1 Identification

· **Product identifier**

· **Trade name:** LOR A Series Resists

· **Product number:**
  G516602, G516603, G516604, G516605, G516606, G516607, G516608, G516658, G516609, G516610, G516611, G516612, G516614, G516616, G516619

· **Application of the substance / the mixture** Photoresist

· **Details of the supplier of the safety data sheet**

· **Manufacturer/Supplier:**
  Kayaku Advanced Materials
  200 Flanders Road
  Westborough, MA 01581
  Tel: (617) 965-5511
  Fax: (617) 965-5818

· **Information department:**
  Product Safety
  Email: productsafety@kayakuAM.com

· **Emergency telephone number:**
  Kayaku Advanced Materials: 617-965-5511
  Chemtrec USA Emergency: 800-424-9300
  Chemtrec International Emergency: 703-527-3887

2 Hazard(s) identification

· **Classification of the substance or mixture**

  GHS02 Flame

  Flam. Liq. 3 H226 Flammable liquid and vapor.

  GHS07

  Skin Irrit. 2 H315 Causes skin irritation.
  Eye Irrit. 2A H319 Causes serious eye irritation.

· **Label elements**

· **GHS label elements** The product is classified and labeled according to the Globally Harmonized System (GHS).

· **Hazard pictograms**

  GHS02 GHS07

· **Signal word** Warning

· **Hazard-determining components of labeling:**
  Cyclopentanone

· **Hazard statements**
  H226 Flammable liquid and vapor.
  H315 Causes skin irritation.

(Contd. on page 2)
Trade name: LOR A Series Resists

H319 Causes serious eye irritation.

- **Precautionary statements**
  - **P210**  Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
  - **P260**  Do not breathe dust/fume/gas/mist/vapors/spray.
  - **P280**  Wear protective gloves/protective clothing/eye protection/face protection.
  - **P301+P310**  If swallowed: Immediately call a poison center/doctor.
  - **P302+P352**  If on skin: Wash with plenty of soap and water.
  - **P304+P341**  If inhaled: If breathing is difficult, remove person to fresh air and keep comfortable for breathing.
  - **P305+P351+P338**  If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
  - **P333+P313**  If skin irritation or rash occurs: Get medical advice/attention.
  - **P337+P313**  If eye irritation persists: Get medical advice/attention.
  - **P370+P378**  In case of fire: Use for extinction: Alcohol resistant foam.
  - **P370+P378**  In case of fire: Use for extinction: Fire-extinguishing powder.
  - **P370+P378**  In case of fire: Use for extinction: Carbon dioxide.
  - **P403+P235**  Store in a well-ventilated place. Keep cool.
  - **P501**  Dispose of contents/container in accordance with local/regional/national/international regulations.

- **Additional information:** No release to water in manufacturing, process, use or disposal.

- **Classification system:**
  - **NFPA ratings (scale 0 - 4)**
    - Health = 2
    - Fire = 3
    - Reactivity = 0

  - **HMIS-ratings (scale 0 - 4)**
    - HEALTH: Health = 2
    - FIRE: Fire = 3
    - REACTIVITY: Reactivity = 0

- **Other hazards**
  - **Results of PBT and vPvB assessment**
    - **PBT:** Not applicable.
    - **vPvB:** Not applicable.

### 3 Composition/information on ingredients

- **Chemical characterization:** Mixtures
- **Description:** Mixture of the substances listed below with nonhazardous additions.

#### Dangerous components:

<table>
<thead>
<tr>
<th>Substance ID</th>
<th>Substance Name</th>
<th>CAS Number</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>120-92-3</td>
<td>Cyclopentanone</td>
<td>65-90%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flam. Liq. 3, H226; Skin Irrit. 2, H315; Eye Irrit. 2A, H319</td>
<td></td>
<td></td>
</tr>
<tr>
<td>107-98-2</td>
<td>1-methoxy-2-propanol</td>
<td>5-25%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flam. Liq. 3, H226; STOT SE 3, H336</td>
<td></td>
<td></td>
</tr>
<tr>
<td>102322-80-5</td>
<td>Polyaliphatic imide copolymer</td>
<td>1-20%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Skin Irrit. 2, H315; Eye Irrit. 2A, H319</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4 First-aid measures

