Conforms to US OSHA Hazard Communication 29CFR1910.1200

SAFETY DATA SHEET

Agilent Technologies

Probe Sample Kit - 500_600 DB, Part Number 94906551

Section 1. Identification

This product is considered an article. This Material Safety Data Sheet is written based on the encapsulated substance or mixture in this article.

1.1 Product identifier

Product name : Probe Sample Kit - 500_600 DB, Part Number 94906551

Part No. (Chemical Kit) : 94906551

Part No. :

13C S/N ASTM	96812069
19F S/N	96812082
15N S/N	96812083
31P S/N	96812087
13C S/N ASTM doped	96812091

Validation date : 12/31/2015

1.2 Relevant identified uses of the substance or mixture and uses advised against

Material uses : Analytical chemistry.

13C S/N ASTM	860 µl
19F S/N	860 µl
15N S/N	860 µl
31P S/N	860 µl
13C S/N ASTM doped	860 µl

1.3 Details of the supplier of the safety data sheet

Supplier/Manufacturer : Agilent Technologies, Inc.
5301 Stevens Creek Blvd
Santa Clara, CA 95051, USA
800-227-9770

1.4 Emergency telephone number

In case of emergency : CHEMTREC®: 1-800-424-9300

Section 2. Hazards identification

This article, when used under reasonable conditions and in accordance with the directions for use, should not present a health hazard. The substance or mixture is encapsulated in the article. Only if released due to use or processing of the article in a manner not in accordance with the product's directions for use it may present potential health and safety hazards.

2.1 Classification of the substance or mixture

OSHA/HCS status :

13C S/N ASTM	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
19F S/N	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
15N S/N	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
31P S/N	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
13C S/N ASTM doped	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture

Section 2. Hazards identification

13C S/N ASTM

H225	FLAMMABLE LIQUIDS - Category 2
H302	ACUTE TOXICITY (oral) - Category 4
H315	SKIN IRRITATION - Category 2
H319	EYE IRRITATION - Category 2A
H340	GERM CELL MUTAGENICITY - Category 1
H350	CARCINOGENICITY - Category 1A
H335	SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3
H336	SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
H372	SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (blood system, kidneys and liver) - Category 1
H304	ASPIRATION HAZARD - Category 1

19F S/N

H225	FLAMMABLE LIQUIDS - Category 2
H302	ACUTE TOXICITY (oral) - Category 4
H315	SKIN IRRITATION - Category 2
H319	EYE IRRITATION - Category 2A
H340	GERM CELL MUTAGENICITY - Category 1
H350	CARCINOGENICITY - Category 1A
H335	SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3
H336	SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
H372	SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (blood system) - Category 1
H304	ASPIRATION HAZARD - Category 1

15N S/N

H227	FLAMMABLE LIQUIDS - Category 4
H319	EYE IRRITATION - Category 2A
H360	TOXIC TO REPRODUCTION (Unborn child) - Category 1B

31P S/N

H302	ACUTE TOXICITY (oral) - Category 4
H315	SKIN IRRITATION - Category 2
H319	EYE IRRITATION - Category 2A
H351	CARCINOGENICITY - Category 2
H335	SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3
H336	SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
H373	SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (kidneys and liver) - Category 2

13C S/N ASTM doped

H225	FLAMMABLE LIQUIDS - Category 2
H302	ACUTE TOXICITY (oral) - Category 4
H315	SKIN IRRITATION - Category 2
H319	EYE IRRITATION - Category 2A
H340	GERM CELL MUTAGENICITY - Category 1
H350	CARCINOGENICITY - Category 1A
H335	SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation) - Category 3
H336	SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Narcotic effects) - Category 3
H372	SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) (blood system,

Section 2. Hazards identification

kidneys and liver) - Category 1

H304 ASPIRATION HAZARD - Category 1

2.2 GHS label elements

Hazard pictograms :

Signal word :

13C S/N ASTM	Danger
19F S/N	Danger
15N S/N	Danger
31P S/N	Warning
13C S/N ASTM doped	Danger

Hazard statements :

13C S/N ASTM

GHS SYMBOL - **Flame** - **Exclamation mark** - **Health hazard** -
H225 - Highly flammable liquid and vapor.
H302 - Harmful if swallowed.
H319 - Causes serious eye irritation.
H315 - Causes skin irritation.
H340 - May cause genetic defects.
H350 - May cause cancer.
H304 - May be fatal if swallowed and enters airways.
H335 - May cause respiratory irritation.
H336 - May cause drowsiness or dizziness.
H372 - Causes damage to organs through prolonged or repeated exposure. (blood system, kidneys, liver)

19F S/N

GHS SYMBOL - **Flame** - **Exclamation mark** - **Health hazard** -
H225 - Highly flammable liquid and vapor.
H302 - Harmful if swallowed.
H319 - Causes serious eye irritation.
H315 - Causes skin irritation.
H340 - May cause genetic defects.
H350 - May cause cancer.
H304 - May be fatal if swallowed and enters airways.
H335 - May cause respiratory irritation.
H336 - May cause drowsiness or dizziness.
H372 - Causes damage to organs through prolonged or repeated exposure. (blood system)

15N S/N

H227 - Combustible liquid.
GHS SYMBOL - **Exclamation mark** - **Health hazard** -
H319 - Causes serious eye irritation.
H360 - May damage the unborn child.

