SAFETY DATA SHEET

Regulation (EC) No 1907/2006 (REACH), Annex II
(COMMISSION REGULATION (EU) No 453/2010)

Version 1  Issue Date 01-Sep-2014
Product Name  Ecoworld® PBAT
Revision date 01-Sep-2014

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product Name  Ecoworld® PBAT
REACH registration number  No information available

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

Recommended Use  Biodegradable resin
Uses advised against  No information available

1.3. Details of the supplier of the safety data sheet

Supplier  JINHUI ZHAOLONG NEW TECHNOLOGY CO., LTD
Address  XIAOYI ECONOMIC DEVELOPMENT ZONE, LVLIANG, SHANXI PROVINCE
Postal Code  032308
Phone  +86-351-8689356-8009
FAX  +86-351-8689718
E-mail  springshi@jinhuiengroup.com

1.4. Emergency telephone number

+86-351-8689356

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

Classification according to Regulation (EC) No. 1272/2008 [CLP]
Not classified

Classification according to Directive 67/548/EEC or 1999/45/EC
Not classified

2.2. Label elements

Symbols/Pictograms  None
Signal word  None
Hazard Statements  Not applicable
Precautionary Statements  Not applicable
2.3. Other hazards
No information available

SECTION 3: Composition/information on ingredients

3.1. Polymer

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>EC No</th>
<th>CAS No</th>
<th>Weight-%</th>
<th>Classification according to Directive 67/548/EEC or 1999/45/EC</th>
<th>Classification according to Regulation (EC) No. 1272/2008 [CLP]</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDO</td>
<td>203-786-5</td>
<td>110-63-4</td>
<td>-</td>
<td>Xn; R22 R67</td>
<td>Acute Tox. 4 (H302) STOT SE 3 (H336)</td>
</tr>
<tr>
<td>TPA</td>
<td>202-830-0</td>
<td>100-21-0</td>
<td>-</td>
<td>Not classified</td>
<td>Not classified</td>
</tr>
<tr>
<td>Adipic acid</td>
<td>204-673-3</td>
<td>124-04-9</td>
<td>-</td>
<td>Xi; R36</td>
<td>Eye Irrit. 2 (H319)</td>
</tr>
</tbody>
</table>

SECTION 4: First aid measures

4.1. Description of first aid measures
General advice
Remove contaminated clothing and shoes. If symptoms persist, call a physician.

Inhalation
Not an expected route of exposure. If inhale dust, get medical advice/attention immediately.

Skin Contact
Product is not irritating to skin. Wash off with soap and water after handling.

Eye contact
Not an expected route of exposure. No first aid measures needed.

Ingestion
Not an expected route of exposure. If swallowed by mistake. Get medical attention immediately.

4.2. Most important symptoms and effects, both acute and delayed
No information available.

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

SECTION 5: Firefighting measures

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

Unsuitable extinguishing media
No information available.

5.2. Special hazards arising from the substance or mixture
Thermal decomposition can lead to release of irritating and toxic gases and vapors

5.3. Advice for firefighters
Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
   Evacuate personnel to safe areas
   Ensure adequate ventilation, especially in confined areas
   Remove all sources of ignition
   Avoid contact with skin, eyes and inhalation of vapors
   Use personal protection recommended in Section 8

6.2. Environmental precautions
   Prevent entry into waterways, sewers, basements or confined areas

6.3. Methods and material for containment and cleaning up
   Collect in suitable containers for disposal according to local / national regulations (see Section 13)

6.4. Reference to other sections
   See Section 7 for more information
   See section 8 for more information
   See section 13 for more information

SECTION 7: Handling and storage

7.1. Precautions for safe handling
   Handle in accordance with good industrial hygiene and safety practice
   Ensure adequate ventilation, especially in confined areas
   Avoid generation of dust
   Use personal protection recommended in Section 8

7.2. Conditions for safe storage, including any incompatibilities
   Keep away from heat
   Keep locked up and out of reach of children
   Store in accordance with local regulations

7.3. Specific end use(s)
   Apart from the uses mentioned in SECTION 1.2 no other specific uses are stipulated.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters
### Derived No Effect Level (DNEL)
No information available.