- **Description of first aid measures**
- **General information:** Immediately remove any clothing soiled by the product.
  - **After inhalation:**
    Supply fresh air. If required, provide artificial respiration. Keep patient warm. Consult doctor if symptoms persist.
  - **After skin contact:**
    Immediately wash with water and soap and rinse thoroughly.
    If skin irritation continues, consult a doctor.
  - **After eye contact:**
    Wash eyes immediately with a large amount of water or normal saline, occasionally lifting upper and lower eye lids until no evidence of chemical remains (about 20 minutes). Remove contact lenses if present and easy to remove. Seek immediate medical attention.
  - **After swallowing:**
    Do not induce vomiting unless instructed to do so by a physician. Wash out mouth with water and keep person at rest. Seek immediate medical attention.
- **Information for doctor:**
  - **Most important symptoms and effects, both acute and delayed** No further relevant information available.
  - **Indication of any immediate medical attention and special treatment needed** Treat symptomatically.

5 Fire-fighting measures

- **Extinguishing media**
- **Suitable extinguishing agents:**
  - Alcohol resistant foam
  - Fire-extinguishing powder
  - Carbon dioxide
- **For safety reasons unsuitable extinguishing agents:**
  - Water with full jet
  - Water
- **Special hazards arising from the substance or mixture**
  - Containers may explode due to pressure increase when container is exposed to extreme heat. Vapors may travel a considerable distance to a source of ignition and flash back along vapor trail.
- **Advice for firefighters**
- **Protective equipment:** Wear SCBA.

6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures**
  - Wear protective equipment. Keep unprotected persons away.
  - Ensure adequate ventilation
  - Keep away from ignition sources
- **Environmental precautions:**
  - Do not allow to enter sewers/ surface or ground water.
  - No release to water in manufacturing, processing, use, or disposal.
7 Handling and storage

· Handling:
  · Precautions for safe handling
    No release to water in manufacturing, process, use or disposal.
    Ensure good ventilation/exhaust at the workplace.
    Prevent formation of aerosols.
    Keep receptacles tightly sealed.
    Use only under yellow light
  · Information about protection against explosions and fires:
    Keep ignition sources away - Do not smoke.
    Use explosion-proof apparatus / fittings and spark-proof tools.
    Protect against electrostatic charges.

· Conditions for safe storage, including any incompatibilities

· Storage:
  · Requirements to be met by storerooms and containers: Store in a cool location.
  · Information about storage in one common storage facility:
    Do not store together with alkalis (caustic solutions).
    Do not store together with oxidizing and acidic materials.
  · Further information about storage conditions:
    Keep container well-sealed in cool, dry location.
    Protect from heat and direct sunlight.
    Store receptacle in a well ventilated area.

· Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

· Additional information about design of technical systems: No further data; see item 7.

· Control parameters
  · Components with limit values that require monitoring at the workplace:

<table>
<thead>
<tr>
<th>107-98-2 1-methoxy-2-propanol</th>
</tr>
</thead>
<tbody>
<tr>
<td>REL Short-term value: 540 mg/m³, 150 ppm</td>
</tr>
<tr>
<td>Long-term value: 360 mg/m³, 100 ppm</td>
</tr>
<tr>
<td>TLV Short-term value: (553) NIC-369 mg/m³, (150) NIC-100 ppm</td>
</tr>
<tr>
<td>Long-term value: (369) NIC-184 mg/m³, (100) NIC-50 ppm</td>
</tr>
</tbody>
</table>

· Additional information: The lists that were valid during the creation were used as basis.
49.4.3.1 · Exposure controls

· Personal protective equipment:

· General protective and hygienic measures:
  Keep away from food and beverages.
  Immediately remove all soiled and contaminated clothing.
  Wash hands before breaks and at the end of work.
  Avoid contact with the eyes and skin.
  Do not inhale gases / fumes / aerosols.