31P S/N

GHS SYMBOL - **Exclamation mark** - **Health hazard** -
H302 - Harmful if swallowed.
H319 - Causes serious eye irritation.
H315 - Causes skin irritation.
H351 - Suspected of causing cancer.
H335 - May cause respiratory irritation.
H336 - May cause drowsiness or dizziness.
H373 - May cause damage to organs through prolonged or repeated exposure. (kidneys, liver)

Section 2. Hazards identification

	13C S/N ASTM doped	GHS SYMBOL - **Flame** - **Exclamation mark** - **Health hazard** - H225 - Highly flammable liquid and vapor. H302 - Harmful if swallowed. H319 - Causes serious eye irritation. H315 - Causes skin irritation. H340 - May cause genetic defects. H350 - May cause cancer. H304 - May be fatal if swallowed and enters airways. H335 - May cause respiratory irritation. H336 - May cause drowsiness or dizziness. H372 - Causes damage to organs through prolonged or repeated exposure. (blood system, kidneys, liver)
Precautionary statements		
Prevention :	13C S/N ASTM	P201 - Obtain special instructions before use. P202 - Do not handle until all safety precautions have been read and understood. P280 - Wear protective gloves. Wear eye or face protection. Wear protective clothing. P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P241 - Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. P242 - Use only non-sparking tools. P243 - Take precautionary measures against static discharge. P233 - Keep container tightly closed. P271 - Use only outdoors or in a well-ventilated area. P260 - Do not breathe vapor. P270 - Do not eat, drink or smoke when using this product. P264 - Wash hands thoroughly after handling.
	19F S/N	P201 - Obtain special instructions before use. P202 - Do not handle until all safety precautions have been read and understood. P280 - Wear protective gloves. Wear eye or face protection. Wear protective clothing. P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P241 - Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. P242 - Use only non-sparking tools. P243 - Take precautionary measures against static discharge. P233 - Keep container tightly closed. P271 - Use only outdoors or in a well-ventilated area. P260 - Do not breathe vapor. P270 - Do not eat, drink or smoke when using this product. P264 - Wash hands thoroughly after handling.
	15N S/N	P201 - Obtain special instructions before use. P202 - Do not handle until all safety precautions have been read and understood.

Section 2. Hazards identification

	31P S/N	P280 - Wear protective gloves. Wear eye or face protection. Wear protective clothing. P210 - Keep away from flames and hot surfaces. - No smoking. P264 - Wash hands thoroughly after handling. P201 - Obtain special instructions before use. P202 - Do not handle until all safety precautions have been read and understood. P280 - Wear protective gloves. Wear eye or face protection. Wear protective clothing. P271 - Use only outdoors or in a well-ventilated area. P260 - Do not breathe vapor. P270 - Do not eat, drink or smoke when using this product. P264 - Wash hands thoroughly after handling.
	13C S/N ASTM doped	P201 - Obtain special instructions before use. P202 - Do not handle until all safety precautions have been read and understood. P280 - Wear protective gloves. Wear eye or face protection. Wear protective clothing. P210 - Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. P241 - Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. P242 - Use only non-sparking tools. P243 - Take precautionary measures against static discharge. P233 - Keep container tightly closed. P271 - Use only outdoors or in a well-ventilated area. P260 - Do not breathe vapor. P270 - Do not eat, drink or smoke when using this product. P264 - Wash hands thoroughly after handling.
Response :	13C S/N ASTM	P314 - Get medical attention if you feel unwell. P308 + P313 - IF exposed or concerned: Get medical attention. P304 + P340 + P312 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. P301 + P310 + P330 + P331 - IF SWALLOWED: Immediately call a POISON CENTER or physician. Rinse mouth. Do NOT induce vomiting. P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. P302 + P352 + P362+P364 - IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. P332 + P313 - If skin irritation occurs: Get medical attention. P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P337 + P313 - If eye irritation persists: Get medical

Section 2. Hazards identification

	attention.
19F S/N	P314 - Get medical attention if you feel unwell. P308 + P313 - IF exposed or concerned: Get medical attention. P304 + P340 + P312 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. P301 + P310 + P330 + P331 - IF SWALLOWED: Immediately call a POISON CENTER or physician. Rinse mouth. Do NOT induce vomiting. P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. P302 + P352 + P362+P364 - IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. P332 + P313 - If skin irritation occurs: Get medical attention. P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P337 + P313 - If eye irritation persists: Get medical attention.
15N S/N	P308 + P313 - IF exposed or concerned: Get medical attention. P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P337 + P313 - If eye irritation persists: Get medical attention.
31P S/N	P314 - Get medical attention if you feel unwell. P308 + P313 - IF exposed or concerned: Get medical attention. P304 + P340 + P312 - IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. P301 + P312 + P330 - IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. P302 + P352 + P362+P364 - IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. P332 + P313 - If skin irritation occurs: Get medical attention. P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P337 + P313 - If eye irritation persists: Get medical attention.
13C S/N ASTM doped	P314 - Get medical attention if you feel unwell. P308 + P313 - IF exposed or concerned: Get medical attention. P304 + P340 + P312 - IF INHALED: Remove person to fresh air and keep comfortable for

Section 2. Hazards identification

			breathing. Call a POISON CENTER or physician if you feel unwell. P301 + P310 + P330 + P331 - IF SWALLOWED: Immediately call a POISON CENTER or physician. Rinse mouth. Do NOT induce vomiting. P303 + P361 + P353 - IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. P302 + P352 + P362+P364 - IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. P332 + P313 - If skin irritation occurs: Get medical attention. P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P337 + P313 - If eye irritation persists: Get medical attention.
Storage	:	13C S/N ASTM	P405 - Store locked up. P403 - Store in a well-ventilated place. P235 - Keep cool.
		19F S/N	P405 - Store locked up. P403 - Store in a well-ventilated place. P235 - Keep cool.
		15N S/N	P405 - Store locked up. P403 - Store in a well-ventilated place. P235 - Keep cool.
		31P S/N	P405 - Store locked up.
		13C S/N ASTM doped	P405 - Store locked up. P403 - Store in a well-ventilated place. P235 - Keep cool.
Disposal	:	13C S/N ASTM	P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.
		19F S/N	P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.
		15N S/N	P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.
		31P S/N	P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.
		13C S/N ASTM doped	P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.
Supplemental label elements	:	13C S/N ASTM	None known.
		19F S/N	None known.
		15N S/N	None known.
		31P S/N	None known.
		13C S/N ASTM doped	None known.

2.3 Other hazards

Hazards not otherwise classified	:	13C S/N ASTM	None known.
		19F S/N	None known.
		15N S/N	None known.
		31P S/N	None known.
		13C S/N ASTM doped	None known.

Section 3. Composition/information on ingredients

This article, when used under reasonable conditions and in accordance with the directions for use, should not present a health hazard. The substance or mixture is encapsulated in the article. Only if released due to use or processing of the article in a manner not in accordance with the product's directions for use it may present potential health and safety hazards.

