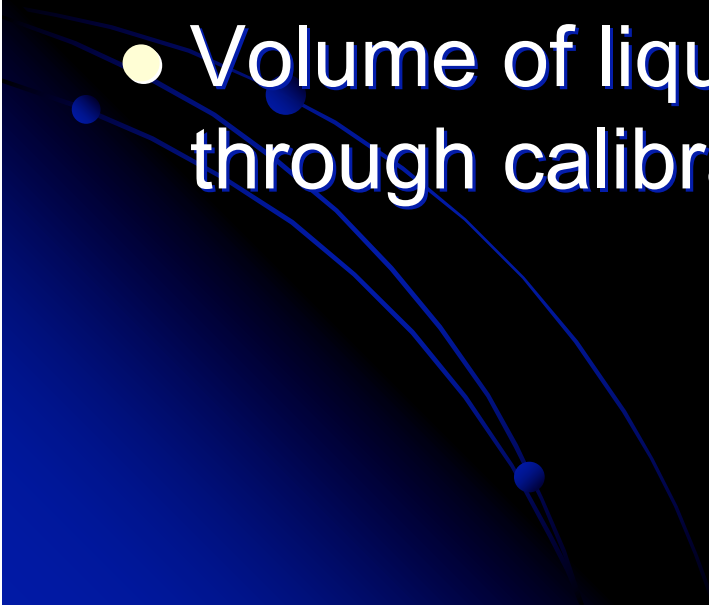
Water and Sediment

- Method D 2709
- 0.050 % volume maximum
- 100 mL of sample are centrifuged at 800 rcf for 10 min at 21° to 32°C in calibrated tube.





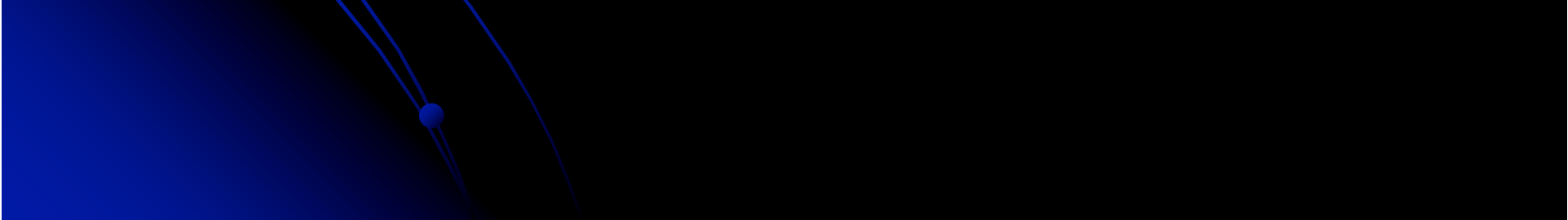
Kinematic Viscosity

- Test Method D 445
 - Measured at 40°C
 - Limits: 1.9 – 6.0° mm²/s
 - Generally higher than Petrodiesel
 - Volume of liquid flows under gravity through calibrated capillary
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Sulfated Ash

- Test Method ASTM D 874
- Limits: 0.020 % mass maximum
- Sample ignited and burned
- Ash + carbon (C removed by H_2SO_4)
- Indication of concentration of metal additives (Ba, Ca, Mg, Na, K, Sn, Zn)



Sulfur

- Test Method ASTM D 5453
- Limits: 0.05 % mass maximum
- S oxidized to SO_2 at high temperatures
- UV fluorescence of emitted gases $\text{SO}_2 \rightarrow \text{SO}_2^* \rightarrow \text{SO}_2$
- S limits dictated by environmental considerations
- Limits vary according to State regulations