· Respiratory equipment:
  In case of low exposure, use cartridge respirator. In case of intensive or longer exposure, use SCBA.

· Protection of hands:

  Protective gloves

  The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.

  · Material of gloves Nitrile rubber, NBR
  · Penetration time of glove material Contact glove manufacture for break-through time.

· Eye protection:

  Tightly sealed goggles

9 Physical and chemical properties

· Information on basic physical and chemical properties

· General Information

· Appearance:
  Form: Liquid
  Color: Red

· Odor:
  Odor: Slightly sweet
  Odor threshold: Not determined.

· pH-value:
  pH-value: Not determined.

· Change in condition
  Melting point/Melting range: Undetermined.
  Boiling point/Boiling range: 120 °C (248 °F)

· Flash point:
  Flash point: 30 °C (86 °F)

· Flammability (solid, gaseous):
  Flammability (solid, gaseous): Not applicable.

· Ignition temperature:
  Ignition temperature: 270 °C (518 °F)

· Decomposition temperature:
  Decomposition temperature: Not determined.

· Auto ignition:
  Auto ignition: Product is not selfigniting.

· Danger of explosion:
  Danger of explosion: Product is not explosive. However, formation of explosive air/vapor mixtures are possible.
Trade name: LOR A Series Resists

| · Explosion limits:            |                          |
|                               | Lower: 2.3 Vol %         |
|                               | Upper: Not determined     |

| · Vapor pressure at 20 °C (68 °F): | 12 hPa (9 mm Hg)         |

| · Density:                       | Not determined.          |
| · Relative density:              | See Table 1 Other Information|
| · Vapor density:                 | Not determined.          |
| · Evaporation rate:              | Not determined.          |

| · Solubility in / Miscibility with Water: | Water miscible No       |

| · Partition coefficient (n-octanol/water): | Not determined.          |

| · Viscosity:                            |                          |
|                                Dynamic: | Not determined.          |
|                                Kinematic: | Not determined.          |
| · Other information                  | Table 1. Product specific gravity and VOC data. |

<table>
<thead>
<tr>
<th>Name</th>
<th>Number</th>
<th>Sp. Grav.</th>
<th>Vol.(% by wt.)</th>
<th>VOC(g/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOR 0.5A</td>
<td>G516602</td>
<td>0.965</td>
<td>98</td>
<td>945</td>
</tr>
<tr>
<td>LOR 0.7A</td>
<td>G516603</td>
<td>0.968</td>
<td>97</td>
<td>940</td>
</tr>
<tr>
<td>LOR 1A</td>
<td>G516604</td>
<td>0.973</td>
<td>96</td>
<td>940</td>
</tr>
<tr>
<td>LOR 2A</td>
<td>G516605</td>
<td>0.977</td>
<td>95</td>
<td>935</td>
</tr>
<tr>
<td>LOR 3A</td>
<td>G516606</td>
<td>0.98</td>
<td>94</td>
<td>920</td>
</tr>
<tr>
<td>LOR 4A</td>
<td>G516607</td>
<td>0.982</td>
<td>93</td>
<td>915</td>
</tr>
<tr>
<td>LOR 5A</td>
<td>G516608</td>
<td>0.984</td>
<td>92</td>
<td>905</td>
</tr>
<tr>
<td>LOR 6A</td>
<td>G516609</td>
<td>0.986</td>
<td>91</td>
<td>900</td>
</tr>
<tr>
<td>LOR 7A</td>
<td>G516610</td>
<td>0.988</td>
<td>90</td>
<td>895</td>
</tr>
<tr>
<td>LOR 10A</td>
<td>G516611</td>
<td>0.99</td>
<td>89</td>
<td>885</td>
</tr>
<tr>
<td>LOR 15A</td>
<td>G516612</td>
<td>0.99</td>
<td>87</td>
<td>860</td>
</tr>
<tr>
<td>LOR 20A</td>
<td>G516614</td>
<td>0.99</td>
<td>86</td>
<td>850</td>
</tr>
<tr>
<td>LOR 30A</td>
<td>G516616</td>
<td>0.99</td>
<td>84</td>
<td>830</td>
</tr>
<tr>
<td>LOR 50A</td>
<td>G516619</td>
<td>0.995</td>
<td>81</td>
<td>820</td>
</tr>
</tbody>
</table>