### Predicted No Effect Concentration (PNEC)
No information available.

#### 8.2. Exposure controls

**Engineering Controls**
Use with local exhaust ventilation. Ensure adequate ventilation, especially in confined areas.

**Personal protective equipment**
- **Eye/face protection**: Wear safety glasses with side shields (or goggles) if necessary
- **Hand Protection**: Wear protective gloves
- **Skin and body protection**: Suitable protective clothing
- **Respiratory protection**: In case of insufficient ventilation, wear suitable respiratory equipment

**Environmental exposure controls**
Do not allow into any sewer, on the ground or into any body of water.

### SECTION 9: Physical and chemical properties

#### 9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Norway</th>
<th>United Kingdom</th>
<th>ACGIH TLV</th>
<th>OSHA PEL</th>
<th>NIOSH IDLH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adipic acid (CAS #: 124-04-9)</td>
<td>-</td>
<td>-</td>
<td>TWA: 5 mg/m³</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TPA (CAS #: 100-21-0)</td>
<td>-</td>
<td>-</td>
<td>TWA: 5 mg/m³</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Table: Exposure limits

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Australia</th>
<th>Austria</th>
<th>Belgium</th>
<th>Denmark</th>
<th>European Union</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adipic acid (CAS #: 124-04-9)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>TWA: 5 mg/m³</td>
<td>-</td>
</tr>
<tr>
<td>TPA (CAS #: 100-21-0)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>TWA: 10 mg/m³</td>
<td>-</td>
</tr>
<tr>
<td>BDO (CAS #: 110-63-4)</td>
<td>-</td>
<td>STEL 200 ppm</td>
<td>STEL 800 mg/m³</td>
<td>TWA: 50 ppm</td>
<td>TWA: 200 mg/m³</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Latvia</th>
<th>France</th>
<th>Finland</th>
<th>Germany</th>
<th>Italy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adipic acid (CAS #: 124-04-9)</td>
<td>TWA: 4 mg/m³</td>
<td>-</td>
<td>TWA: 5 mg/m³</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Poland</th>
<th>Portugal</th>
<th>Spain</th>
<th>Switzerland</th>
<th>Netherlands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adipic acid (CAS #: 124-04-9)</td>
<td>STEL: 10 mg/m³</td>
<td>TWA: 5 mg/m³</td>
<td>TWA: 5 mg/m³</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

---

**Derived No Effect Level (DNEL)**
No information available.

**Predicted No Effect Concentration (PNEC)**
No information available.

**8.2. Exposure controls**

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**SECTION 9: Physical and chemical properties**

**9.1. Information on basic physical and chemical properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td>Solid</td>
</tr>
<tr>
<td><strong>Color</strong></td>
<td>White</td>
</tr>
<tr>
<td><strong>Odor</strong></td>
<td>Odorless</td>
</tr>
<tr>
<td><strong>Odor Threshold</strong></td>
<td>No information available</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>No information available</td>
</tr>
<tr>
<td>Property</td>
<td>Value</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Melting point/freezing point</td>
<td>20°C (BDO)</td>
</tr>
<tr>
<td></td>
<td>151°C (Adipic acid)</td>
</tr>
<tr>
<td>Boiling point / boiling range</td>
<td>230°C (BDO)</td>
</tr>
<tr>
<td></td>
<td>ca. 330°C (Adipic acid)</td>
</tr>
<tr>
<td>Flash point</td>
<td>130°C (BDO)</td>
</tr>
<tr>
<td></td>
<td>260°C (TPA)</td>
</tr>
<tr>
<td></td>
<td>196°C (Adipic acid)</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No information available</td>
</tr>
<tr>
<td>Flammability (solid, gas)</td>
<td>Not flammable</td>
</tr>
<tr>
<td>Flammability Limit in Air</td>
<td>No information available</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>&lt;1 mbar (20°C) (BDO)</td>
</tr>
<tr>
<td>Vapor density</td>
<td>No information available</td>
</tr>
<tr>
<td>Density</td>
<td>1.26 (g/cm³) (polymer)</td>
</tr>
<tr>
<td>Relative density</td>
<td>1.26</td>
</tr>
<tr>
<td>Bulk density</td>
<td>No information available</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>No information available</td>
</tr>
<tr>
<td>Water solubility</td>
<td>Mixable (BDO)</td>
</tr>
<tr>
<td></td>
<td>15 mg/l (20°C) (TPA)</td>
</tr>
<tr>
<td></td>
<td>15 g/l (20°C) (Adipic acid)</td>
</tr>
<tr>
<td>Partition coefficient</td>
<td>-0.83 (BDO)</td>
</tr>
<tr>
<td></td>
<td>2 (TPA)</td>
</tr>
<tr>
<td></td>
<td>0.081 (Adipic acid)</td>
</tr>
<tr>
<td>Autoignition temperature</td>
<td>370°C (BDO)</td>
</tr>
<tr>
<td></td>
<td>496°C (TPA)</td>
</tr>
<tr>
<td></td>
<td>420°C (Adipic acid)</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>&gt;300°C (TPA)</td>
</tr>
<tr>
<td>Kinematic viscosity</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Dynamic viscosity</td>
<td>71.5 mPa · s (25°C) (BDO)</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not an explosive</td>
</tr>
<tr>
<td>Oxidizing properties</td>
<td>No information available</td>
</tr>
</tbody>
</table>

