

MATERIAL SAFETY DATA SHEET

Section 1

PRODUCT AND COMPANY INFORMATION

- a) Product Name: ADPS™ Oncology Kits
- b) Recommended use of the chemical and restriction on use: Research Use Only
- c) Manufacturer/Supplier/Distributor Information
 - Name: GENECAST Co.,Ltd.
 - Address: Office 10009, Garden5 Techno Hall, 66, Chungmin-ro, Songpa-gu, Seoul, Korea
 - Country: South Korea
 - Emergency phone number: +82-2-2157-3150

Section 2

HAZARDS IDENTIFICATION

- 2. Hazard identification
- a) Hazard-Risk Classification:
 - Acute toxicity(oral): Category 3
 - Acute toxicity(dermal): Category 3
- b) Label elements, including precautionary statements
 - Symbol:



- Signal Word: Danger
- Hazard-Risk Statement: H301 Toxic if swallowed. / H311 Toxic in contact with skin.
- Precautionary Statement:
Harmful in contact with skin. Toxic if swallowed. Irritating to eyes, respiratory system and skin. Hygroscopic (absorbs moisture from the air). Potential Health Effects
Eye: Causes eye irritation.
Skin: Causes skin irritation. Harmful if absorbed through the skin.
Ingestion: Harmful if swallowed.
Inhalation: Causes respiratory tract irritation.
Chronic: No information found.

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Section 3

COMPOSITION/INFORMATION ON INGREDIENT

COMPOSITION

Chemical Name	CAS Number	Content(%)
Tetramethyl ammonium chloride	75-57-0	0.274
Poly(oxy-1,2-ethanediyl), α -(nonylphenyl)- ω -hydroxy-	9016-45-9	0.050
Tris-HCl	1185-53-1	0.002

Other components except for ADPS™ Oncology Kits contain no hazardous ingredients.

Section 4

FIRST-AID MEASURES

- a) Eye contact: In case of contact, immediately flush eyes with plenty of water for at least 20 minutes. Get medical aid.
- b) Skin contact: In case of contact, immediately flush skin with plenty of water for at least 20 minutes while removing contaminated clothing and shoes. Get medical aid immediately.
- c) Inhalation: In case of inhalation, move to fresh air environment. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
- d) Ingestion: In case of ingestion, do not induce vomiting unless directed to do so by medical personnel. Do not give anything by mouth to an unconscious person. Get medical aid.
- e) Indication of immediate medical attention and notes for physician:

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Section 5

FIRE FIGHTING MEASURES

- a) General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gas may be generated by thermal decomposition or combustion.
- b) Suitable (and unsuitable) extinguishing media: Use water spray, dry chemical, or carbon dioxide.
- c) Specific hazards arising from the chemical (e.g. nature of any hazardous combustion products):
- Containers may explode on heating. Some may burn but not easily. The substance itself is not burned but decomposes upon heating, resulting in corrosive / toxic fumes. May cause irritating, corrosive and toxic gases in case of fire.
- d) Special protective equipment and precautions for fire-fighters:
- Move container from fire area where it's not hazardous.
 - Some may be transported at high temperatures.
 - Leachate may cause contamination.
 - Contact with skin and eyes may cause burn.
 - For the disposal of fire demand water, dig a ditch and lock it so that the material is not scattered.
 - Move container from fire area where it's not hazardous.
 - In case of fire, cool containers with plenty of water after extinguishing.
 - In the event of a tank fire, immediately release the pressure release device if there is noise or discoloration of the tank.
 - Tank escape from a flamed tank during a fire.
 - Rescuers should wear appropriate protective gear. Keep out of the reach of children and keep safe distance.
 - In case of fire, use fire extinguisher at maximum distance or use unmanned firefighting equipment.
 - Do not let water get inside of the container.

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Section 6

ACCIDENTAL RELEASE MEASURES

- a) General Information: Use proper personal protective equipment as indicated in Section 8.
- b) Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Clean up spills immediately, observe precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.
- c) Personal precautions, protective equipment and emergency procedures:
 - Wipe off all spills immediately and follow all protective precautions.
 - Remove all ignition sources.
 - Do not touch the container or leaks without wearing appropriate protective clothing.
 - Cover with plastic sheet to prevent from spreading.
 - Note the substances and conditions to avoid.
- d) Environmental precautions and protective procedures:

Prevent entry into waterways, sewers, basements and confined areas.
- e) Methods and materials for containment and cleaning up:
 - Absorb spillage with inert materials (eg. dry sand or earth) and place in a chemical waste container.
 - Absorb liquid and rinse contaminated area with detergent and water.

