1 Identification of the substance/mixture and of the company

- Product identifier
  - Trade name: MBK/IPA 1:3 Positive Radiation Resist Developer
  - Product number: M089025
  - Application of the substance / the mixture: Solvents
  - Details of the supplier of the safety data sheet
  - Manufacturer/Supplier:
    MicroChem Corp.
    200 Flanders Road
    Westborough, MA 01581 USA

- Information department:
  - Product Safety
  - Email: productsafety@microchem.com
  - Emergency telephone number:
    MicroChem Corp : 617-965-5511
    Chemirec: USA Emergency : 800-424-9300
    Chemirec: International Emergency : 703-527-3887

2 Hazard(s) identification

- Classification of the substance or mixture
  - GHS02 Flame
    Flam. Liq. 2 H225 Highly flammable liquid and vapor.
  - GHS08 Health hazard
    Carc. 2 H351 Suspected of causing cancer.
  - GHS07
    Eye Irrit. 2A H319 Causes serious eye irritation.
    STOT SE 3 H335-H336 May cause respiratory irritation. May cause drowsiness or dizziness.

- Label elements
  - GHS label elements The product is classified and labeled according to the Globally Harmonized System (GHS).
  - Hazard pictograms
    GHS02 GHS07 GHS08

- Signal word Danger

- Hazard-determining components of labeling:
  - Methyl isobutyl ketone
  - Isopropyl alcohol

- Hazard statements
  H225 Highly flammable liquid and vapor.

(Contd. on page 2)
Safety Data Sheet
acc. to OSHA HCS

Trade name: MIBK/IPA 1:3 Positive Radiation Resist Developer

H319 Causes serious eye irritation.
H331 Suspected of causing cancer.
H335-H336 May cause respiratory irritation. May cause drowsiness or dizziness.

Precautionary statements:
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P261 Avoid breathing 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.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
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.
P302+P352 IF ON SKIN: Wash with plenty of soap and water.
P403+P235 Store in a well-ventilated place. Keep cool.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

Classification system:

NFPA ratings (scale 0 - 4):

Health = 1
Fire = 3
Reactivity = 0

HMIS-ratings (scale 0 - 4):

HEALTH

Health = *1

FIRE

Fire = 3

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>67-63-0</th>
<th>Isopropyl alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flam. Liq. 2, H225; Eye Irrit. 2A, H319; STOT SE 3, H336</td>
<td>70-80%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>108-10-1</th>
<th>Methyl isobutyl ketone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flam. Liq. 2, H225; Carc. 2, H351; Acute Tox. 4, H332; Eye Irrit. 2A, H319; STOT SE 3, H335</td>
<td>20-30%</td>
</tr>
</tbody>
</table>
4 First-aid measures

- Description of first aid measures
  - General information:
    Immediately remove any clothing soiled by the product. Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
  - 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.
  - 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; immediately call for medical help.
  - 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.
  Keep away from ignition sources
  Ensure adequate ventilation
  - Environmental precautions: Do not allow to enter sewers/surface or ground water.
  - Methods and material for containment and cleaning up:
    Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
    Ensure adequate ventilation.
    Dispose contaminated material as waste according to Section 13.
  - Reference to other sections
    See Section 7 for information on safe handling.
    See Section 8 for information on personal protection equipment.
7 Handling and storage

· Handling:
  · Precautions for safe handling
    Ensure good ventilation/exhaust at the workplace.
    Store in cool, dry place in tightly closed containers.
    Prevent formation of aerosols.
  · Information about protection against explosives and fires:
    Keep ignition sources away - Do not smoke.
    Protect against electrostatic charges.
    Use explosion-proof apparatus / fittings and spark-proof tools.
  · 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 oxidizing and acidic materials.
      Do not store together with alkalis (caustic solutions).
    · Further information about storage conditions:
      Keep container well-sealed in cool, dry location.
      Store receptacle in a well ventilated area.
      Store under lock and key and with access restricted to technical experts or their assistants only.
  · 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:
    67-63-0 Isopropyl alcohol
    | PEL | Long-term value: 980 mg/m³, 400 ppm |
    | REL | Short-term value: 1225 mg/m³, 500 ppm |
    | TLV | Short-term value: 984 mg/m³, 400 ppm |
    |     | Long-term value: 492 mg/m³, 200 ppm |
    |     | BEI                               |
    108-10-1 Methyl isobutyl ketone
    | PEL | Long-term value: 410 mg/m³, 160 ppm |
    | REL | Short-term value: 300 mg/m³, 75 ppm  |
    | TLV | Short-term value: 307 mg/m³, 75 ppm  |
    |     | Long-term value: 82 mg/m³, 20 ppm  |
    |     | BEI                               |
Trade name: MIBK/IPA 1:3 Positive Radiation Resist Developer