Substance/mixture	:	13C S/N ASTM	Mixture (encapsulated in article)
		19F S/N	Mixture (encapsulated in article)
		15N S/N	Mixture (encapsulated in article)
		31P S/N	Mixture (encapsulated in article)
		13C S/N ASTM doped	Mixture (encapsulated in article)

Ingredient name	%	CAS number
13C S/N ASTM		
(2H6)benzene	≥50 - ≤75	1076-43-3
1,4-Dioxane	≥25 - ≤50	123-91-1
19F S/N		
(2H6)benzene	≥90	1076-43-3
15N S/N		
Formamide	≥90	75-12-7
di[($^{2}H_{3}$)Methyl] sulphoxide	≥10 - ≤25	2206-27-1
31P S/N		
(^{2}H)Chloroform	≥90	865-49-6
13C S/N ASTM doped		
(2H6)benzene	≥50 - ≤75	1076-43-3
1,4-Dioxane	≥25 - ≤50	123-91-1

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

4.1 Description of necessary first aid measures

Eye contact	:	13C S/N ASTM	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
		19F S/N	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
		15N S/N	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
		31P S/N	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get

Section 4. First aid measures

			medical attention.
		13C S/N ASTM doped	Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.
Inhalation	:	13C S/N ASTM	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
		19F S/N	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
		15N S/N	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
		31P S/N	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the

Section 4. First aid measures

			person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
		13C S/N ASTM doped	Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If necessary, call a poison center or physician. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
Skin contact	:	13C S/N ASTM	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
		19F S/N	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
		15N S/N	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
		31P S/N	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.
		13C S/N ASTM doped	Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Section 4. First aid measures

Ingestion	:	13C S/N ASTM	Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
		19F S/N	Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
		15N S/N	Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
		31P S/N	Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. If necessary, call a poison center or physician. Never give anything by mouth to an unconscious person.

Section 4. First aid measures

	If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.
13C S/N ASTM doped	Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

4.2 Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact	: 13C S/N ASTM	Causes serious eye irritation.
	19F S/N	Causes serious eye irritation.
	15N S/N	Causes serious eye irritation.
	31P S/N	Causes serious eye irritation.
	13C S/N ASTM doped	Causes serious eye irritation.
Inhalation	: 13C S/N ASTM	Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation.
	19F S/N	Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation.
	15N S/N	No known significant effects or critical hazards.
	31P S/N	Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation.
	13C S/N ASTM doped	Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation.
Skin contact	: 13C S/N ASTM	Causes skin irritation.
	19F S/N	Causes skin irritation.
	15N S/N	No known significant effects or critical hazards.
	31P S/N	Causes skin irritation.
	13C S/N ASTM doped	Causes skin irritation.
Ingestion	: 13C S/N ASTM	Harmful if swallowed. Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.
	19F S/N	Harmful if swallowed. Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.
	15N S/N	No known significant effects or critical hazards.
	31P S/N	Harmful if swallowed. Can cause central nervous system (CNS) depression.
	13C S/N ASTM doped	Harmful if swallowed. Can cause central nervous system (CNS) depression. May be fatal if

Section 4. First aid measures

swallowed and enters airways.

Over-exposure signs/symptoms

Eye contact	:	13C S/N ASTM	Adverse symptoms may include the following: pain or irritation watering redness
		19F S/N	Adverse symptoms may include the following: pain or irritation watering redness
		15N S/N	Adverse symptoms may include the following: pain or irritation watering redness
		31P S/N	Adverse symptoms may include the following: pain or irritation watering redness
		13C S/N ASTM doped	Adverse symptoms may include the following: pain or irritation watering redness
Inhalation	:	13C S/N ASTM	Adverse symptoms may include the following: respiratory tract irritation coughing nausea or vomiting headache drowsiness/fatigue dizziness/vertigo unconsciousness
		19F S/N	Adverse symptoms may include the following: respiratory tract irritation coughing nausea or vomiting headache drowsiness/fatigue dizziness/vertigo unconsciousness
		15N S/N	Adverse symptoms may include the following: reduced fetal weight increase in fetal deaths skeletal malformations
		31P S/N	Adverse symptoms may include the following: respiratory tract irritation coughing nausea or vomiting headache drowsiness/fatigue dizziness/vertigo unconsciousness
		13C S/N ASTM doped	Adverse symptoms may include the following: respiratory tract irritation coughing nausea or vomiting headache drowsiness/fatigue dizziness/vertigo unconsciousness

Section 4. First aid measures

Skin contact	:	13C S/N ASTM	Adverse symptoms may include the following: irritation redness
		19F S/N	Adverse symptoms may include the following: irritation redness
		15N S/N	Adverse symptoms may include the following: reduced fetal weight increase in fetal deaths skeletal malformations
		31P S/N	Adverse symptoms may include the following: irritation redness
		13C S/N ASTM doped	Adverse symptoms may include the following: irritation redness
Ingestion	:	13C S/N ASTM	Adverse symptoms may include the following: nausea or vomiting
		19F S/N	Adverse symptoms may include the following: nausea or vomiting
		15N S/N	Adverse symptoms may include the following: reduced fetal weight increase in fetal deaths skeletal malformations
		31P S/N	No specific data.
		13C S/N ASTM doped	Adverse symptoms may include the following: nausea or vomiting

4.3 Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician	:	13C S/N ASTM	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
		19F S/N	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
		15N S/N	In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
		31P S/N	In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.
		13C S/N ASTM doped	Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
Specific treatments	:	13C S/N ASTM	No specific treatment.
		19F S/N	No specific treatment.
		15N S/N	No specific treatment.
		31P S/N	No specific treatment.
		13C S/N ASTM doped	No specific treatment.

Section 4. First aid measures

Protection of first-aiders	:	13C S/N ASTM	No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.
		19F S/N	No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.
		15N S/N	No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.
		31P S/N	No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.
		13C S/N ASTM doped	No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media	:	13C S/N ASTM	Use dry chemical, CO_2, water spray (fog) or foam.
		19F S/N	Use dry chemical, CO_2, water spray (fog) or foam.
		15N S/N	Use dry chemical, CO_2, water spray (fog) or foam.
		31P S/N	Use an extinguishing agent suitable for the surrounding fire.
		13C S/N ASTM doped	Use dry chemical, CO_2, water spray (fog) or foam.
Unsuitable extinguishing media	:	13C S/N ASTM	Do not use water jet.
		19F S/N	Do not use water jet.
		15N S/N	Do not use water jet.
		31P S/N	None known.
		13C S/N ASTM doped	Do not use water jet.