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Section 7

HANDLING AND STORAGE

- a) Precautions for safe handling: Wash thoroughly after handling. Use adequate ventilation. Minimize dust and accumulation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation.
- b) Conditions for safe storage (including any incompatibilities): Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Store away from moisturized environment.

Section 8

EXPOSURE CONTROLS/PERSONAL PROTECTION

- a) Control parameters (e.g. occupational exposure limit values, biological limit values):
- b) Appropriate engineering controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate ventilation to keep airborne concentrations low.
- c) Personal protective equipment
- Respiratory protection: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
 - Eye protection: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
 - Hand/Skin protection: Wear appropriate protective gloves to prevent skin exposure.
 - Body protection: Wear appropriate protective clothing to prevent skin exposure.

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Section 9

PHYSICAL AND CHEMICAL PROPERTIES

- a) Appearance (physical state, color etc)
 - form: Liquid
 - Color: Clear
 - The product's characteristics are very similar to water
- b) Odor: Odorless
- c) pH: pH-value at 20°C(68°F) 7.4~8.5
- d) Melting point/freezing point: 0°C
- e) Initial boiling point and boiling range: 100°C
- f) Flash point: Not Applicable
- g) Evaporation rate: Not Determined
- h) Flammability (solid, gas): Not Applicable
- i) Upper/lower flammability or explosive limits: Not Applicable
- j) Vapor pressure: at 20°C 23hPa
- k) Solubility: Soluble in cold water, hot water
- l) Vapor density: Not Determined
- m) Relative density: Not Determined
- n) Partition coefficient: n-octanol/water: Not Available
- o) Auto-ignition temperature: Not auto-ignition
- p) Decomposition temperature: Not Available
- q) Viscosity: Not Available
- r) Molecular mass: Not Applicable

Section 10

STABILITY AND REACTIVITY

- a) Chemical stability and possibility of hazardous reactions:
- b) Conditions to avoid (e.g. static discharge, shock or vibration, etc.):
- c) Incompatible materials:
- d) Hazardous decomposition products:

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Section 11

TOXICOLOGICAL INFORMATION

a) Information on the likely routes of exposure:

b) Health hazards information

- Acute toxic:

Tetramethyl ammonium chloride	LD50 47 mg/kg Rat
Poly(oxy-1,2-ethanediyl), α -(nonylphenyl)- ω -hydroxy-	LD50 4290 mg/kg Mouse (Female/Male)
Tris-HCl	No Data

- Skin corrosive/irritant:

Tetramethyl ammonium chloride	LD50 200 ~ 500 mg/kg Rabbit
Poly(oxy-1,2-ethanediyl), α -(nonylphenyl)- ω -hydroxy-	LD50 2000 mg/kg Rabbit
Tris-HCl	No Data

- Serious eye damage/eye irritation:

Tetramethyl ammonium chloride	No irritants found with severe eye damage/irritation test using rabbit Conjunctiva rate=1.1 (recover in 7days) Chemosis rate= 0.3(recover in 48hrs.)
Poly(oxy-1,2-ethanediyl), α -(nonylphenyl)- ω -hydroxy-	Result of Severe eye damage/irritation test using rabbit EO Chain 2~1 : strong irritant Over EO Chain 30 : No irritant
Tris-HCl	No Data

- Respiratory sensitization: No data

- Skin sensitization:

Tetramethyl ammonium chloride	No Data
Poly(oxy-1,2-ethanediyl), α -(nonylphenyl)- ω -hydroxy-	Strong irritant was shown through skin corrosion and irritation test using rabbit.
Tris-HCl	No Data

- Carcinogenicity: No Data

- Germ Cell Mutagenicity:

Tetramethyl ammonium chloride	As a result of mutagenesis test using microorganism in vitro, it turn out to be all negative regardless of the metabolic system.
Poly(oxy-1,2-ethanediyl), α -(nonylphenyl)- ω -hydroxy-	Result of Mutagenesis test using microorganism in vitro is negative.
Tris-HCl	No Data

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TOXICOLOGICAL INFORMATION

- Reproductive toxicity:

Tetramethyl ammonium chloride	As a result of reproductive toxicity test using rats, decreased movement and eyelid retraction are found. NOAEL = 5 mg/kg bw/day
Poly(oxy-1,2-ethanediyl), α -(nonylphenyl)- ω -hydroxy-	No Data
Tris-HCl	No Data

- Specific target organ toxicity (single exposure):

Tetramethyl ammonium chloride	No Data
Poly(oxy-1,2-ethanediyl), α -(nonylphenyl)- ω -hydroxy-	Irritates eye, skin, and airway. May affect central nervous system.
Tris-HCl	No Data

- Specific target organ toxicity (repeated exposure):

Tetramethyl ammonium chloride	As result of repeated inhalation toxicity test with rats (M/F), significant reduction in food consumption was found. NOAEL(M)=5mg/kg bw/day, NOAEL(F)= 10 mg/kg bw/day
Poly(oxy-1,2-ethanediyl), α -(nonylphenyl)- ω -hydroxy-	No Data
Tris-HCl	No Data

- Aspiration hazard: No Data

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Section 12

ECOLOGICAL INFORMATION

a) Aquatic and terrestrial ecotoxicity:

- Pisces

Tetramethyl ammonium chloride	LC50 462 mg/ℓ 96 hr Pimephales promelas
Poly(oxy-1,2-ethanediyl), α-(nonylphenyl)-ω-hydroxy-	LC50 4.7 mg/ℓ 96 hr Oncorhynchus mykiss
Tris-HCl	LC50 259000000 mg/ℓ 96 hr

- Shellfish

Tetramethyl ammonium chloride	EC50 3 mg/ℓ 48 hr Daphnia magna
Poly(oxy-1,2-ethanediyl), α-(nonylphenyl)-ω-hydroxy-	LC50 1.82 mg/ℓ 48 hr
Tris-HCl	LC50 174,000,000 mg/ℓ 48 hr

- Algae

Tetramethyl ammonium chloride	EC50 96.3 mg/ℓ 72 hr
Poly(oxy-1,2-ethanediyl), α-(nonylphenyl)-ω-hydroxy-	LC50 12 mg/ℓ 96 hr
Tris-HCl	EC50 73,700,000 mg/ℓ 96 hr

b) Persistence and degradability:

- Persistence

Tetramethyl ammonium chloride	log Kow -4.18
Poly(oxy-1,2-ethanediyl), α-(nonylphenyl)-ω-hydroxy-	log Kow 3.7
Tris-HCl	NA

- Degradability: No Data

c) Bioaccumulative potential:

- Bioaccumulation

Tetramethyl ammonium chloride	0 % 14 day
Poly(oxy-1,2-ethanediyl), α-(nonylphenyl)-ω-hydroxy-	98 % 30 day (degradability)
Tris-HCl	No Data

d) Mobility in soil: No Data

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Section 12

ECOLOGICAL INFORMATION

d) Mobility in soil: No Data

Tetramethyl ammonium chloride	Daphnia magna, NOEC, 11d, =30 µg/L, Pseudokirchnerella subcapitata, NOEC, 72H, =6.25 mg/L
Poly(oxy-1,2-ethanediyl), α-(nonylphenyl)-ω-hydroxy-	No Data
Tris-HCl	No Data

Section 13

DISPOSAL CONSIDERATIONS

Disposal precaution (including the disposal method of contaminated container and packaging): Dispose of in a manner consistent with federal, state, and local regulations.

Section 14

TRANSPORT INFORMATION

- a) Land Transport ADR/RID: No Classification Assigned.
- b) Air Transport IATA/ICAO: No Classification Assigned.
- c) Maritime Transport IMDG: No Classification Assigned.

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Section 15

REGULATORY INFORMATION

a) Industrial Safety and Health Act: No Data

b) Toxic Chemical Control Act:

Tetramethyl ammonium chloride	No Data
Poly(oxy-1,2-ethanediyl), α -(nonylphenyl)- ω -hydroxy-	Nonylphenols [Nonylphenol ethoxylates] and mixtures containing more than 0.1% of them are toxic substances.
Tris-HCl	No Data

c) Dangerous Material Safety Control Act:

Tetramethyl ammonium chloride	No Data
Poly(oxy-1,2-ethanediyl), α -(nonylphenyl)- ω -hydroxy-	4th grade 3rd petroleum (non-water soluble) 2000L
Tris-HCl	No Data

d) Wastes Management Act: Designated Waste

e) Other requirements in domestic and other countries: Not regulated

Section 16

OTHER INFORMATION

N/A