9.2. Other information
No information available

SECTION 10: Stability and reactivity

10.1. Reactivity
No information available.

10.2. Chemical stability
Stable under normal conditions.

10.3. Possibility of hazardous reactions
None under normal processing.

10.4. Conditions to avoid
Heat, flames and sparks
10.5. Incompatible materials

10.6. Hazardous decomposition products
None under normal use conditions

SECTION 11: Toxicological information

11.1. Information on toxicological effects

<table>
<thead>
<tr>
<th>Acute toxicity</th>
<th>Chemical Name</th>
<th>Oral LD50</th>
<th>Dermal LD50</th>
<th>Inhalation LC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDO (CAS #: 110-63-4)</td>
<td>1530 mg/kg bw (rat)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>TPA (CAS #: 100-21-0)</td>
<td>&gt;6400 mg/kg bw (rat)</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Adipic acid (CAS #: 124-04-9)</td>
<td>5560 mg/kg bw (rat)</td>
<td>-</td>
<td>&gt; 7.7 mg/L (Rat) 4 h &gt; 31 mg/L (Rat) 1 h</td>
<td></td>
</tr>
</tbody>
</table>

Skin corrosion/irritation
Non-irritating to the skin.

Serious eye damage/eye irritation
No eye irritation.

Sensitization
No sensitization responses were observed.

Germ cell mutagenicity
No information available.

Carcinogenicity
No information available.

Reproductive toxicity
No information available.

STOT - single exposure
No information available.

STOT - repeated exposure
No information available.

Aspiration hazard
No information available.

SECTION 12: Ecological information

12.1. Toxicity
<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Algae/aquatic plants EC50</th>
<th>Fish LC50</th>
<th>Crustacea EC50</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDO (CAS #: 110-63-4)</td>
<td>500: 72 h Desmodesmus spicatus mg/L EC50</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Adipic acid (CAS #: 124-04-9)</td>
<td>31.3: 72 h Desmodesmus spicatus mg/L EC50</td>
<td>97: 96 h Pimephales promelas mg/L LC50 static</td>
<td>85.7: 48 h Daphnia magna mg/L EC50</td>
</tr>
<tr>
<td></td>
<td>26.6: 96 h Desmodesmus spicatus mg/L EC50</td>
<td>230: 96 h Leuciscus idus mg/L LC50 static</td>
<td></td>
</tr>
</tbody>
</table>

12.2. Persistence and degradability
No information available.

12.3. Bioaccumulative potential

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Partition coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adipic acid (CAS #: 124-04-9)</td>
<td>0.081</td>
</tr>
</tbody>
</table>

12.4. Mobility in soil
No information available.

12.5. Results of PBT and vPvB assessment
PBT/vPvB assessment information is not available as chemical safety assessment not conducted.

12.6. Other adverse effects
No information available.

SECTION 13: Disposal considerations

13.1. Waste treatment methods
- Waste from residues/unused products
  Disposal should be in accordance with applicable regional, national and local laws and regulations
- Contaminated packaging
  Disposal should be in accordance with applicable regional, national and local laws and regulations

SECTION 14: Transport information

14.1 UN Number                  | Not regulated         |
14.2 Proper shipping name       | Not regulated         |
14.3 Hazard Class               | Not regulated         |
14.4 Packing Group              | Not regulated         |
14.5 Environmental hazards      | Not applicable        |
14.6 Special precautions        | No information available|
14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code | Not applicable |
SECTION 15: Regulatory information

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

European Union
Take note of Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work
Take note of Directive 94/33/EC on the protection of young people at work
Take note of Directive 92/85/EC on the protection of pregnant and breastfeeding women at work

International Inventories

<table>
<thead>
<tr>
<th>Component</th>
<th>TSCA</th>
<th>DSL/NDSL</th>
<th>EINECS/EL INCS</th>
<th>ENCS</th>
<th>IECSC</th>
<th>KECL</th>
<th>PICCS</th>
<th>AICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDO 110-63-4</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>TPA 100-21-0</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Adipic acid 124-04-9</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

"-" Not Listed
"X" Listed

15.2. Chemical safety assessment
No information available

SECTION 16: Other information

This material safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

Issue Date 01-Sep-2014
Revision date 01-Sep-2014
Revision Note Not applicable

Key or legend to abbreviations and acronyms used in the safety data sheet
TWA - TWA (time-weighted average)
STEL - STEL (Short Term Exposure Limit)
TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

Full text of H-Statements referred to under section 3
H302- Harmful if swallowed.
H319- Causes serious eye irritation.
H336- May cause drowsiness or dizziness.
Full text of R-phrases referred to under sections 2 and 3

R22- Harmful if swallowed.
R36- Irritating to eyes.
R67- Vapours may cause drowsiness and dizziness.

Disclaimer
The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

-------- End of Safety Data Sheet --------