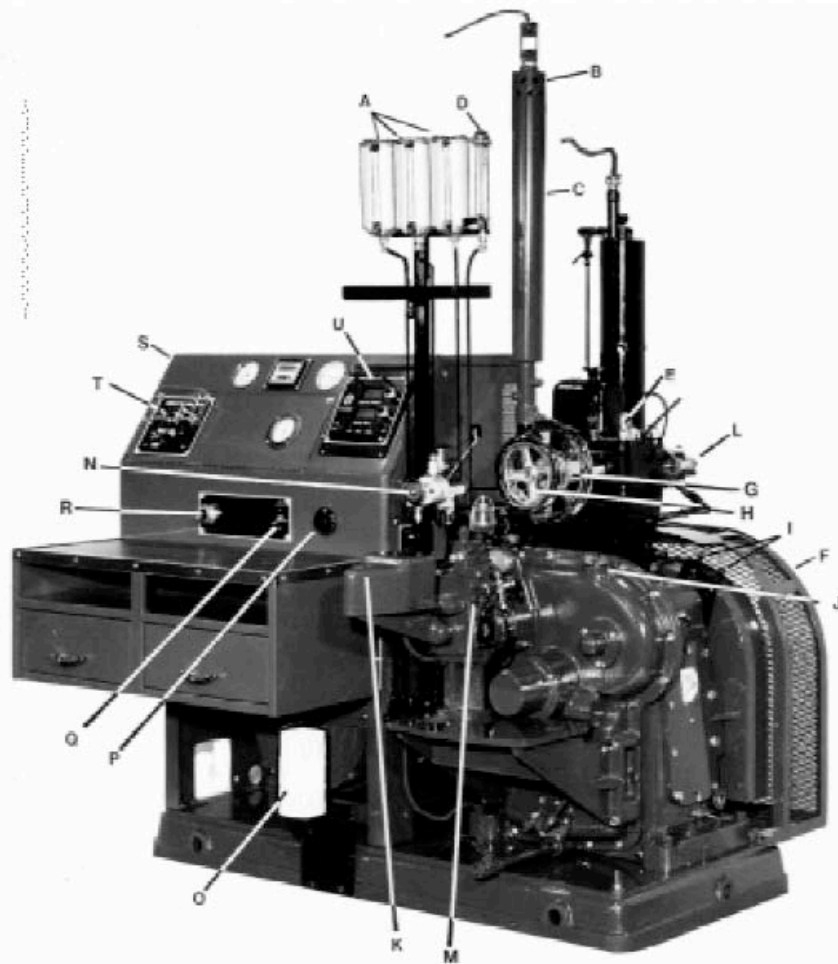


Copper strip corrosion

- Test Method ASTM D 130
- Limits: No 3 maximum
- A copper strip is immersed into a fixed volume of sample and heated for a certain period. The color of the strip is compared to standards.
- Amount of S not directly correlated to corrosivity of fuel.

Cetane Number

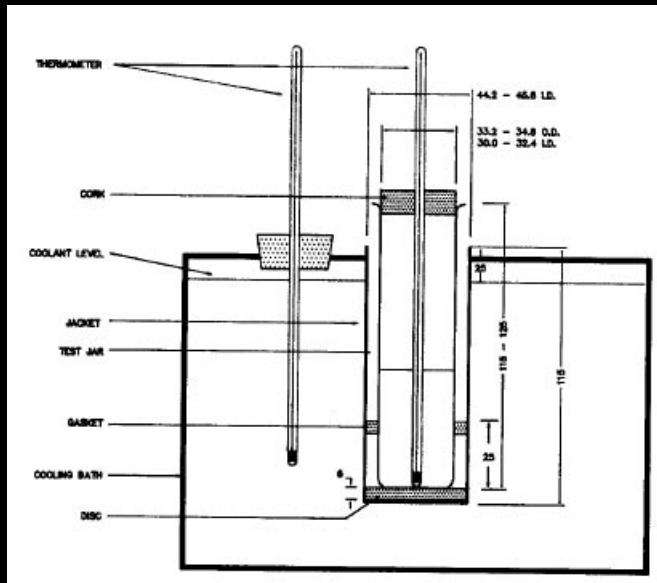
- Test Method ASTM D 613
- Limits: 47 minimum
- Comparison of combustion characteristics with reference fuels.
- Measure of ignition characteristics
- Compression ratio is varied for the sample and 2 bracketing standards.