10 Stability and reactivity

· Reactivity: No further relevant information available.
· Chemical stability: Stable
· Thermal decomposition / conditions to be avoided: No decomposition if used according to specifications.
· Possibility of hazardous reactions: No dangerous reactions known.
· Conditions to avoid
  Heat, flames and sparks. Extremes of temperature and direct sunlight.
  Contact with incompatible materials.
· Incompatible materials: Strong Oxidizing Agents, Strong Acids, Strong Bases
· Hazardous decomposition products:
  Carbon monoxide and carbon dioxide
  Nitrogen oxides (NOx)
11 Toxicological information

- Information on toxicological effects
  - Acute toxicity:
    - LD/LC50 values that are relevant for classification:
      120-92-3 Cyclopentanone
      - Oral LD50 1180 mg/kg (Rat)
      - Dermal LD50 >2000 mg/kg (rabbit)
      - Inhalative LC50/4 h >19.5 mg/l (Rat)
      107-98-2 1-methoxy-2-propanol
      - Oral LD50 5660 mg/kg (Rat)
      - Dermal LD50 13000 mg/kg (rabbit)
      - Inhalative LC50/4 h 54.6 mg/l (Rat)
      102322-80-5 Polyaliphatic imide copolymer
      - Oral LD50 >5000 mg/kg (Rat) (Data for compositionally similar material)
      - Dermal LD50 >5000 mg/kg (Rat) (Data for compositionally similar material)

- Primary irritant effect:
  - on the skin: Irritant to skin and mucous membranes.
  - on the eye: Irritating effect.
  - Sensitization: No sensitizing effects known.
  - Experience with humans: No further relevant information available.

- Additional toxicological information:
  The product shows the following dangers according to internally approved calculation methods for preparations: Irritant

12 Ecological information

- Toxicity
  - Aquatic toxicity:
    120-92-3 Cyclopentanone
    - EC50/48 h 100 mg/l (daphnia magna)
    - EC50/72 h >100 mg/l (scenedesmus subspicatus)
    - LC50/96 h >100 mg/l (fish)
    107-98-2 1-methoxy-2-propanol
    - EC50/96 hr 23300 mg/l (daphnia magna)
    - >1000 mg/l (green algae)
    - LC50/96 h 208000 mg/l (Pimephales promelas)
49.4.3.1

- **Persistence and degradability** Moderately/partly biodegradable
- **Behavior in environmental systems:**
- **Bioaccumulative potential** No further relevant information available.
- **Mobility in soil** No further relevant information available.
- **Additional ecological information:**
- **General notes:**
  Water hazard class 1 (Self-assessment): slightly hazardous for water
  Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
- **Results of PBT and vPvB assessment**
- **PBT:** Not applicable.
- **vPvB:** Not applicable.
- **Other adverse effects** No further relevant information available.

### 13 Disposal considerations

- **Waste treatment methods**
  - **Recommendation:**
    Must not be disposed of as regular garbage/trash. Do not allow product to reach sewage system.
    Disposal must be made in accordance with Federal, State, and Local regulations.
- **Uncleaned packagings:**
  - **Recommendation:** Disposal must be made in accordance with Federal, State, and Local regulations.

