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

1.1 Product identifier

PRODUCT NAME:  UPM BioPiva 238
SYNONYMS:  Activated kraft lignin in alkaline

REACH REGISTRATION NUMBER

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

Identified uses: The product is for research and development purposes and for commercial use as a raw material (e.g. binding agents and composites) and fuel.

1.3 Details of the supplier of the safety data sheet

SUPPLIER:  UPM-Kymmene Oyj
DIVISION:  UPM Biochemicals
ADDRESS:  FI-53200 Lappeenranta, Finland
E-MAIL ADDRESS:  lignin@upm.com
TELEPHONE:  +358 5041 54235
FAX PHONE:  +358 2041 55198
EMERGENCY PHONE:  112

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

SECTION 2: HAZARD IDENTIFICATION

2.1 Classification of the substance or mixture
In accordance with current regulations (1272/2008 CLP):
Corrosive to metals, Category 1, H290
Skin corrosion, Category 1A, H314
For the full text of the H-Statements mentioned in this Section, see Section 16.

Classification according to 67/548/EEC-1999/45/EC:
C Corrosive R35
For the full text of the R-phrases mentioned in this Section, see Section 16

2.2 Label elements
Labelling (1272/2008)
Hazard pictograms

Signal word
Danger

Hazard statements
H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.

Precautionary statements
Prevention
P234 Keep only in original container
P264 Wash … thoroughly after handling.
P363 Wash contaminated clothing before reuse
P390 Absorb spillage to prevent material damage.
Response
P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do not induce vomiting.
P303 + P361 + P353 IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P305 + P351 + 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
Not identified.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances
The Product is a mixture.

3.2 Mixtures

<table>
<thead>
<tr>
<th>INGREDIENT</th>
<th>CAS NO.</th>
<th>% WT</th>
<th>Warning symbol, H statements, R phrases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kraft Lignin</td>
<td>8068-05-01</td>
<td>30-40</td>
<td>-</td>
</tr>
<tr>
<td>Sodium hydroxide</td>
<td>1310-73-2</td>
<td>5-15</td>
<td>Skin Corr. 1A H314; Met Corr. 1 H290</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>C, R35</td>
</tr>
</tbody>
</table>

Registration number for Sodium hydroxide: 01-2119457892-27-XXXX

SECTION 4: FIRST AID MEASURES

4.1 Description of first aid measures
EMERGENCY OVERVIEW: The primary health hazards posed by Activated Kraft Lignin are due to skin and eye contact.

EYE CONTACT: Immediately flush with running water for 15 minutes, also under the eyelids. Seek medical help if irritation persists.

SKIN CONTACT: Remove contaminated clothing and shoes immediately. Flush contaminated skin with plenty of water. Wash with mild soap and water.

INGESTION: Do not induce vomiting. Rinse mouth with water. Drink large amount of water. If persistent irritation or symptoms occur seek medical help.

INHALATION: Remove person to fresh air. Seek medical advice if persistent irritation, severe coughing, or breathing difficulties occur.

4.2 Most important symptoms and effects, both acute and delayed

ROUTES OF ENTRY: Skin and inhalation.

POTENTIAL HEALTH EFFECTS

EYES: May cause severe eye damage.

SKIN: pH is basic; exposure may result in irritation and burns. Repeated or prolonged exposure may cause dermatitis.

INGESTION: Not likely to occur under normal use –is corrosive to mouth, throat and stomach if ingested.

INHALATION: Inhalation may result in irritation of the respiratory system, cough and shortness of breath.

4.3 Indication of any immediate medical attention and special treatment needed
No information.

SECTION 5: FIRE-FIGHTING MEASURES

5.1 Extinguishing media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

5.2 Special hazards arising from the substance or mixture
Not combustible.

Ambient fire may liberate hazardous vapours.

5.3 Advice for firefighters
Not considered to be an explosion hazard. Wear self-contained breathing apparatus for fire fighting if necessary. Prevent skin contact by keeping a safe distance or by wearing suitable protective clothing.

SECTION 5 NOTES:
Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid skin and eye contact. Do not breathe vapours or aerosols. Arrange good ventilation and use personal protective equipment where ventilation is inadequate or not possible.

6.2 Environmental precautions
Do not let product enter drains.
6.3 Methods and material for containment and cleaning up
Place recovered Activated Kraft lignin in a container for proper disposal. Clean up affected area.

6.4 Reference to other sections
Safe handling: see point 7
Personal protection equipment: see point 8
Disposal: see section 13

SECTION 7: HANDLING AND STORAGE

7.1 Precautions for safe handling
Observe label precautions. Avoid eye contact. Avoid contact with skin. Avoid prolonged or repeated inhalation of Activated Kraft lignin.
Normal measures for fire prevention.

7.2 Conditions for safe storage, including any incompatibilities
Store in cool place. Keep container tightly closed in a dry and well-ventilated place. No aluminium, tin, or zinc containers.

7.3 Specific end use(s)
See exposure scenario of sodium hydroxide

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Occupational exposure limit values
CAS 1310-73-2 Sodium hydroxide:
STEL: 2 mg/m³ (15 min), ceiling value

DNEL
Chemical safety assessment has not been performed for the product itself.

DNEL: Sodium hydroxide: End Use: Workers
Exposure routes: Inhalation
Value: 1 mg/m³

PNEC
Chemical safety assessment has not been performed for the product itself.