5.2 Special hazards arising from the substance or mixture

Section 5. Fire-fighting measures

Specific hazards arising from the chemical	:	13C S/N ASTM	Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.
		19F S/N	Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Runoff to sewer may create fire or explosion hazard.
		15N S/N	Combustible liquid. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Runoff to sewer may create fire or explosion hazard.
		31P S/N	In a fire or if heated, a pressure increase will occur and the container may burst.
		13C S/N ASTM doped	Highly flammable liquid and vapor. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.
Hazardous thermal decomposition products	:	13C S/N ASTM	Decomposition products may include the following materials: carbon dioxide carbon monoxide
		19F S/N	Decomposition products may include the following materials: carbon dioxide carbon monoxide
		15N S/N	Decomposition products may include the following materials: carbon dioxide carbon monoxide nitrogen oxides sulfur oxides
		31P S/N	Decomposition products may include the following materials: carbon dioxide carbon monoxide phosphorus oxides halogenated compounds carbonyl halides
		13C S/N ASTM doped	Decomposition products may include the following materials: carbon dioxide carbon monoxide

5.3 Advice for firefighters

Section 5. Fire-fighting measures

Special protective actions for fire-fighters	:	13C S/N ASTM	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
		19F S/N	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
		15N S/N	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
		31P S/N	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
		13C S/N ASTM doped	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
Special protective equipment for fire-fighters	:	13C S/N ASTM	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
		19F S/N	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
		15N S/N	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
		31P S/N	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.
		13C S/N ASTM doped	Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Section 6. Accidental release measures

For non-emergency personnel :

13C S/N ASTM

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

19F S/N

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

15N S/N

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

31P S/N

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

13C S/N ASTM doped

No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders :

13C S/N ASTM

If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

19F S/N

If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

15N S/N

If specialized clothing is required to deal with the spillage, take note of any information in Section 8

Section 6. Accidental release measures

		on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
	31P S/N	If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
	13C S/N ASTM doped	If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".
6.2 Environmental precautions :	13C S/N ASTM	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
	19F S/N	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
	15N S/N	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
	31P S/N	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
	13C S/N ASTM doped	Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

6.3 Methods and materials for containment and cleaning up

Methods for cleaning up :	13C S/N ASTM	Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
	19F S/N	Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
	15N S/N	Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of

Section 6. Accidental release measures

	via a licensed waste disposal contractor.
31P S/N	Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
13C S/N ASTM doped	Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Section 7. Handling and storage

7.1 Precautions for safe handling

Protective measures	:	13C S/N ASTM	Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not swallow. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.
		19F S/N	Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not swallow. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.
		15N S/N	Put on appropriate personal protective equipment

Section 7. Handling and storage

		(see Section 8). Avoid exposure - obtain special instructions before use. Avoid exposure during pregnancy. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous. Do not reuse container.
	31P S/N	Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.
	13C S/N ASTM doped	Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not swallow. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.
Advice on general occupational hygiene :	13C S/N ASTM	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
	19F S/N	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and

Section 7. Handling and storage

		processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
	15N S/N	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
	31P S/N	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
	13C S/N ASTM doped	Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
7.2 Conditions for safe storage, including any incompatibilities	: 13C S/N ASTM	Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.
	19F S/N	Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.
	15N S/N	Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition

Section 7. Handling and storage

		sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.
	31P S/N	Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.
	13C S/N ASTM doped	Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

7.3 Specific end use(s)

Recommendations	:	13C S/N ASTM	Industrial applications, Professional applications.
		19F S/N	Industrial applications, Professional applications.
		15N S/N	Industrial applications, Professional applications.
		31P S/N	Industrial applications, Professional applications.
		13C S/N ASTM doped	Industrial applications, Professional applications.
Industrial sector specific solutions	:	13C S/N ASTM	Not applicable.
		19F S/N	Not applicable.
		15N S/N	Not applicable.
		31P S/N	Not applicable.
		13C S/N ASTM doped	Not applicable.

Section 8. Exposure controls/personal protection

Since the hazardous ingredient in this article is encapsulated, the risk of exposure by inhalation, ingestion, skin contact and eyes contact is minimum.

8.1 Control parameters

Occupational exposure limits

Section 8. Exposure controls/personal protection

Ingredient name	Exposure limits
13C S/N ASTM	
(2H6)benzene	**ACGIH TLV (United States, 3/2015).** **Absorbed through skin.** TWA: 0.5 ppm 8 hours. TWA: 1.6 mg/m³ 8 hours. STEL: 2.5 ppm 15 minutes. STEL: 8 mg/m³ 15 minutes. **OSHA PEL 1989 (United States, 3/1989).** TWA: 1 ppm 8 hours. STEL: 5 ppm 15 minutes. **OSHA PEL Z2 (United States, 2/2013).** TWA: 10 ppm 8 hours. CEIL: 25 ppm AMP: 50 ppm 10 minutes. **NIOSH REL (United States, 10/2013).** TWA: 0.1 ppm 10 hours. STEL: 1 ppm 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 1 ppm 8 hours. STEL: 5 ppm 15 minutes.
1,4-Dioxane	**OSHA PEL 1989 (United States, 3/1989).** **Absorbed through skin.** TWA: 25 ppm 8 hours. TWA: 90 mg/m³ 8 hours. **NIOSH REL (United States, 10/2013).** CEIL: 1 ppm 30 minutes. CEIL: 3.6 mg/m³ 30 minutes. **ACGIH TLV (United States, 3/2015).** **Absorbed through skin.** TWA: 20 ppm 8 hours. **OSHA PEL (United States, 2/2013).** **Absorbed through skin.** TWA: 100 ppm 8 hours. TWA: 360 mg/m³ 8 hours.
19F S/N	
(2H6)benzene	**ACGIH TLV (United States, 3/2015).** **Absorbed through skin.** TWA: 0.5 ppm 8 hours. TWA: 1.6 mg/m³ 8 hours. STEL: 2.5 ppm 15 minutes. STEL: 8 mg/m³ 15 minutes. **OSHA PEL 1989 (United States, 3/1989).** TWA: 1 ppm 8 hours. STEL: 5 ppm 15 minutes. **OSHA PEL Z2 (United States, 2/2013).** TWA: 10 ppm 8 hours. CEIL: 25 ppm AMP: 50 ppm 10 minutes. **NIOSH REL (United States, 10/2013).** TWA: 0.1 ppm 10 hours. STEL: 1 ppm 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 1 ppm 8 hours. STEL: 5 ppm 15 minutes.

