GREEN FUEL Nordic Oy

X **SAFETY DATA SHEET** (INFORMATION FORM FOR CHEMICALS DATA)

Date: 12 December 2013 **Former date:** 14 August 2012

SECTION 1:IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Trade name

FAST PYROLYSIS BIO-OIL

Company product code
-

Reach registration number
01-2120015452-70-xxxx

1.2 Relevant identified uses of the substance or mixture and uses advised against

The uses of the chemical
Fuel for energy production

Classification of economic activities (NACE)	40 Electricity, gas, steam and hot water supply
Use categories (UC62)	27 Fuels
The chemical can be used by the general public	☐
The chemical is used by the general public only	☐

1.3 Details of the supplier of the safety data sheet

Manufacturer, importer, other undertaking
Green Fuel Nordic Oy

Street address	Puijonkatu 29B
Postcode and post office	FI-70100 Kuopio
Post-office box	
Postcode and post office	
Telephone number	
Telefax	
E-mail address	info@greenfuelnordic.fi
Finnish Business ID (Y code)	FI-2433-135-7

1.4 Emergency telephone number **112**

Poison Information centre (in Finland), open 24 h daily
(09) 471977 or (09) 4711

SECTION 2: HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

1272/2008 (CLP)
Met. Corr. 1; H290, Skin corr. 1C; H314, Skin Sens. 1A; H317, Asp. Tox. 1; H304, Aquatic Chronic 3; H412

67/548/EEC – 1999/45/ED:
C; R34, Xi; R43, Xn; R65, R52/53

2.2 Label elements
GHS05, GHS07, GHS08

Signal Word: **Danger**

Hazard Statements:

H290	May be corrosive to metals.
H304	May be fatal if swallowed and enters airways.
H314	Causes severe skin burns and eye damage.
H317	May cause an allergic skin reaction.
H412	Harmful to aquatic life with long lasting effects.

Precautionary Statements:

P280	Wear protective gloves/protective clothing/eye protection/face protection.
P284	Wear respiratory protection.
P301+P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P302+P352	IF ON SKIN: Wash with plenty of soap and water.
P305+351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

2.3 Other hazards
FIRE AND EXPLOSION HAZARD: Combustible liquid.
Strong characteristic odour.
Properties of the substance may vary according to raw material, production process and batch.

SECTION 3:COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous ingredients

CAS/EC number and the registration number	Name of the ingredient	Concentration	Classification
CAS 1207435-39-9	Fast pyrolysis bio-oil	100 %	Met. Corr. 1; H290, Skin corr. 1C; H314, Skin Sens. 1; H317, Asp. Tox. 1; H304, Aquatic Chronic 3; H412
	Contains:		
67-56-1 / 200-659-6	Methanol	< 3 %	Flam. Liq. 2; H225, Acute Tox. 3; H301, H311, H331, STOT SE 1; H370
50-00-0 / 200-001-8	Formaldehyde	< 0.5 %	Carc. 2; H351, Acute Tox. 3; H301, H311, H331, Skin Corr. 1B; H314, Skin Sens. 1; H317

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures
General advice: Anyone providing first aid should avoid any contact with the product. Use appropriate protective equipment. Move victim immediately away from the danger zone. Never give anything orally to an unconscious person. If exposure has occurred, seek medical attention.
Inhalation: If vapour has been inhaled, remove victim to fresh air and keep warm and at rest in a position comfortable for breathing. If needed, oxygen or cardiopulmonary resuscitation should be administered by qualified personnel. Seek medical attention.

Skin contact: Remove contaminated clothing immediately. Cleanse affected area(s) immediately by washing with mild soap and plenty of water. If the product is hot, rinse with plenty of water for at least 15 minutes. Seek medical attention.
Eye contact: Rinse with warm water and neutral soap, then continue rinsing with warm water for at least 15 minutes, holding eyelids open. Remove contact lenses if present and easy to do. Seek medical attention. Continue rinsing during transportation to hospital.
Ingestion: Rinse mouth immediately with water and give plenty of water or milk to drink. DO NOT INDUCE VOMITING. If the victim vomits, hold head down. If breathing difficulties develop, follow instructions under "Inhalation". Seek immediate medical attention.