PNEC: Sodium hydroxide:
A generic PNEC cannot be derived

8.2 Exposure controls
PERSONAL PROTECTIVE EQUIPMENT
VENTILATION: Approved local exhaust ventilation/fume hood.
RESPIRATORY PROTECTION: Required when vapours/aerosols are generated. Use approved filtering respirator and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU), or handle material in ventilated enclosures such as an approved fume hood. Recommended filter type P2.
EYE PROTECTION: If splashes are likely to occur: Tight-fitting safety goggles or a face shield.
SKIN PROTECTION: Wear appropriate impervious chemical resistant gloves. The protective gloves to be used must comply with appropriate government directives and standards.
Recommended glove material:
butyl-rubber, PVC, polychloroprene with natural latex liner, material thickness: 0.5 mm, breakthrough time: > 480 min
nitrile-rubber, fluorinated rubber, material thickness: 0.35-0.4 mm, breakthrough time: > 480 min

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: If splashes are likely to occur: Chemical protective clothing. Rubber or plastic boots.
WORK HYGIENIC PRACTICES: Wash hands after handling product.

SECTION 9: FIRE-FIGHTING MEASURES

9.1 Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Brown paste or liquid.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odour</td>
<td>Vanilla odour.</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>No information.</td>
</tr>
</tbody>
</table>
9.2 Other information
Corrosion may be corrosive to metals.

SECTION 10: FIRE-FIGHTING MEASURES

10.1 Reactivity
No information.

10.2 Chemical stability
Stable under ordinary conditions of use and storage.

10.3 Possibility of hazardous reactions
Risk of formation of gases or vapours with:
Metals, Light metals

Violent reactions possible with:
Nitriles, ammonium compounds, cyanides, magnesium, organic nitro compounds, organic combustible substances, phenols, powdered alkaline earth metals, acids

10.4 Conditions to avoid
Avoid hot storage conditions and hot objects.

10.5 Incompatible materials
Aluminium, brass, metals, metal alloys, zinc, tin, light metals, quartzes/silicate ceramics

10.6 Hazardous decomposition products
No information available

SECTION 11: TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects
ACUTE TOXITY: The substance is not classified as acutely toxic.
SKIN IRRITATION/CORROSION: Causes severe skin burns.
SERIOUS EYE DAMAGE/IRRITATION: Causes severe eye damage
SENSITISATION: No classification. Prolonged or repeated exposure may cause allergic reactions or dermatitis in certain sensitive individuals.
MUTAGENICITY, CARCINOGENICITY OR REPRODUCTIVE TOXICITY: No classification.
STOT – SINGLE EXPOSURE: No classification.
STOT – REPEATED EXPOSURE: No classification.

TOXICOLOGICAL INFORMATION: To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

SECTION 12: FIRE-FIGHTING MEASURES

12.1 Toxicity
No information.
Commercial lignin and lignin in Kraft waste water have shown acute toxic effects on D. magna and V. fischeri (Borton 2004).

12.2 Persistence and degradability
Lignin biogradates slowly in water and soil (half-life of 1 month – 1 year). Multiple bacterial degradation pathways have been reported. The method for determining the biological degradability are not applicable to inorganic substances.

12.3 Bioaccumulative potential
No information.

12.4 Mobility in soil
No information on the product itself.
Sodium hydroxide: Non-volatile. Soluble in water.

12.5 Results of PBT and vPvB assessment
Chemical safety assessment has not been performed for the product itself. PBT assessment is not applicable to inorganic substances (NaOH)

12.6 Other adverse effects
Harmful effect due to pH shift. Death of fish possible. Does not cause biological oxygen deficit. Discharge into the environment must be avoided.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods
PRODUCT: Dispose of in compliance with local and national regulations.
CONTAMINATED PACKAGING: Dispose of as unused product.

SECTION 14: TRANSPORT INFORMATION

14.1 UN number
1824

14.2 UN proper shipping name
SODIUM HYDROXIDE SOLUTION

14.3 Transport hazard class(es)
8

14.4 Packing group
II

14.5 Environmental hazards
The product is not classified as hazardous to the environment.

14.6 Special precautions for user
Avoid contact with skin and eyes.

14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
Not applicable.

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 not been performed for the product itself, but is performed on sodium hydroxide.

SECTION 16: OTHER INFORMATION

Changes to previous version
09.06.2015: Precautionary statements updated.
04.11.2014: Product name and the section 9 updated.
11.02.2014: Use category broadened, exposure scenario of NaOH added. All information revised.

References
Degree on Concentrations known to be Hazardous (1213/2011) (HTP-arvot 2012)

Full text of H-Statements refered to under section 2.
H290 May be corrosive to metals.
H314 Causes severe skin burns and eye damage.

Full text of R-phrases refered to under section 2.
R35 Causes severe burns.

Abbreviations
CLP – Regulation on Classification, Labelling and Packaging of Substances and Mixtures
DNEL – Derived No-Effect Level
PNEC – Predicted No-Effect Concentration
NIOSH – National Institute for Occupational Safety and Health
CEN - European Committee for Standardization
PBT – Persistant, Bioaccumulative and Toxic
vPvB – Very Persistent, Bioaccumulative
STEL - Short-term exposure limit

List of exposure scenarios
Exposure Scenario 3: Industrial and Professional Use of NaOH