



Waste oil test methods implemented in Outão Quality Control Laboratory



Agenda

- Why this concern?
 - Environmental License
 - Influences on Production Process
- Test methods implemented in Outão
- PCB+PCP Project



Waste Oil

A petroleum based oil which, through use or handling, has become unsuitable for its original purpose due to the presence of impurities or loss of original properties. It must have sufficient liquid content to be free flowing.



Waste Oil Characterization

Why this concern?



Environmental License

Co-incineration of hazardous waste



Admission Requirements



Safety Co-incineration



Environmental License

Compound	Maximum Value*
Sulphur S (%)	4,5
Chlorides Cl (%)	4
Fluorine F (mg/Kg)	2000
Mercury Hg (mg/Kg)	10
Cd + Tl (mg/Kg)	100
Sb + As + Pb + Cr + Co + Ni + V + Sn + Te + Se (mg/Kg)	2500
PCB+PCP (mg/Kg)	30

* Maximum value for admission of hazardous waste on the plant .



Influences in Production Process

- Clinkerization process;
- Kiln conditions;
- Emissions;
- Clinker and cement final quality.



Physical and Chemical Characterization



Waste Oil Characterization

Characteristics

Physical	Calorific Value (J/g)
	Water Content (%)
Chemical	% of C, H, N, S, Al, Ca, Cl, F, Fe, K, Mg, Na, P, Si, Ti
	ppm of As, Ba, Br, Cd, Ce, Co, Cr, Cs, Cu, Hg, Mo, Ni, Pb, Rb, Sb, Sc, Se, Sn, Sr, Te, Tl, V, Zn, PCB and PCP content



Test Methods in Outão



Calorific Value

Water Content

Carbon, Hydrogen, Nitrogen and Sulphur

Chemical Analyses



Test Methods in Outão

Frequency of Analyse



1 sample per batch/supplier



Test Methods in Outão

Sampling



Preparation of test sample



Calorific Value

Standard

ASTM D240

Standard test method for heat of combustion of liquid hydrocarbon fuels by bomb calorimeter



Calorific Value



- Water Level;
- O₂ pressure.



Equipment stability



Calorific Value



- Homogeneity;
- Low Calorific Value.





Water Content

Standard

ASTM D5530

Standard test method for Total Moisture of Hazardous waste Fuel by Karl Fischer Titrimetry



Waste Content



- Homogeneity;
- Viscosity.



Carbon (C), Hydrogen (H), Nitrogen (N)

Standard

ASTM D5291

Standard test method for Instrumental Determination of Carbon, Hydrogen and Nitrogen in Petroleum Products and Lubricants



Carbon (C), Hydrogen (H), Nitrogen (N)



- O₂ quality;
- H₂ quality;
- Condition of consumables.



Equipment stability



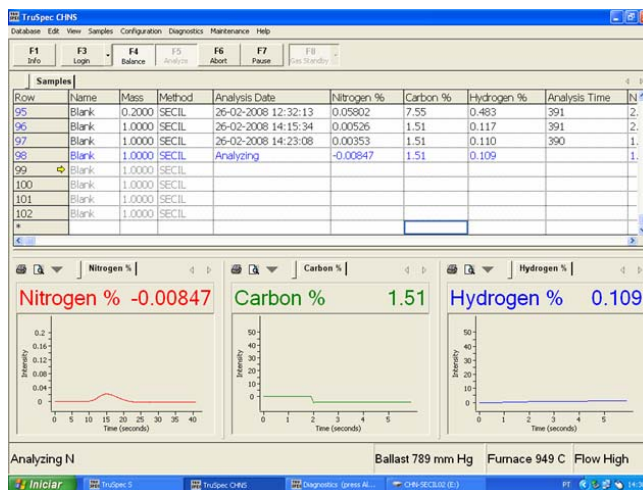
Carbon (C), Hydrogen (H), Nitrogen (N)



- Homogeneity;
- Fast Combustion.