Section 8. Exposure controls/personal protection

15N S/N	
Formamide	**ACGIH TLV (United States, 3/2015).** **Absorbed through skin.** TWA: 10 ppm 8 hours. TWA: 18 mg/m³ 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 20 ppm 8 hours. TWA: 30 mg/m³ 8 hours. STEL: 30 ppm 15 minutes. STEL: 45 mg/m³ 15 minutes. **NIOSH REL (United States, 10/2013).** **Absorbed through skin.** TWA: 10 ppm 10 hours. TWA: 15 mg/m³ 10 hours.
di[($^2H_3$)Methyl] sulphoxide	**AIHA WEEL (United States, 10/2011).** TWA: 250 ppm 8 hours.
31P S/N	
(^{2}H)Chloroform	**ACGIH TLV (United States, 3/2015).** TWA: 10 ppm 8 hours. TWA: 49 mg/m³ 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 2 ppm 8 hours. TWA: 9.78 mg/m³ 8 hours. **NIOSH REL (United States, 10/2013).** STEL: 2 ppm 60 minutes. STEL: 9.78 mg/m³ 60 minutes. **OSHA PEL (United States, 2/2013).** CEIL: 50 ppm CEIL: 240 mg/m³
13C S/N ASTM doped	
(2H6)benzene	**ACGIH TLV (United States, 3/2015).** **Absorbed through skin.** TWA: 0.5 ppm 8 hours. TWA: 1.6 mg/m³ 8 hours. STEL: 2.5 ppm 15 minutes. STEL: 8 mg/m³ 15 minutes. **OSHA PEL 1989 (United States, 3/1989).** TWA: 1 ppm 8 hours. STEL: 5 ppm 15 minutes. **OSHA PEL Z2 (United States, 2/2013).** TWA: 10 ppm 8 hours. CEIL: 25 ppm AMP: 50 ppm 10 minutes. **NIOSH REL (United States, 10/2013).** TWA: 0.1 ppm 10 hours. STEL: 1 ppm 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 1 ppm 8 hours. STEL: 5 ppm 15 minutes.
1,4-Dioxane	**OSHA PEL 1989 (United States, 3/1989).** **Absorbed through skin.** TWA: 25 ppm 8 hours. TWA: 90 mg/m³ 8 hours. **NIOSH REL (United States, 10/2013).**

Section 8. Exposure controls/personal protection

	CEIL: 1 ppm 30 minutes. CEIL: 3.6 mg/m³ 30 minutes. **ACGIH TLV (United States, 3/2015).** **Absorbed through skin.** TWA: 20 ppm 8 hours. **OSHA PEL (United States, 2/2013).** **Absorbed through skin.** TWA: 100 ppm 8 hours. TWA: 360 mg/m³ 8 hours.

8.2 Exposure controls

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state	:	13C S/N ASTM	Liquid.
		19F S/N	Liquid.
		15N S/N	Liquid.
		31P S/N	Liquid.
		13C S/N ASTM doped	Liquid.
Color	:	13C S/N ASTM	Colorless.
		19F S/N	Not available.
		15N S/N	Not available.
		31P S/N	Not available.
		13C S/N ASTM doped	Colorless.
Odor	:	13C S/N ASTM	Not available.
		19F S/N	Not available.
		15N S/N	Not available.
		31P S/N	Not available.
		13C S/N ASTM doped	Not available.
Odor threshold	:	13C S/N ASTM	Not available.
		19F S/N	Not available.
		15N S/N	Not available.
		31P S/N	Not available.
		13C S/N ASTM doped	Not available.
pH	:	13C S/N ASTM	Not available.
		19F S/N	Not available.
		15N S/N	Not available.
		31P S/N	Not available.
		13C S/N ASTM doped	Not available.
Melting point	:	13C S/N ASTM	6.8°C (44.2°F)
		19F S/N	5°C (41°F)
		15N S/N	Not available.
		31P S/N	-64°C (-83.2°F)
		13C S/N ASTM doped	6.8°C (44.2°F)
Boiling point	:	13C S/N ASTM	79.1°C (174.4°F)
		19F S/N	80°C (176°F)
		15N S/N	Not available.
		31P S/N	62°C (143.6°F)
		13C S/N ASTM doped	79.1°C (174.4°F)
Flash point	:	13C S/N ASTM	Closed cup: -18 to 23°C (-0.4 to 73.4°F)
		19F S/N	Closed cup: -11.11°C (12°F)
		15N S/N	Closed cup: 87.8°C (190°F)
		31P S/N	Not available.
		13C S/N ASTM doped	Closed cup: 21.1°C (70°F)
Evaporation rate	:	13C S/N ASTM	Not available.
		19F S/N	Not available.
		15N S/N	Not available.
		31P S/N	Not available.
		13C S/N ASTM doped	Not available.
Flammability (solid, gas)	:	13C S/N ASTM	Not applicable.
		19F S/N	Not applicable.
		15N S/N	Not applicable.
		31P S/N	Not applicable.
		13C S/N ASTM doped	Not applicable.