4.2 Most important symptoms and effects, both acute and delayed
Inhalation: May release toxic, irritating or harmful volatile compounds (formaldehyde, acetaldehyde, phenol, furfural).
Skin contact: Corrosive, causes severe skin burns. May cause an allergic reaction.
Eye contact: Corrosive, causes severe eye damage.
Ingestion: Irritates mouth and gastrointestinal tract. Aspiration to lungs may cause irritation of the airways and lung damage. Aspiration to lungs may lead to immediate or delayed breathing difficulties. Danger of chemical pneumonitis.

4.3 Indication of any immediate medical attention and special treatment needed
Treat symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1 Extinguishing media
Foam, dry chemical, carbon dioxide, water spray.

5.2 Special hazards arising from the substance or mixture
Combustible liquid. In a fire or if heated, a pressure increase will occur and the container may burst. In a fire or if heated, toxic or harmful gases may be formed (formaldehyde, acetaldehyde, acrolein, phenol, furfural). Polymerization occurs at temperatures exceeding 100 °C.

5.3 Advice for firefighters
Use appropriate protective equipment and a self-contained breathing apparatus. Keep storage containers cool with water spray from a safe distance.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Evacuate the area upwind. Prevent entry of unnecessary and unprotected personnel. Those working on cleaning up the spill must wear appropriate personal protective equipment (see Section 8). Avoid contact with the product and breathing vapours.

6.2 Environmental precautions
Avoid entry into soil, waterways, drains or sewers. Contain the leak with barriers. Stop leak of without risk. If possible, collect the spilt material.

6.3 Methods and material for containment and cleaning up
Do not touch the product without appropriate protective equipment. Collect the spilt material in suitable labelled containers, close and reuse or dispose of in accordance with local regulations (see Section 13). Small volumes can be absorbed with inert and noncombustible materials (e.g. sand). After cleanup, minor remnants may be rinsed with water. Note fire and health hazards caused by hot product. Inform the relevant authorities immediately. Use appropriate protective equipment in all operations (see Section 8).

6.4 Reference to other sections
Personal protection equipment: see section 8
Disposal: see section 13

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling
Do not breathe fumes (formaldehyde, acetaldehyde, phenol, furfural) when transfering the product or opening containers. Ensure adequate ventilation while handling the product. Use appropriate personal protective equipment (see Section 8). Do not eat, drink or smoke in areas where this product is handled, stored or processed. Wash thoroughly after handling the product and before breaks. If working in confined spaces, note hazards due to oxygen replacement and volatile compounds. May be heated before use. Note fire and health hazards caused by hot product.

7.2 Conditions for safe storage, including any incompatibilities
Store in containers and storage spaces suited for combustible liquids. Do not store in open containers. Ensure adequate ventilation. Take appropriate precautions to prevent entry in drains, sewers, soil or water courses. Suitable packaging materials: stainless steels (20M04, 304L, 316L, 430) and most plastics (PTFE, HDPE, PE, PP). EPDM has been found a durable sealant. Regarding long-term storage, see point 10.2.

7.3 Specific end use(s)
No specific end uses other than intended use.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

National (finnish) occupational exposure limit values
No applicable exposure limit values for the product itself.

HTP values for ingredients

CAS number	Name of ingredient	HTP 8 h		HTP 15 min		Note
		ppm	mg/m³	ppm	mg/m³	
67-56-1	Methanol	200	270	250	330	Skin
50-00-0	Formaldehyde	0.3	0.37	1	1,2	Ceiling value

Other limit values
No applicable other limit values for the product itself.

DNEL
Systemic effects: worker
Long term, inhalation DNEL = 22 mg/m3
Acute, inhalation DNEL = 132 mg/m3

Systemic effects: general population
Long term, inhalation DNEL = 11 mg/m3
Acute, inhalation DNEL = 11 mg/m3
Long term, oral DNEL = 0.25 mg/kg bw/day
Acute, oral DNEL = 1.5 mg/kg bw/day

Man via the environment:
Systemic long term inhalation: 11 mg/m3
Systemic long term oral: 0.25 mg/kg bw/day

PNEC
PNEC (fresh water) = 0.232 mg/L
PNEC (marine water) = 0.0232 mg/L
PNEC (water, intermittent releases) = 0.354 mg/L
PNEC (STP) = 9.77 mg/L

8.2 Exposure controls

Appropriate engineering controls
Use process enclosures as far as possible. Ensure adequate ventilation. Ensure that eyewash stations and safety showers are close to the workstation location.
Eye/face protection
Use safety goggles. If needed, use a face shield.
Skin protection
Use appropriate protective clothing and boots to provide liquid splash protection. When handling heated product, use protective clothing that provides insulation against heat (e.g. cotton).
Hand protection
Use chemical-resistant, impervious gloves that provide insulation against heat (nitrile rubber). Follow instructions provided by the glove manufacturer.
Respiratory protection

Use a respirator with A2+P3 type filter when exposure is likely. When handling heated product, use a respirator with AB+P3 type filter.