Carbon (C), Hydrogen (H), Nitrogen (N)





Sulphur (S)

Standard

ASTM D5291

Standard test method for Sulphur in Petroleum Products (High Temperature Methods)



Sulphur (S)



- O₂ pressure;
- Condition of consumables.



Equipment stability



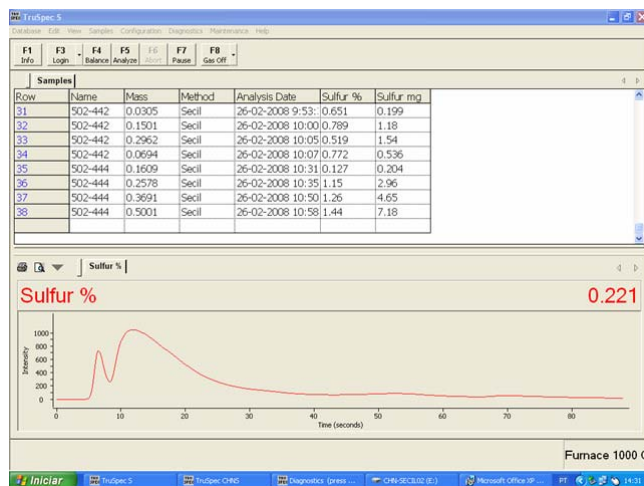
Sulphur (S)



- Homogeneity;
- Fast Combustion.



Sulphur (S)





Chemical Analyses

Standard

ASTM D6052

Standard test method for preparation and elemental analysis of liquid hazardous waste by energy-Dispersive x-ray fluorescence



Chemical analyses by x-ray

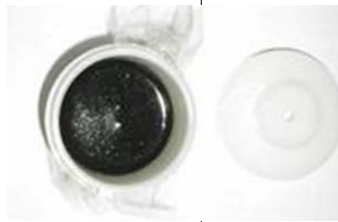
Chemical analyses by x-ray [Preparation with Al_2O_3]



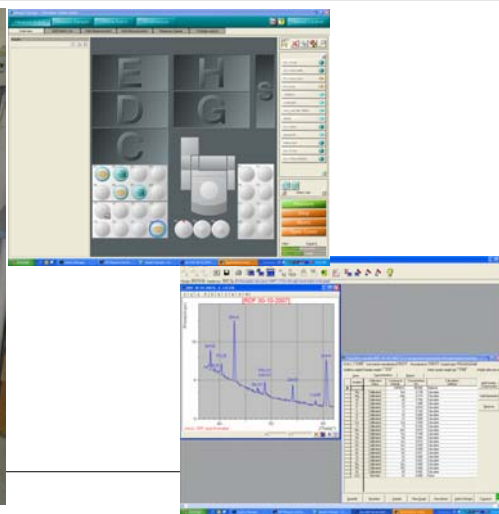


Chemical analyses by x-ray

Chemical analyses by x-ray [Preparation for test with Helium]



Chemical analyses by x-ray





PCB and PCP content

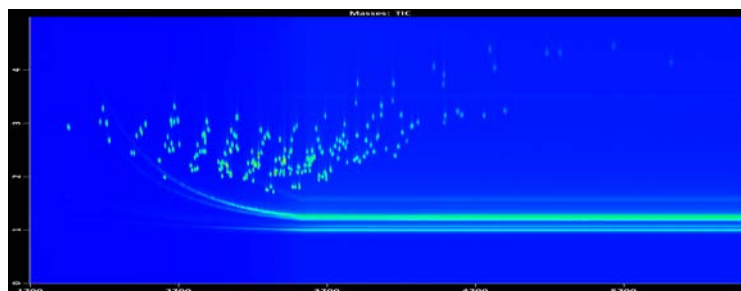
PCB and PCP content

EN 12766-1

Petroleum products and used oils - Determination of PCBs and related products - Part 1: Separation and determination of selected PCB congeners by gas chromatography (GC) using an electron capture detector (ECD)



PCB and PCP content



- Leco, Instrumentos
- Universidade Nova de Lisboa



Thank you for your attention.

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