Section 9. Physical and chemical properties

Lower and upper explosive (flammable) limits	:	13C S/N ASTM	Lower: 1.3% Upper: 8%
		19F S/N	Not available.
		15N S/N	Not available.
		31P S/N	Not available.
		13C S/N ASTM doped	Not available.
Vapor pressure	:	13C S/N ASTM	22.1 kPa (166 mm Hg) [room temperature]
		19F S/N	Not available.
		15N S/N	Not available.
		31P S/N	Not available.
		13C S/N ASTM doped	22.1 kPa (166 mm Hg) [room temperature]
Vapor density	:	13C S/N ASTM	>1 [Air = 1]
		19F S/N	Not available.
		15N S/N	Not available.
		31P S/N	Not available.
		13C S/N ASTM doped	2.77 [Air = 1]
Relative density	:	13C S/N ASTM	0.95
		19F S/N	Not available.
		15N S/N	Not available.
		31P S/N	Not available.
		13C S/N ASTM doped	0.98
Solubility	:	13C S/N ASTM	Easily soluble in the following materials: cold water and hot water.
		19F S/N	Insoluble in the following materials: cold water and hot water.
		15N S/N	Soluble in the following materials: cold water and hot water.
		31P S/N	Very slightly soluble in the following materials: cold water and hot water.
		13C S/N ASTM doped	Easily soluble in the following materials: cold water and hot water.
Partition coefficient: n-octanol/water	:	13C S/N ASTM	Not available.
		19F S/N	Not available.
		15N S/N	Not available.
		31P S/N	Not available.
		13C S/N ASTM doped	Not available.
Auto-ignition temperature	:	13C S/N ASTM	Not available.
		19F S/N	Not available.
		15N S/N	Not available.
		31P S/N	Not available.
		13C S/N ASTM doped	Not available.
Decomposition temperature	:	13C S/N ASTM	Not available.
		19F S/N	Not available.
		15N S/N	Not available.
		31P S/N	Not available.
		13C S/N ASTM doped	Not available.
Viscosity	:	13C S/N ASTM	Not available.
		19F S/N	Not available.
		15N S/N	Not available.
		31P S/N	Not available.
		13C S/N ASTM doped	Not available.

Section 10. Stability and reactivity

10.1 Reactivity	:	13C S/N ASTM	No specific test data related to reactivity available for this product or its ingredients.
		19F S/N	No specific test data related to reactivity available for this product or its ingredients.
		15N S/N	No specific test data related to reactivity available for this product or its ingredients.
		31P S/N	No specific test data related to reactivity available for this product or its ingredients.
		13C S/N ASTM doped	No specific test data related to reactivity available for this product or its ingredients.
10.2 Chemical stability	:	13C S/N ASTM	The product is stable.
		19F S/N	The product is stable.
		15N S/N	The product is stable.
		31P S/N	The product is stable.
		13C S/N ASTM doped	The product is stable.
10.3 Possibility of hazardous reactions	:	13C S/N ASTM	Under normal conditions of storage and use, hazardous reactions will not occur.
		19F S/N	Under normal conditions of storage and use, hazardous reactions will not occur.
		15N S/N	Under normal conditions of storage and use, hazardous reactions will not occur.
		31P S/N	Under normal conditions of storage and use, hazardous reactions will not occur.
		13C S/N ASTM doped	Under normal conditions of storage and use, hazardous reactions will not occur.
10.4 Conditions to avoid	:	13C S/N ASTM	Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.
		19F S/N	Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
		15N S/N	Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
		31P S/N	No specific data.
		13C S/N ASTM doped	Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.
10.5 Incompatible materials	:	13C S/N ASTM	Reactive or incompatible with the following materials: oxidizing materials
		19F S/N	Reactive or incompatible with the following materials: oxidizing materials
		15N S/N	Reactive or incompatible with the following materials: oxidizing materials

Section 10. Stability and reactivity

	31P S/N	May react or be incompatible with oxidizing materials.
	13C S/N ASTM doped	Reactive or incompatible with the following materials: oxidizing materials

10.6 Hazardous decomposition products :

13C S/N ASTM	Under normal conditions of storage and use, hazardous decomposition products should not be produced.
19F S/N	Under normal conditions of storage and use, hazardous decomposition products should not be produced.
15N S/N	Under normal conditions of storage and use, hazardous decomposition products should not be produced.
31P S/N	Under normal conditions of storage and use, hazardous decomposition products should not be produced.
13C S/N ASTM doped	Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
13C S/N ASTM				
(2H6)benzene	LD50 Oral	Rat	930 mg/kg	-
1,4-Dioxane	LD50 Oral	Rat	4200 mg/kg	-
19F S/N				
(2H6)benzene	LD50 Oral	Rat	930 mg/kg	-
15N S/N				
Formamide	LD50 Dermal	Rabbit	17 g/kg	-
	LD50 Oral	Rat	4000 mg/kg	-
di[($^2H_3$)Methyl] sulphoxide	LD50 Dermal	Rat	40000 mg/kg	-
	LD50 Oral	Rat	14500 mg/kg	-
31P S/N				
(^{2}H)Chloroform	LC50 Inhalation Vapor	Rat	47702 mg/m³	4 hours
	LD50 Dermal	Rabbit	>20 g/kg	-
	LD50 Oral	Rat	300 mg/kg	-
13C S/N ASTM doped				
(2H6)benzene	LD50 Oral	Rat	930 mg/kg	-
1,4-Dioxane	LD50 Oral	Rat	4200 mg/kg	-

Irritation/Corrosion

Section 11. Toxicological information

Product/ingredient name	Result	Species	Score	Exposure	Observation
13C S/N ASTM					
(2H6)benzene	Eyes - Moderate irritant	Rabbit	-	88 milligrams	-
	Eyes - Severe irritant	Rabbit	-	24 hours 2 milligrams	-
	Skin - Mild irritant	Rat	-	8 hours 60 microliters	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-
1,4-Dioxane	Eyes - Moderate irritant	Rabbit	-	24 hours 100 milligrams	-
	Skin - Mild irritant	Rabbit	-	515 milligrams	-
19F S/N					
(2H6)benzene	Eyes - Moderate irritant	Rabbit	-	88 milligrams	-
	Eyes - Severe irritant	Rabbit	-	24 hours 2 milligrams	-
	Skin - Mild irritant	Rat	-	8 hours 60 microliters	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-
15N S/N					
Formamide	Eyes - Severe irritant	Rabbit	-	100 milligrams	-
di[($^{2}H_{3}$)Methyl] sulphoxide	Eyes - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Eyes - Mild irritant	Rabbit	-	100 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
	Skin - Mild irritant	Rabbit	-	100 milligrams	-
31P S/N					
(^{2}H)Chloroform	Eyes - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-
	Skin - Mild irritant	Rabbit	-	24 hours 500 milligrams	-
13C S/N ASTM doped					
(2H6)benzene	Eyes - Moderate irritant	Rabbit	-	88 milligrams	-
	Eyes - Severe irritant	Rabbit	-	24 hours 2 milligrams	-
	Skin - Mild irritant	Rat	-	8 hours 60 microliters	-
	Skin - Mild irritant	Rabbit	-	24 hours 15 milligrams	-
	Skin - Moderate irritant	Rabbit	-	24 hours 20 milligrams	-
1,4-Dioxane	Eyes - Moderate irritant	Rabbit	-	24 hours 100 milligrams	-
	Skin - Mild irritant	Rabbit	-	515	-

