Product Stewardship Summary

*N-vinyl-2-pyrrolidone*

**General Statement**

*N-vinyl-2-pyrrolidone* (VP) is commonly used as a reactive diluent for radiation curing in UV-coating, UV-inks, and UV-adhesives. It is also used as a monomer for the production of water soluble polyvinylpyrrolidone (PVP) with uses not limited to oral care, home care, personal care, pharmaceutical, food, beverage, and industrial segments.

**Chemical Identity**

Name: 1-vinyl-2-pyrrolidone  
Brand Names Used in: Ashland uses 1-vinyl-2-pyrrolidone in a wide variety of products throughout the Ashland portfolio  
Chemical names (IUPAC):
- 1-Ethenyl-2-pyrrolidinone
- 1-ethenyl-2-pyrrolidone
- 1-ethenylpyrrolidin-2-one
- 1-ethenypyrrolidin-2-one
- 1-vinil-2-pirrolidona
- 1-VINYL-2-PYRROLIDINE
- 1-Vinyl-2-pyrrolidon
- 1-Vinyl-2-pyrrolidone
- 1-Vinyl-2-pyrrolidone (stabilized with N,N'-Di-sec-butyl-p-phenylenediamine)
- 1-vinyl-2pyrrolidone
- 1-vinylpyrrolidin-2-one
- N-ethenyl pyrrolid-2-one
- N-Vinyl-2-pyrrolidon
- N-Vinyl-2-pyrrolidone
- N-Vinyl-2-pyrrolidone, optical grade
- Vinyl Pyrrolidone
- VINYL-N-PYRROLIDONE-2
- Vinylpyrrolidone

CAS number(s): 88-12-0  
EC number: 201-800-4  
Molecular formula: C₆H₉NO  
Structure:
Uses and Applications

VP is used by Asland as a reactive diluent for radiation curing in UV-coating, UV-inks, and UV-adhesives. In addition, VP also used as a monomer for the production of water soluble polyvinylpyrrolidone (PVP) with uses not limited to oral care, home care, personal care, pharmaceutical, food, beverage, and industrial businesses.

Physical/Chemical Properties

Phys/Chem Safety Assessment

VP is a colorless to slightly yellow liquid. It is fully miscible in water and it is non-flammable and non-explosive. No Physical hazards have been identified with VP.

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>Liquid</td>
</tr>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Color</td>
<td>Colorless to slightly yellow</td>
</tr>
<tr>
<td>Odor</td>
<td>Characteristic odor</td>
</tr>
<tr>
<td>Density</td>
<td>1.04 g/cm$^3$ @ 20°C</td>
</tr>
<tr>
<td>Melting / boiling point</td>
<td>14°C / 95°C</td>
</tr>
<tr>
<td>Flammability</td>
<td>Non-flammable</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Non-flammable</td>
</tr>
<tr>
<td>Self-ignition temperature</td>
<td>240-364°C</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>1.97 hPa @ 56.9°C; 133.2 hPa @ 148°C</td>
</tr>
<tr>
<td>Mol weight</td>
<td>111.14</td>
</tr>
<tr>
<td>Water solubility</td>
<td>49941 mg/L@25°C</td>
</tr>
<tr>
<td>Flash point</td>
<td>100.5°C @ 101.3 hPa</td>
</tr>
<tr>
<td>Octanol-water partition coefficient (LogPow)</td>
<td>0.4</td>
</tr>
</tbody>
</table>

Health Effects

Human Health Safety Assessment

Consumer: There is no intended use of VP in consumer products and no direct exposure to consumer is expected. Although VP is used in the manufacture of various products that may come into contact with consumers, it is either part of a processing aid, or polymerized into non-monomeric forms, which are considered to be nonhazardous.

Worker: Exposure to VP can occur to workers in either the manufacturing facility manufacturing VP or in manufacturing facility that use VP. The workers can be exposed to VP during maintenance related activities, sampling, testing, or other procedures. Each manufacturing facility should have a thorough training program for employees and appropriate work processes, as well as safety equipment in place to limit unnecessary exposure to VP. The occupational use of this substance is considered safe for the worker following the recommended safety measures in the SDS.