Thermal hazards

Use protective clothing and gloves that provide appropriate insulation against heat if handling heated product.

Environmental exposure controls

Prevent entry into soil, sewers, drains or waterways.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Dark brown to black viscous liquid.
Odour	Intensive organic and smokey odour
Odour threshold	Unknown.
pH	2.5–3.5
Melting point/freezing point	Measured value: Melting point -22.7 °C (101325 Pa). Pour point ≤ -10 °C.
Initial boiling point and boiling range	< 100 °C (initial boiling point; partly polymerizes, partly undistillable).
Flash point	51 °C (101325 Pa). Flash points from 40 °C to above 100 °C have been measured for fast pyrolysis bio-oils.
Evaporation rate	Unknown.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	Unknown.
Vapour pressure	Ca. 24 hPa (20 °C), 119 hPa (50 °C); water = 6.5 kPa.
Vapour density	Unknown.
Relative density	1.1742 (20 °C; water content 31 %). Densities of biomass pyrolysis liquids are a function of water content. Typical values 1.1-1.3.
Solubility(ies)	Partly water-soluble (water concentration 20 - 30 % w/w; water-insoluble fraction 20 - 25 % w/w). Soluble in alcohols, ketones, organic acids. Insoluble in hydrocarbons.
Partition coefficient: n-octanol/water	Unknown.
Auto-ignition temperature	Measured value 455 °C (101325 Pa). Typical value ≥ 600 °C (TG).
Decomposition temperature	Polymerizes at > 100 °C.
Viscosity	Measured value 121 mPa•s (dynamic; 20 °C) Typical values ca. 15–40 mm²/s (40 °C; water = 0.5 mm²/s). Viscosities of pyrolysis liquids are a function of water content and age.
Explosive properties	Non explosive.
Oxidising properties	Not oxidising.

9.2 Other information

Combustible liquid. However, the substance does not sustain combustion according to test L.2 (Sustained combustibility test) described in Part III, section 32 of the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria. The viscosity of the substance increases with age and is decreased by heating. Properties of the substance may vary according to raw material, production process and batch.

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

Unknown.

10.2 Chemical stability

Contains volatile and oxygen-containing compounds. Polymerizes at high temperatures and with age. Polymerization reactions are fastest during the first weeks. Viscosity increases during storage. In long-term storage, two phases may be formed. Slight overpressure or vacuum may develop in containers during long-term storage.

10.3 Possibility of hazardous reactions

None known.

10.4 Conditions to avoid

Do not store in open containers. Open containers cause odour nuisance, and contact with air accelerates the aging of the substance and affects its quality.

10.5 Incompatible materials

The substance may corrode metals (e.g. aluminium and carbon steel) and embrittle or swell unsuitable sealants. Compatible materials: see point 7.2.

10.6 Hazardous decomposition products

In a fire or if heated, may release harmful or toxic gases (formaldehyde, acetaldehyde, acrolein, phenol, furfural).

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

Toxicological information is based on tests on similar material.

LD50 (rat, oral, female, 14 d): > 2000 mg/kg

Oral NOAEL (rat, 7 d) 150 mg/kg/day

Skin corrosion/irritation

Causes severe skin burns. Classified as 1C due to delayed effect.

Serious eye damage/irritation

Causes severe eye damage.

Respiratory or skin sensitisation

May cause an allergic skin reaction.

Germ cell mutagenicity

Not classified as a germ cell mutagen.

Mammalian bone marrow chromosomal aberration test *in vivo* (B.11): negative

Mammalian cell gene mutation assay *in vitro* (B.17): positive

Mammalian cell micronucleus assay *in vitro* (OECD 487): positive

Ames test (B.13/14): positive

Carcinogenicity

Not classified as a suspected human carcinogen.

Reproductive toxicity

There is no evidence from known components to suggest classification for reproductive or developmental toxicity.