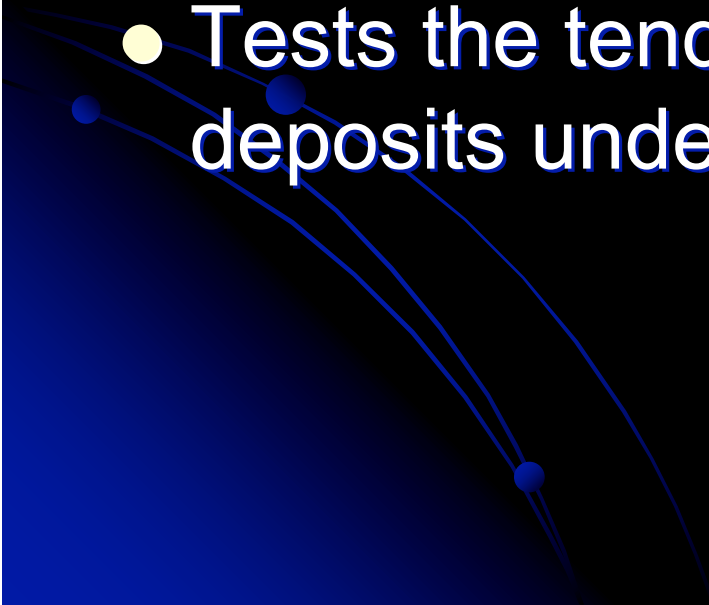
- A—Fuel Tanks
- B—Air Heater Housing
- C—Air Intake Silencer
- D—Fuel Flow Rate Buret
- E—Combustion Pickup
- F—Safety Guard
- G—Variable Compression Plug Handwheel
- H—V.C.P. Locking Handwheel
- I—Flywheel Pickups
- J—Oil Filler Cap
- K—Injection Pump Safety Shut-Off Solenoid
- L—Injector Assembly
- M—Fuel Injection Pump
- N—Fuel Selector-Valve
- O—Oil Filter
- P—Crankcase Oil Heater Control
- Q—Air Heater Switch
- R—Engine Start-Stop Switch
- S—Instrument Panel
- T—Intake Air Temperature Controller
- U—Dual Digital Cetane Meter

Cloud point

- Test Method ASTM D 2500
- Limits: No established limits
- Reported in °C
- Sample cooled and examined visually until first cloud appears.
- Indicates the lowest temperature at which fuel is usable.
- Generally higher than Petrodiesel.



