Safety Data Sheet
acc. to OSHA HCS

Printing date 05/12/2023 *Reviewed on 05/12/2023*

1 Identification

· **Product identifier**

· **Trade name: MIBK/IPA 1:4 Positive Radiation Resist Developer**

· **Product number:** M089020
· **Application of the substance / the mixture** Solvents

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Kayaku Advanced Materials, Inc.
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

Flammable Liquids 2 — H225 Highly flammable liquid and vapor.

GHS08 Health hazard

Carcinogenicity 2 — H351 Suspected of causing cancer.

GHS07

Eye Irritation 2A — H319 Causes serious eye irritation.

Specific Target Organ Toxicity - Single Exposure 3 — H336 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

(Contd. on page 2)

Safety Data Sheet
acc. to OSHA HCS

Printing date 05/12/2023 *Reviewed on 05/12/2023*

Trade name: MIBK/IPA 1:4 Positive Radiation Resist Developer

(Contd. of page 1)

· **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.
H336 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.
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 to extinguish: Alcohol resistant foam, Fire-extinguishing powder, 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.

· **Classification system:**
· **NFPA ratings (scale 0 - 4)**

Health = 2
Fire = 3
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = 2
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:**

67-63-0	Isopropyl alcohol Flammable Liquids 2, H225; Eye Irritation 2A, H319; Specific Target Organ Toxicity - Single Exposure 3, H336	75-85%

(Contd. on page 3)

Safety Data Sheet
acc. to OSHA HCS

Printing date 05/12/2023 Reviewed on 05/12/2023

Trade name: MIBK/IPA 1:4 Positive Radiation Resist Developer

(Contd. of page 2)

108-10-1	Methyl isobutyl ketone Flammable Liquids 2, H225; Carcinogenicity 2, H351; Acute Toxicity - Inhalation 4, H332; Eye Irritation 2A, H319; Specific Target Organ Toxicity - Single Exposure 3, H336	15-25%

4 First-aid measures

· **Description of first aid measures**
· **General information:**
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 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
· **Special hazards arising from the substance or mixture** No further relevant information available.
· **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.

(Contd. on page 4)

(Contd. of page 3)

· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
· **Protective Action Criteria for Chemicals**

· **PAC-1:**		
67-63-0	Isopropyl alcohol	400 ppm
108-10-1	Methyl isobutyl ketone	75 ppm

· **PAC-2:**		
67-63-0	Isopropyl alcohol	2000* ppm
108-10-1	Methyl isobutyl ketone	500 ppm

· **PAC-3:**		
67-63-0	Isopropyl alcohol	12000** ppm
108-10-1	Methyl isobutyl ketone	3000* ppm

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 explosions 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.
Protect from heat and direct sunlight.
· **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 section 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

(Contd. on page 5)

(Contd. of page 4)

REL	Short-term value: 1225 mg/m³, 500 ppm Long-term value: 980 mg/m³, 400 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, 100 ppm
REL	Short-term value: 300 mg/m³, 75 ppm Long-term value: 205 mg/m³, 50 ppm
TLV	Short-term value: 307 mg/m³, 75 ppm Long-term value: 82 mg/m³, 20 ppm BEI

· **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:**

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.

(Contd. on page 6)

Safety Data Sheet
acc. to OSHA HCS

Printing date 05/12/2023 *Reviewed on 05/12/2023*

Trade name: MIBK/IPA 1:4 Positive Radiation Resist Developer

(Contd. of page 5)

· **Eye protection:**

Tightly sealed goggles

· **Body protection:** *Long-sleeved work clothes*

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.*
Boiling point/Boiling range:	*82-116 °C (179.6-240.8 °F)*
· **Flash point:**	*13 °C (55.4 °F)*
· **Flammability (solid, gaseous):**	*Not applicable.*
· **Auto igniting:**	*425 °C (797 °F)*
· **Decomposition temperature:**	*Not determined.*
· **Ignition temperature:**	*Product is not selfigniting.*
· **Danger of explosion:**	*Product is not explosive. However, formation of explosive air/vapor mixtures are possible.*
· **Explosion limits:**	
Lower:	*1.7 Vol %*
Upper:	*12.0 Vol %*
· **Vapor pressure at 20 °C (68 °F):**	*43 hPa (32.3 mm Hg)*
· **Density:**	*Not determined.*
· **Relative density at 20 °C (68 °F)**	*0.788 g/cm³ (6.57586 lbs/gal)*
· **Vapor density**	*Not determined.*
· **Evaporation rate**	*1.6-2.3 (BuAc=1)*
· **Solubility in / Miscibility with**	
Water:	*Partly miscible.*
· **Partition coefficient (n-octanol/water):**	*Not determined.*
· **Viscosity:**	
Dynamic:	*Not determined.*
Kinematic:	*Not determined.*

(Contd. on page 7)

(Contd. of page 6)

· **Solvent content:**	
Organic solvents:	100.0 %
VOC content:	100.0 %
· **Other information**	No further relevant information available.

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** 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 (rab)
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.
· **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	2B

(Contd. on page 8)

(Contd. of page 7)

· **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)*
	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.*

(Contd. on page 9)

Safety Data Sheet
acc. to OSHA HCS

Printing date 05/12/2023 *Reviewed on 05/12/2023*

Trade name: MIBK/IPA 1:4 Positive Radiation Resist Developer

(Contd. of page 8)

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** 3

· **ADR, IMDG, IATA**

· **Class** 3 Flammable liquids
· **Label** 3

· **Packing group**
· **DOT, ADR, IMDG, IATA** II

· **Environmental hazards:**
· **Marine pollutant:** No

· **Special precautions for user** Warning: Flammable liquids
· **Hazard identification number (Kemler code):** 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":** UN1993, FLAMMABLE LIQUID, N.O.S. (ISOPROPANOL (ISOPROPYL ALCOHOL), METHYL ISOBUTYL KETONE), 3, II

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):**
All ingredients are listed.

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

(Contd. on page 10)

Safety Data Sheet
acc. to OSHA HCS

Printing date 05/12/2023 *Reviewed on 05/12/2023*

Trade name: MIBK/IPA 1:4 Positive Radiation Resist Developer

(Contd. of page 9)

· **Hazardous Air Pollutants**

108-10-1	Methyl isobutyl ketone

· **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:**

108-10-1	Methyl isobutyl ketone

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**

108-10-1	Methyl isobutyl ketone	I

· **TLV (Threshold Limit Value)**

67-63-0	Isopropyl alcohol	A4

· **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

· **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.

(Contd. on page 11)

(Contd. of page 10)

H336 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.
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 to extinguish: Alcohol resistant foam, Fire-extinguishing powder, 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.com)

· **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** 05/12/2023
· **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 relatif au transport international 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
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
Flammable Liquids 2: Flammable liquids – Category 2

(Contd. on page 12)

Safety Data Sheet
acc. to OSHA HCS

Printing date 05/12/2023 *Reviewed on 05/12/2023*

Trade name: MIBK/IPA 1:4 Positive Radiation Resist Developer

(Contd. of page 11)

Acute Toxicity - Inhalation 4: Acute toxicity – Category 4
Eye Irritation 2A: Serious eye damage/eye irritation – Category 2A
Carcinogenicity 2: Carcinogenicity – Category 2
Specific Target Organ Toxicity - Single Exposure 3: Specific target organ toxicity (single exposure) – Category 3