- Ingredients with biological limit values:
  
  **67-63-0 Isopropyl alcohol**
  
  BEI 40 mg/L  
  Medium: urine  
  Time: end of shift at end of workweek  
  Parameter: Acetone (background, nonspecific)

  **108-10-1 Methyl isobutyl ketone**
  
  BEI 1 mg/L  
  Medium: urine  
  Time: end of shift  
  Parameter: MIBK

- Additional information: The lists that were valid during the creation were used as basis.
  
  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.  
  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:
  The glove material must be impermeable and resistant to the product/ the substance/ the preparation.

  Material of gloves:
  PVA gloves  
  The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer.

  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: Colorless  
  Odor: Like alcohol  
  Odor threshold: Not determined.

  pH-value: Not determined.

  Change in condition
  
  Melting point/Melting range: Undetermined.
**Trade name:** MIBK/IPA 1:3 Positive Radiation Resist Developer

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boiling point/Boiling range</td>
<td>82-116 °C (180-241 °F)</td>
</tr>
<tr>
<td>Flash point</td>
<td>13 °C (55 °F)</td>
</tr>
<tr>
<td>Flammability (solid, gaseous)</td>
<td>Not applicable.</td>
</tr>
<tr>
<td>Ignition temperature</td>
<td>425 °C (797 °F)</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Auto igniting</td>
<td>Product is not selfigniting.</td>
</tr>
<tr>
<td>Danger of explosion</td>
<td>Product is not explosive. However, formation of explosive air/vapor mixtures are possible.</td>
</tr>
<tr>
<td>Explosion limits</td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>1.7 Vol %</td>
</tr>
<tr>
<td>Upper</td>
<td>12.0 Vol %</td>
</tr>
<tr>
<td>Vapor pressure at 20 °C (68 °F)</td>
<td>43 hPa (32 mm Hg)</td>
</tr>
<tr>
<td>Density</td>
<td>See other information</td>
</tr>
<tr>
<td>Relative density at 20 °C (68 °F)</td>
<td>0.789 g/cm³ (6.584 lbs/gal)</td>
</tr>
<tr>
<td>Vapor density</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>1.5-2.3 (BuAc=1)</td>
</tr>
<tr>
<td>Solubility in / Miscibility with Water</td>
<td>Partly miscible.</td>
</tr>
<tr>
<td>Partition coefficient (n-octanol/water)</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Viscosity</td>
<td></td>
</tr>
<tr>
<td>Dynamic</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Kinematic</td>
<td>Not determined.</td>
</tr>
<tr>
<td>Solvent content</td>
<td></td>
</tr>
<tr>
<td>Organic solvents</td>
<td>100.0 %</td>
</tr>
<tr>
<td>VOC content</td>
<td>100.0 %</td>
</tr>
<tr>
<td>Other information</td>
<td>No further relevant information available.</td>
</tr>
</tbody>
</table>

**10 Stability and reactivity**

- **Reactivity:** No further relevant information available.
- **Chemical stability**
  - **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
  - **Possibility of hazardous reactions:** Possible formation of peroxide.
  - **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
    - Flammable gases/vapors
11 Toxicological information

- Information on toxicological effects
  - Acute toxicity:
    - LD/LC50 values that are relevant for classification:
      - **67-63-0 Isopropyl alcohol**
        - Oral LD50: 5045 mg/kg (Rat)
        - Dermal LD50: 12800 mg/kg (rabbit)
        - Inhalative LC50/4 h: 30 mg/l (Rat)
      - **108-10-1 Methyl isobutyl ketone**
        - Oral LD50: 2080 mg/kg (Rat)
        - Dermal LD50: 1600 mg/kg (rabbit)
        - Inhalative LC50/4 h: 100 mg/l (Rat)
  - 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:
    - Harmful
    - Irritant
    - Carcinogenic categories
      - IARC (International Agency for Research on Cancer)
        - 67-63-0 Isopropyl alcohol:
          - 3
        - 108-10-1 Methyl isobutyl ketone:
          - 108-10-1
      - NTP (National Toxicology Program)
        - None of the ingredients are listed.
      - OSHA-Ca (Occupational Safety & Health Administration)
        - None of the ingredients are listed.