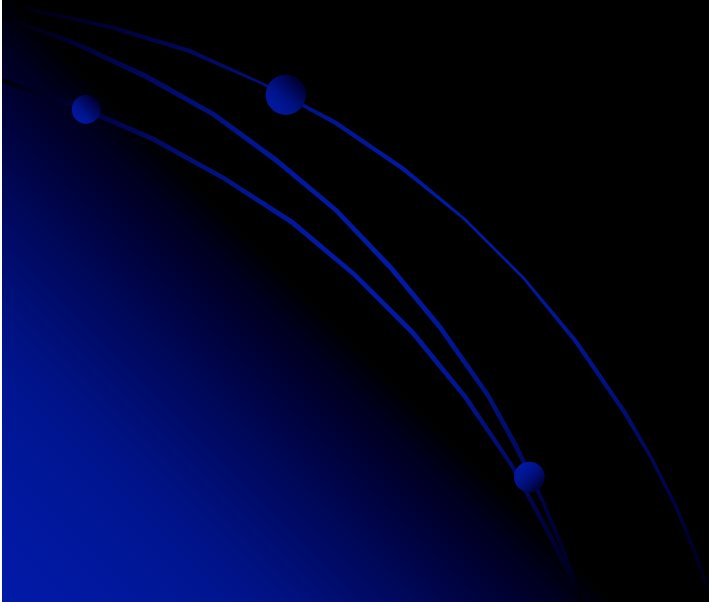
Carbon Residue

- Test Method ASTM D 4530
 - Limits: 0.050 % mass maximum
 - Sample heated at 500°C under inert atmosphere (N₂)
 - Tests the tendency of the sample to form deposits under degradation
