

# Automotive Fuels from Flash-pyrolysis of Biomass Bio-oils

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## Summary

On the frame of a EU project (AIR-CT92-0216) related to the upgrading of pyrolysis bio-oils, in which the Department of Chemistry of the University of Sassari was partner and coordinator of the hydrotreating process, the feasibility of the complete deoxygenation and stabilisation of pyrolysis oil was demonstrated in a bench-scale continuous plant (UNISS) and in a 10 kg/h pilot plant (DMT)

The product (yield 52.8% db) can be considered a mixture of a industrial gas oil and a light naptha which can be processed by common refineries (reforming)

## Characteristics of the hydrogenated bio-oil compared with the flash-pyrolysis bio-oil

		Flash pyrolysis Bio-oil	Hydrogenated Bio-oil
Density @ 20°C	g/cm <sup>3</sup>	1.258	0.801
Viscosity @ 20°C	mm <sup>2</sup> /s	857.8	1.35
Pour Point	°C		< -35
Flash Point	°C		< 6
LHV	MJ/kg	19.8	21.4
Ash	% wt.	0.4	0
Moisture	% wt.	20.5	<0.05
C	% wt. (dry)	46.0	87.3
H	% wt. (dry)	6.9	12.7
O	% wt. (dry)	47.0	<< 0.1
N	ppm (dry)	352	2
S	ppm (dry)	57	32

## Characteristics of the final products

		Reforming product	Commercial reformat
Density @ 15°C	g/cm <sup>3</sup>	0.825	< 0,81
<b>Distillation</b>	Initial Boiling Point	°C	> 30
	10% evaporated	°C	76,3
	20% evaporated	°C	90,3
	50% evaporated	°C	130,2
	90% evaporated	°C	196,6
	Final Boiling Point	°C	213
Gum test	mg/100ml	1	< 4
Oxidation stability	min.	> 480	> 480
Clear octane number (Research)		90	> 86,5
Copper corrosion (3h @ 50°C)		< 1	< 1

		Hydrogenated bio-oil Heavy fraction	Commercial diesel fuel	Industrial gas oil	
Density @ 15°C	g/cm <sup>3</sup>	0.9024	< 0.84		
<b>Distillation</b>	Initial Boiling Point	°C	224	> 170	
	recovered @ 250°C	% vol.	11.5	< 65	
	recovered @ 300°C	% vol.	53.8	> 60 e < 80	> 50
	recovered @ 350°C	% vol.	86.5	> 87	
	Final Boiling Point	°C	396	< 500	< 500
Colour		2.5	< 2	< 2	
Flash point	°C	102	> 55	> 55	
Sulphur	% wt.	0.025	< 0.03	< 0.07	
Corrosion number		absent	absent	absent	
Cloud point	°C	non detectable		< +50	
Neutralization no.	mg KOH/g	0.27	< 2		
Oxidation stability	min	> 420			
Cetane index		38.5	> 47	> 30	