<table>
<thead>
<tr>
<th>Effect Assessment</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Toxicity</td>
<td>H302: Harmful if swallowed</td>
</tr>
<tr>
<td>Oral / inhalation / dermal</td>
<td>H312: Harmful in contact with skin</td>
</tr>
<tr>
<td></td>
<td>H332: Harmful if inhaled</td>
</tr>
<tr>
<td>Irritation / corrosion</td>
<td>H318: Causes serious eye damage</td>
</tr>
<tr>
<td>Skin / eye / respiratory test</td>
<td>H335: May cause respiratory irritation</td>
</tr>
<tr>
<td>Toxicty after repeated exposure</td>
<td>H373: May cause damage to organ system through prolonged or repeated exposure</td>
</tr>
</tbody>
</table>
Environmental Effects

Environmental Safety Assessment

VP is readily biodegradable and should be degraded within the wastewater treatment process. The substance can be considered to be acutely toxic to aquatic organisms, a risk for the environment is not identified since the exposure of surface waters is expected to be negligible due to the rapid degradation.

<table>
<thead>
<tr>
<th>Effect Assessment</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic Toxicity</td>
<td>H402: Harmful to aquatic life</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fate and behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodegradation</td>
</tr>
<tr>
<td>Bioaccumulation potential</td>
</tr>
<tr>
<td>PBT / vPvB conclusion</td>
</tr>
</tbody>
</table>

Exposure

Human Health

Consumer exposure to VP is not expected, as there is no direct use of VP in any consumer products. Workers may be exposed to VP during VP-manufacturing processes and manufacturing process using VP. This potential exposure should be mitigated by workplace controls such as respiratory protection equipment.

Environment

As VP degrades rapidly in aqueous environments, significant environmental exposure to VP is unlikely except in cases of significant spills.

Risk Management Recommendations

Exposure to VP in the workplace can be controlled by sufficient ventilation and proper handling and storage techniques. Respiratory protection should be worn in applications with the potential to generate vapor or aerosol release. Suitable hand and eye protection should be worn to reduce unnecessary exposure to VP.

A selection of occupational exposure limits are below.

ACGIH TLV: 0.05 ppm (8 hr TWA)

Regulatory Agency Review

Regulatory Information / Classification and Labeling

Under the Globally Harmonized System for classification and labeling (GHS), substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the (Extended) SDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use.

GHS Classification:
Acute oral toxicity Category 4
Acute dermal toxicity Category 4
Acute inhalation toxicity Category 4
Eye irritation Category 1
Specific target organ toxicity: Single exposure Category 3: Respiratory irritation
Specific target organ toxicity: Repeated exposure Category 2: Respiratory system by inhalation
Carcinogenicity Category 2

Hazard Statements:
H351: Suspected of causing cancer
H332: Harmful if inhaled
H312: Harmful in contact with skin
H302: Harmful if swallowed
H373: May cause damage to organs through prolonged or repeated exposure
H335: May cause respiratory irritation
H318: Causes serious eye damage

Signal Word: Danger

Precautionary Statements:
P201: Obtain special instructions before use
P202: Do not handle until all safety precautions have been read and understood
P281: Use personal protective equipment as required
P308 + P313: IF exposed or concerned: Get medical advice/ attention
P261: Avoid breathing dust/ fume/ mist/ vapor/ spray
P271: Use only outdoors or in a well-ventilated area
P280: Wear protective gloves/ protective clothing/ eye protection/ face protection
P302 + P352: IF ON SKIN: Wash with plenty of water

Hazard Pictograms:

GHS05: corrosion

GHS07: exclamation mark

GHS08: health hazard

Conclusion

VP is a useful chemical in the production of polyvinylpyrrolidone polymers and as reactive diluent for various UV-curing processes. When handled responsibly, the potential for ocular damage and concern for cancer can be minimized, allowing
workers to use Vp and materials containing VP safely.

Contact Information with Company

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Revision: 1

Additional Information

For more information on GHS, visit http://www.osha.gov/dsg/hazcom/ghsquideoct05.pdf or http://live.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html.
Ashland product stewardship summaries are located at http://www.ashland.com/stewardship

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REACH registration is specific to Importers/Manufacturers that place the chemical on the EU market, and specific to registered uses. Inclusion on the list of REACH Registered Substances does not automatically imply registration by Ashland.

Inclusion on the New Zealand Inventory of Chemicals applies only to the pure substance listed. The importer of record must determine whether or not their substances are in compliance.