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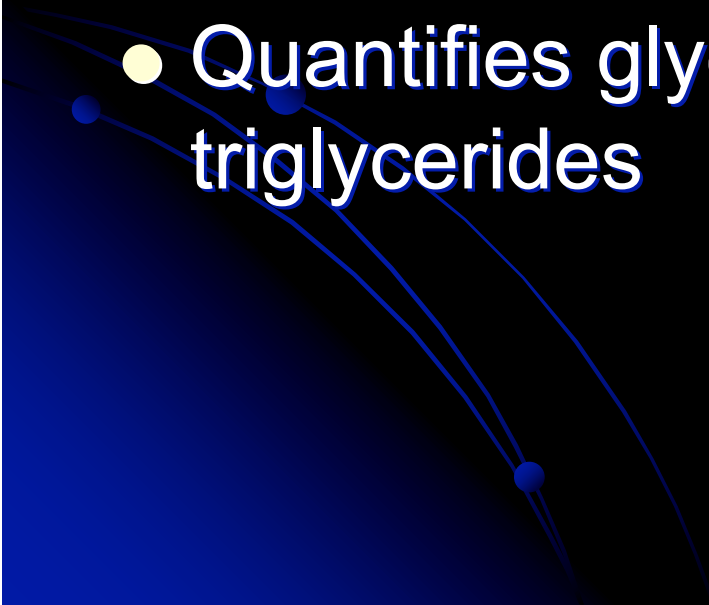
Acid Number

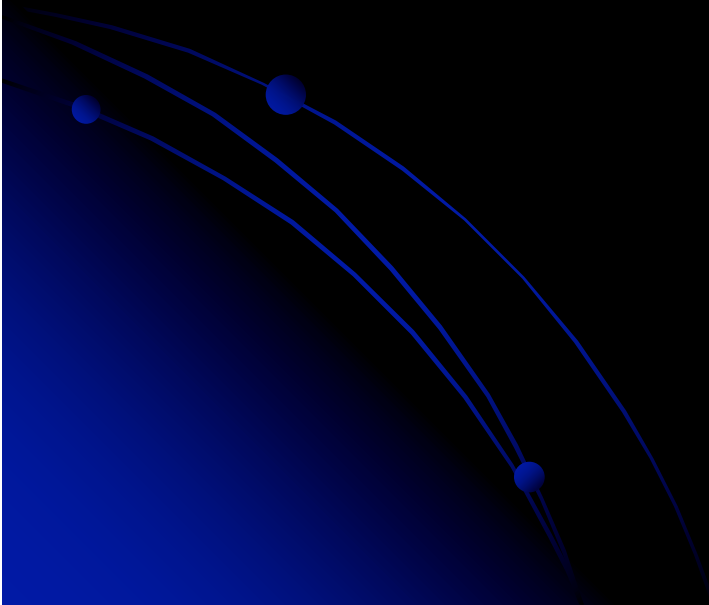
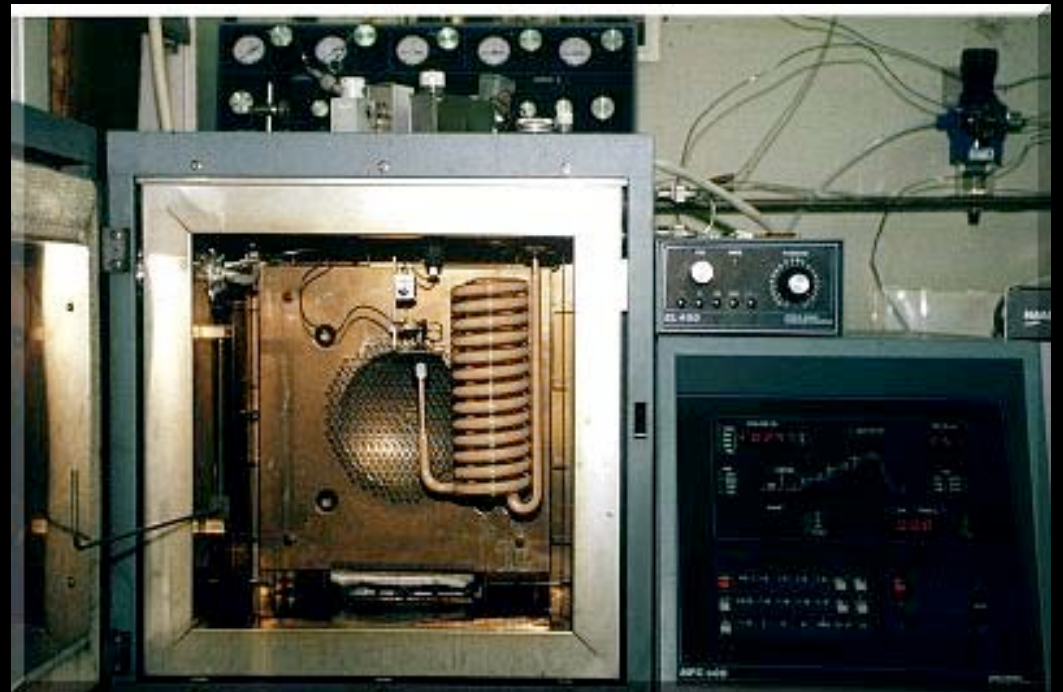
- Test Method ASTM D 664
- Limits: 0.8 mg KOH/g maximum
- pH sensitive electrode
- May also be determined using indicators