### 14 Transport information

- **UN-Number**
  - DOT, ADR, IMDG, IATA  UN1866
- **UN proper shipping name**
  - DOT, IMDG, IATA  RESIN SOLUTION
  - ADR  1866 RESIN SOLUTION
- **Transport hazard class(es)**
  - **DOT**
    - **Class**  3 Flammable liquids
    - **Label**  3
  - **ADR, IMDG, IATA**
    - **Class**  3 Flammable liquids
    - **Label**  3
- **Packing group**
  - DOT, ADR, IMDG, IATA  III
Trade name: LOR A Series Resists

49.4.3.1 Environmental hazards:
· Marine pollutant: No
· Special precautions for user: Warning: Flammable liquids
· Danger code (Kemler): 33
· EMS Number: F-E,S-E
· Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable.
· UN "Model Regulation": UN1866, RESIN SOLUTION, 3, III

15 Regulatory information
· Safety, health and environmental regulations/legislation specific for the substance or mixture
  · Sara
    · Section 355 (extremely hazardous substances): None of the ingredients are listed.
    · Section 313 (Specific toxic chemical listings): None of the ingredients is listed.
  · TSCA (Toxic Substances Control Act): All ingredients are listed or comply with TSCA regulations.
  · Proposition 65
    · Chemicals known to cause cancer: None of the ingredients are listed.
    · Chemicals known to cause reproductive toxicity for females: None of the ingredients are listed.
    · Chemicals known to cause reproductive toxicity for males: None of the ingredients are listed.
    · Chemicals known to cause developmental toxicity: None of the ingredients are listed.
  · Carcinogenic categories
    · EPA (Environmental Protection Agency) None of the ingredients are listed.
    · TLV (Threshold Limit Value established by ACGIH) None of the ingredients are listed.
    · NIOSH-Ca (National Institute for Occupational Safety and Health) None of the ingredients are listed.
  · Massachusetts State Right To Know List
    120-92-3 Cyclopentanone
    107-98-2 1-methoxy-2-propanol
  · New Jersey State Right To Know List
    120-92-3 Cyclopentanone
    107-98-2 1-methoxy-2-propanol

(Contd. on page 10)
Trade name: LOR A Series Resists

· **Pennsylvania Hazardous Substances List**
  - 120-92-3 Cyclopentanone
  - 107-98-2 1-methoxy-2-propanol

· **California SCAQMD Rule 443.1 VOC's:** See Table 1 - Section 9

· **GHS label elements** The product is classified and labeled according to the Globally Harmonized System (GHS).

· **Hazard pictograms**
  - GHS02
  - GHS07

· **Signal word** Warning

· **Hazard-determining components of labeling:**
  - Cyclopentanone

· **Hazard statements**
  - H226 Flammable liquid and vapor.
  - H315 Causes skin irritation.
  - H319 Causes serious eye irritation.

· **Precautionary statements**
  - P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
  - P260 Do not breathe dust/fume/gas/mist/vapors/spray.
  - P280 Wear protective gloves/protective clothing/eye protection/face protection.
  - P301+P310 If swallowed: Immediately call a poison center/doctor.
  - P302+P352 If on skin: Wash with plenty of soap and water.
  - P304+P341 If inhaled: If breathing is difficult, remove person to fresh air and keep comfortable for breathing.
  - P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
  - P333+P313 If skin irritation or rash occurs: Get medical advice/attention.
  - P337+P313 If eye irritation persists: Get medical advice/attention.
  - P370+P378 In case of fire: Use for extinction: Alcohol resistant foam.
  - P370+P378 In case of fire: Use for extinction: Fire-extinguishing powder.
  - P370+P378 In case of fire: Use for extinction: Carbon dioxide.
  - P403+P235 Store in a well-ventilated place. Keep cool.
  - P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

**16 Other information**

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Department issuing SDS:** Product safety department
· **Contact:** Tom Cole, EHS Manager (tcole@kayakuAM)

· **Revision History:**
  - The manufacturer's information in Section 1, the product hazard information in Section 2 and the component hazard information in Section 3 have been updated.
· **Date of preparation / last revision 08/22/2019 / 3**
Abbreviations and acronyms:
RID: Règlement international concernant le transport des marchandises dangereuses par chemin de fer (Regulations Concerning the International Transport of Dangerous Goods by Rail)
ICAO: International Civil Aviation Organisation
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
Flam. Liq. 3: Flammable liquids – Category 3
Skin Irrit. 2: Skin corrosion/irritation – Category 2
Eye Irrit. 2A: Serious eye damage/eye irritation – Category 2A
STOT SE 3: Specific target organ toxicity (single exposure) – Category 3