STOT-single exposure

None known.

STOT-repeated exposure

None known.

Aspiration hazard

May be fatal if swallowed and enters airways.

Other information

Properties of the substance may vary according to raw material, production process and batch. May release toxic, irritating or harmful volatile compounds (formaldehyde, acetaldehyde, phenol, furfural).

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity

Harmful to aquatic life with long lasting effects.
EC50 (*Daphnia magna*, 21 d; 48 h): > 37.9 mg/L
NOEC (*Daphnia magna*, 21 d): 37.9 mg/L

ErC50 (algae, 72 h): 35.4 mg/L
NOEC (algae, 72 h): 11.6 mg/L

LC50 (Fish, *Danio rerio*, 96 h) of 63.7 mg/L

12.2 Persistence and degradability

Biodegradability:
50.9 % (28 d) (Ready biodegradability, Manometric Respirometry Test)
41–50 % (28 d) (literature)

12.3 Bioaccumulative potential

Not bioaccumulative on basis of known composition. Consists potentially bioaccumulative components ca. 4 %.

12.4 Mobility in soil

The substance evaporates slowly from water and soil surfaces. Partly soluble in water. May leach through soil and enter groundwater and be dispersed with it. Degradation under anaerobic conditions is very slow.

12.5 Results of PBT and vPvB assessment

The substance is not PBT / vPvB.

12.6 Other adverse effects

Properties of the substance may vary according to raw material, production process and batch.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Waste containing this substance is hazardous waste. Dispose of in compliance with local and national regulations. When handling waste, note hazards caused by the substance and ensure appropriate precautions, labelling and communication of information.

SECTION 14: TRANSPORT INFORMATION

14.1 UN number

3265

14.2 UN proper shipping name

CORROSIVE LIQUID, ACIDIC, ORGANIC, N.O.S. (fast pyrolysis bio-oil)

14.3 Transport hazard class(es)

8

14.4 Packing group

III

14.5 Environmental hazards

H412: Harmful to aquatic life with long lasting effects.

14.6 Special precautions for user

Do not breathe fumes when transfering the product or opening containers. Use appropriate personal protective equipment (see point 8.2).

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code

Not applicable.

14.8 Other information

The product does not need to be heated during transport.

SECTION 15: REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

No specific regulations.

15.2 Chemical safety assessment

Chemical safety assessment has been performed as part of REACH registration in 2013.

SECTION 16: OTHER INFORMATION

Changes to previous version

12th December, 2013: Updated according to new information from REACH registration

Glossary of abbreviations

bw: body weight
DNEL: Derived No-Effect Level
EC50: Effective concentration 50 % (median effective concentration), concentration which kills or immobilizes 50 % of exposed organisms
LC50: Lethal Concentration 50%, Concentration which kills 50 % of exposed organisms
LD50: Lethal dose 50 % (median lethal dose), dose of the substance which kills 50 % of exposed organisms
EPDM: Ethylene propylene diene monomer (M-class) rubber
HDPE: High-density polyethylene
NOEC: No Observed Effect Concentration
NOAEL: No Observed Adverse Effect Level
PNEC: Predicted No-Effect Concentration
PE: Polyethylene
PP: Polypropylene
PTFE: Polytetrafluoroethylene (Teflon)
STOT: Specific Target Organ Toxicity
STP: sewage treatment plant

References

Finnish MSDS for the product (8 August 2012)
REACH registration dossier and chemical safety report for Fast Pyrolysis Bio-oil
Degree on Concentrations known to be Hazardous (1213/2011) (HTP-arvot 2011)

Methods used to derive classification for mixture

UVCB substance.
Classification based on test results for the substance: flammability, explosivity, corrosivity to metals, acute toxicity, corrosivity to skin, skin sensitization, mutagenity, aspiration hazard, hazard to the aquatic environment, bioaccumulation, carcinogenity
Classification based on ingredients: oxidation potential, toxicity to specific target organs, hazard to the ozone layer

List of relevant R phrases

R34 Causes burns.
R43 May cause sensitisation by skin contact.

Euroopan unioni
Euroopan aluekehitysrahasto

Hankkeesta vastaava, Lieksan Teollisuuskylä Oy

Yhteysviranominen, Pohjois-Karjalan Ely-keskus

YVA-konsultti, Green Fuel Nordic Oy