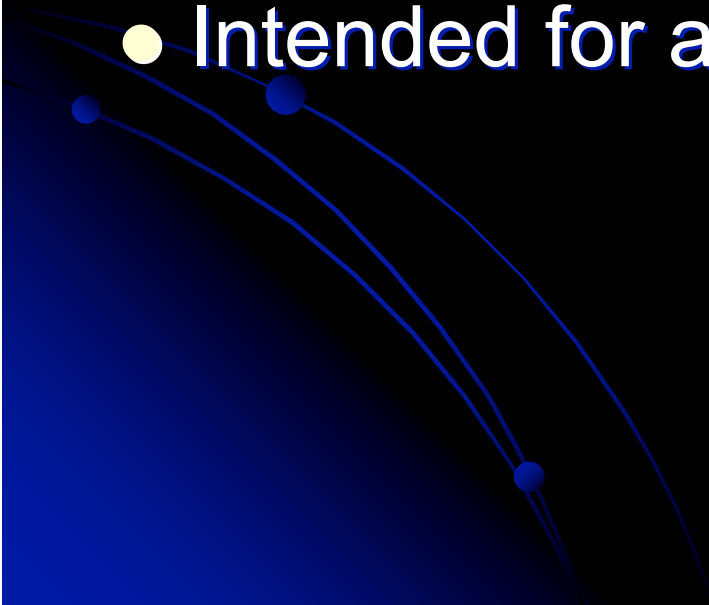


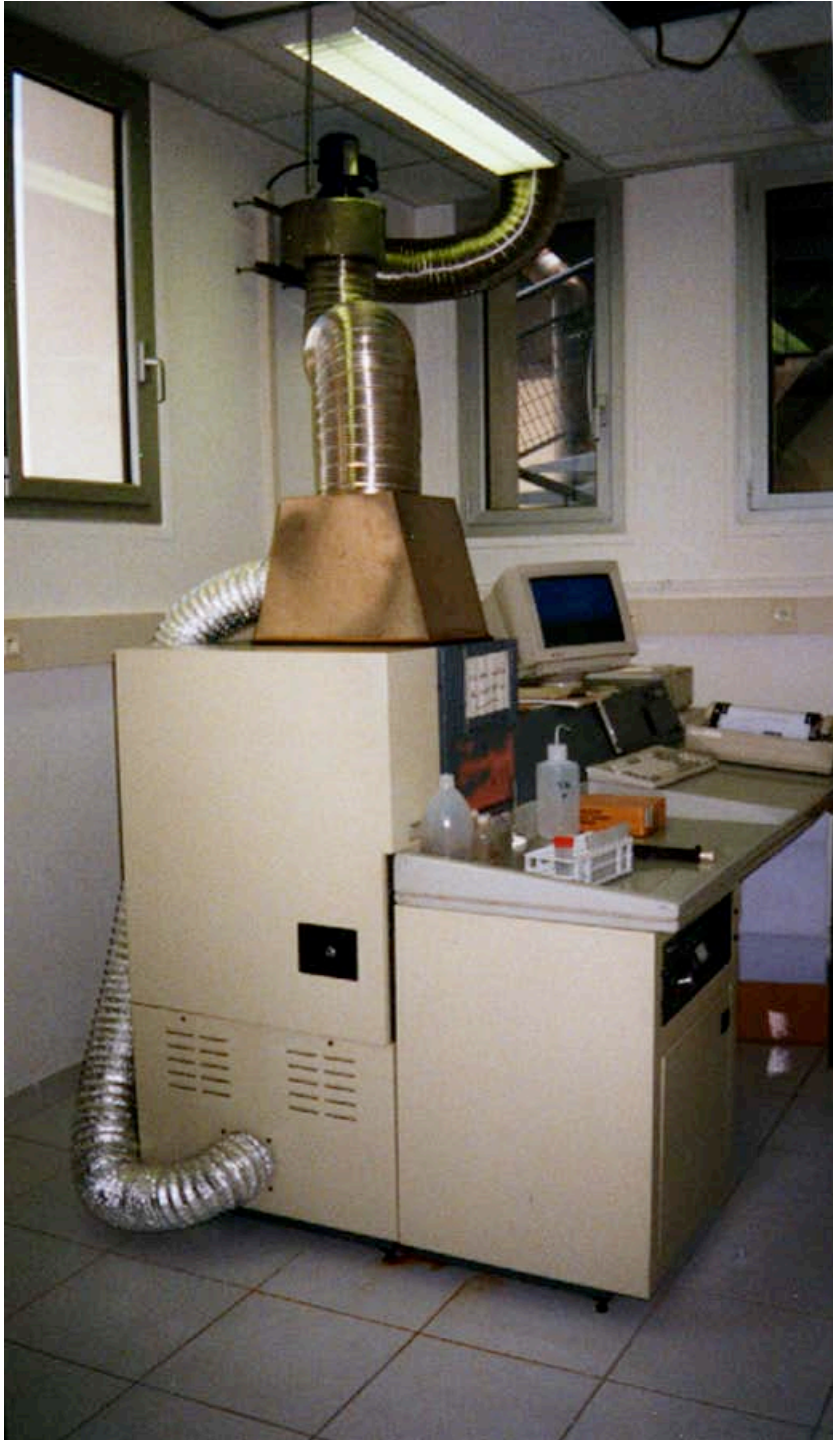
Free and Total Glycerin

- Test Method ASTM D 6584
 - Limits: 0.020 % mass free glycerin
 - 0.240 % mass total glycerin
 - Gas Chromatography with FID detection
 - Quantifies glycerine, mono-, di- and triglycerides
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Phosphorous content

- Test Method ASTM D 4951
 - Limits: 0.001 % mass maximum
 - ICP – Determines 8 elements (Ba, B, Ca, Cu, Mg, P, S, Zn)
 - Intended for additive packages
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Distillation Temperature

- Test Method ASTM D 1160
- Limits: 360°C maximum when 90% recovered
- Bears relation with viscosity, vapor pressure, heating value, average molecular weight, etc
- Indication of suitability for desired application.