Section 11. Toxicological information

				milligrams	

Conclusion/Summary

Skin : Repeated exposure may cause skin dryness or cracking.

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
13C S/N ASTM			
(2H6)benzene	+	1	Known to be a human carcinogen.
1,4-Dioxane	-	2B	Reasonably anticipated to be a human carcinogen.
19F S/N			
(2H6)benzene	+	1	Known to be a human carcinogen.
31P S/N			
(^{2}H)Chloroform	-	2B	Reasonably anticipated to be a human carcinogen.
13C S/N ASTM doped			
(2H6)benzene	+	1	Known to be a human carcinogen.
1,4-Dioxane	-	2B	Reasonably anticipated to be a human carcinogen.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
13C S/N ASTM			
(2H6)benzene	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
1,4-Dioxane	Category 3	Not applicable.	Respiratory tract irritation
19F S/N			
(2H6)benzene	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
31P S/N			
(^{2}H)Chloroform	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
13C S/N ASTM doped			
(2H6)benzene	Category 3	Not applicable.	Respiratory tract

Section 11. Toxicological information

1,4-Dioxane	Category 3	Not applicable.	irritation and Narcotic effects Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
13C S/N ASTM			
(2H6)benzene	Category 1	Oral Inhalation	blood system blood system
1,4-Dioxane	Category 1	Oral	kidneys and liver
19F S/N			
(2H6)benzene	Category 1	Oral Inhalation	blood system blood system
31P S/N			
(^{2}H)Chloroform	Category 2	Not determined	kidneys and liver
13C S/N ASTM doped			
(2H6)benzene	Category 1	Oral Inhalation	blood system blood system
1,4-Dioxane	Category 1	Oral	kidneys and liver

Aspiration hazard

Name	Result
13C S/N ASTM	
13C S/N ASTM	ASPIRATION HAZARD - Category 1
(2H6)benzene	ASPIRATION HAZARD - Category 1
19F S/N	
19F S/N	ASPIRATION HAZARD - Category 1
(2H6)benzene	ASPIRATION HAZARD - Category 1
31P S/N	
(^{2}H)Chloroform	ASPIRATION HAZARD - Category 1
13C S/N ASTM doped	
13C S/N ASTM doped	ASPIRATION HAZARD - Category 1
(2H6)benzene	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure :

13C S/N ASTM	Routes of entry anticipated: Oral, Dermal, Inhalation.
19F S/N	Routes of entry anticipated: Oral, Dermal, Inhalation.
15N S/N	Routes of entry anticipated: Oral, Dermal, Inhalation.
31P S/N	Routes of entry anticipated: Oral, Dermal, Inhalation.
13C S/N ASTM doped	Routes of entry anticipated: Oral, Dermal, Inhalation.

Potential acute health effects

Section 11. Toxicological information

Eye contact	:	13C S/N ASTM	Causes serious eye irritation.
		19F S/N	Causes serious eye irritation.
		15N S/N	Causes serious eye irritation.
		31P S/N	Causes serious eye irritation.
		13C S/N ASTM doped	Causes serious eye irritation.
Inhalation	:	13C S/N ASTM	Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation.
		19F S/N	Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation.
		15N S/N	No known significant effects or critical hazards.
		31P S/N	Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation.
		13C S/N ASTM doped	Can cause central nervous system (CNS) depression. May cause drowsiness or dizziness. May cause respiratory irritation.
Skin contact	:	13C S/N ASTM	Causes skin irritation.
		19F S/N	Causes skin irritation.
		15N S/N	No known significant effects or critical hazards.
		31P S/N	Causes skin irritation.
		13C S/N ASTM doped	Causes skin irritation.
Ingestion	:	13C S/N ASTM	Harmful if swallowed. Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.
		19F S/N	Harmful if swallowed. Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.
		15N S/N	No known significant effects or critical hazards.
		31P S/N	Harmful if swallowed. Can cause central nervous system (CNS) depression.
		13C S/N ASTM doped	Harmful if swallowed. Can cause central nervous system (CNS) depression. May be fatal if swallowed and enters airways.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact	:	13C S/N ASTM	Adverse symptoms may include the following: pain or irritation watering redness
		19F S/N	Adverse symptoms may include the following: pain or irritation watering redness
		15N S/N	Adverse symptoms may include the following: pain or irritation watering redness
		31P S/N	Adverse symptoms may include the following: pain or irritation watering redness
		13C S/N ASTM doped	Adverse symptoms may include the following: pain or irritation watering redness

Section 11. Toxicological information

Inhalation	:	13C S/N ASTM	Adverse symptoms may include the following: respiratory tract irritation coughing nausea or vomiting headache drowsiness/fatigue dizziness/vertigo unconsciousness
		19F S/N	Adverse symptoms may include the following: respiratory tract irritation coughing nausea or vomiting headache drowsiness/fatigue dizziness/vertigo unconsciousness
		15N S/N	Adverse symptoms may include the following: reduced fetal weight increase in fetal deaths skeletal malformations
		31P S/N	Adverse symptoms may include the following: respiratory tract irritation coughing nausea or vomiting headache drowsiness/fatigue dizziness/vertigo unconsciousness
		13C S/N ASTM doped	Adverse symptoms may include the following: respiratory tract irritation coughing nausea or vomiting headache drowsiness/fatigue dizziness/vertigo unconsciousness
Skin contact	:	13C S/N ASTM	Adverse symptoms may include the following: irritation redness
		19F S/N	Adverse symptoms may include the following: irritation redness
		15N S/N	Adverse symptoms may include the following: reduced fetal weight increase in fetal deaths skeletal malformations
		31P S/N	Adverse symptoms may include the following: irritation redness
		13C S/N ASTM doped	Adverse symptoms may include the following: irritation redness