12 Ecological information

- Toxicity
  - Aquatic toxicity:
    - **67-63-0 Isopropyl alcohol**
      - EC50/48 h: 7550-13300 mg/l (daphnia magna) (immobilization)
      - EC50/72 h: >1000 mg/l (scenedesmus subspicatus) (Growth rate inhibition)
      - LC50/96 h: 9640-10400 mg/l (Pimephales promelas)
    - **108-10-1 Methyl isobutyl ketone**
      - EC50/96 hr: 980 mg/l (scenedesmus subspicatus)
      - 400 mg/l (Selenastrum capricornutum)
      - LC50/24 h: 5000 mg/l (daphnia magna)
      - 460 mg/l (goldfish)
      - LC50/96 h: 505 mg/l (fathead minnow)
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505-540 mg/l (Pimephales promelas)
600 mg/l (Salmo gairdneri)

- Persistence and degradability: No further relevant information available.
- 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
  UN1993
- UN proper shipping name
  DOT, ADR, IMDG, IATA
  FLAMMABLE LIQUID, N.O.S. (ISOPROPYL ALCOHOL, METHYL ISOBUTYL KETONE)
- Transport hazard class(es)
  - DOT
  - Class
    - 3 Flammable liquids
  - Label
  - ADR, IMDG, IATA
  - Class
    - 3 Flammable liquids
  - Label

(Contd. of page 7)
Trade name: MIBK/IPA 1:3 Positive Radiation Resist Developer

15 Regulatory information

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

  - Section 355 (extremely hazardous substances):
    None of the ingredients are listed.

  - Section 313 (Specific toxic chemical listings):
    All ingredients are listed.

  - TSCA (Toxic Substances Control Act):
    All ingredients are listed or comply with TSCA regulations.

  - Proposition 65
    - Chemicals known to cause cancer:
      108-10-1 Methyl isobutyl ketone
    - 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)
    108-10-1 Methyl isobutyl ketone
  - TLV (Threshold Limit Value established by ACGIH)
    67-63-0 Isopropyl alcohol
  - NIOSH-Ca (National Institute for Occupational Safety and Health)
    None of the ingredients are listed.

- Massachusetts State Right To Know List
  - 67-63-0 Isopropyl alcohol
  - 108-10-1 Methyl isobutyl ketone
Trade name: MIBK/IPA 1:3 Positive Radiation Resist Developer

- New Jersey State Right To Know List
  - 67-63-0 Isopropyl alcohol
  - 108-10-1 Methyl isobutyl ketone

- Pennsylvania Hazardous Substances List
  - 67-63-0 Isopropyl alcohol
  - 108-10-1 Methyl isobutyl ketone

- California SCAQMD Rule 443.1 VOC's: 788 g/l
- GHS label elements The product is classified and labeled according to the Globally Harmonized System (GHS).
- Hazard pictograms
  - GHS02
  - GHS07
  - GHS08

- Signal word Danger
- Hazard-determining components of labeling:
  - Methyl isobutyl ketone
  - Isopropyl alcohol
- Hazard statements
  - H225 Highly flammable liquid and vapor.
  - H319 Causes serious eye irritation.
  - H351 Suspected of causing cancer.
  - H335-H336 May cause respiratory irritation. May cause drowsiness or dizziness.
- Precautionary statements
  - P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
  - P261 Avoid breathing 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.
  - P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
  - P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
  - 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.
  - P302+P352 IF ON SKIN: Wash with plenty of soap and water.
  - 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: Mr. Cole

(Contd. on page 11)
Revision History:
The business address of the manufacturer in Section 1 was updated. The hazard classification and precautionary statements for the mixture in Section 2 were revised. The toxicology data in Sections 11 and 12 were revised.

Date of preparation / last revision: 05/03/2017 / 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 Organization
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)
VOC: Volatile Organic Compounds (USA, EU)
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
BEI: Biological Exposure Limit
Flam. Liq. 2: Flammable liquid – Category 2
Acute Tox. 4: Acute toxicity – Category 4
Eye Irrit. 2A: Serious eye damage/eye irritation – Category 2A
Carc. 2: Carcinogenicity – Category 2
STOT SE 3: Specific target organ toxicity (single exposure) – Category 3