Section 11. Toxicological information

Ingestion :	13C S/N ASTM	Adverse symptoms may include the following: nausea or vomiting
	19F S/N	Adverse symptoms may include the following: nausea or vomiting
	15N S/N	Adverse symptoms may include the following: reduced fetal weight increase in fetal deaths skeletal malformations
	31P S/N	No specific data.
	13C S/N ASTM doped	Adverse symptoms may include the following: nausea or vomiting

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

General :	13C S/N ASTM	Causes damage to organs through prolonged or repeated exposure.
	19F S/N	Causes damage to organs through prolonged or repeated exposure.
	15N S/N	No known significant effects or critical hazards.
	31P S/N	May cause damage to organs through prolonged or repeated exposure.
	13C S/N ASTM doped	Causes damage to organs through prolonged or repeated exposure.
Carcinogenicity :	13C S/N ASTM	May cause cancer. Risk of cancer depends on duration and level of exposure.
	19F S/N	May cause cancer. Risk of cancer depends on duration and level of exposure.
	15N S/N	No known significant effects or critical hazards.
	31P S/N	Suspected of causing cancer. Risk of cancer depends on duration and level of exposure.
	13C S/N ASTM doped	May cause cancer. Risk of cancer depends on duration and level of exposure.
Mutagenicity :	13C S/N ASTM	May cause genetic defects.
	19F S/N	May cause genetic defects.
	15N S/N	No known significant effects or critical hazards.
	31P S/N	No known significant effects or critical hazards.
	13C S/N ASTM doped	May cause genetic defects.
Teratogenicity :	13C S/N ASTM	No known significant effects or critical hazards.
	19F S/N	No known significant effects or critical hazards.
	15N S/N	May damage the unborn child.
	31P S/N	No known significant effects or critical hazards.
	13C S/N ASTM doped	No known significant effects or critical hazards.
Developmental effects :	13C S/N ASTM	No known significant effects or critical hazards.
	19F S/N	No known significant effects or critical hazards.
	15N S/N	No known significant effects or critical hazards.
	31P S/N	No known significant effects or critical hazards.
	13C S/N ASTM doped	No known significant effects or critical hazards.

Section 11. Toxicological information

Fertility effects	:	13C S/N ASTM	No known significant effects or critical hazards.
		19F S/N	No known significant effects or critical hazards.
		15N S/N	No known significant effects or critical hazards.
		31P S/N	No known significant effects or critical hazards.
		13C S/N ASTM doped	No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
13C S/N ASTM	
Oral	1356.8 mg/kg
19F S/N	
Oral	930.5 mg/kg
15N S/N	
Oral	4444.4 mg/kg
31P S/N	
Oral	504.6 mg/kg
13C S/N ASTM doped	
Oral	1360.7 mg/kg

Other information	:	13C S/N ASTM	Not available.
		19F S/N	Not available.
		15N S/N	Not available.
		31P S/N	Not available.
		13C S/N ASTM doped	Not available.

Section 12. Ecological information

12.1 Toxicity

Product/ingredient name	Result	Species	Exposure
13C S/N ASTM			
(2H6)benzene	Acute EC50 29000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 1600000 µg/l Fresh water	Algae - Selenastrum sp.	96 hours
	Acute EC50 9230 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 21000 µg/l Marine water	Crustaceans - Artemia salina - Nauplii	48 hours
	Acute LC50 5.28 ul/L Fresh water	Fish - Oncorhynchus gorbuscha - Fry	96 hours
	Chronic NOEC 98 mg/l Fresh water	Daphnia - Daphnia magna	21 days
	Chronic NOEC 1.5 to 5.4 ul/L Marine water	Fish - Morone saxatilis - Juvenile (Fledgling, Hatchling, Weanling)	4 weeks
1,4-Dioxane	Acute LC50 6700000 µg/l Marine water	Fish - Menidia beryllina	96 hours
19F S/N			
(2H6)benzene	Acute EC50 29000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 1600000 µg/l Fresh water	Algae - Selenastrum sp.	96 hours
	Acute EC50 9230 µg/l Fresh water	Daphnia - Daphnia magna -	48 hours

Section 12. Ecological information

		Neonate	
	Acute LC50 21000 µg/l Marine water	Crustaceans - Artemia salina - Nauplii	48 hours
	Acute LC50 5.28 ul/L Fresh water	Fish - Oncorhynchus gorbuscha - Fry	96 hours
	Chronic NOEC 98 mg/l Fresh water	Daphnia - Daphnia magna	21 days
	Chronic NOEC 1.5 to 5.4 ul/L Marine water	Fish - Morone saxatilis - Juvenile (Fledgling, Hatchling, Weanling)	4 weeks
15N S/N			
di[($^2H_3$)Methyl] sulphoxide	Acute LC50 25000 ppm Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 34000000 µg/l Fresh water	Fish - Pimephales promelas	96 hours
	Chronic NOEC 100 ul/L Marine water	Algae - Ulva lactuca	72 hours
31P S/N			
(^{2}H)Chloroform	Acute EC50 13.3 mg/l Fresh water	Algae - Chlamydomonas reinhardtii - Exponential growth phase	72 hours
	Acute EC50 2.803 mg/l Fresh water	Crustaceans - Cypris subglobosa	48 hours
	Acute LC50 29000 µg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 13300 µg/l Fresh water	Fish - Lepomis macrochirus	96 hours
	Chronic EC10 3.61 mg/l Fresh water	Algae - Chlamydomonas reinhardtii - Exponential growth phase	72 hours
	Chronic NOEC 1.8 mg/l Fresh water	Daphnia - Daphnia magna	21 days
13C S/N ASTM doped			
(2H6)benzene	Acute EC50 29000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 1600000 µg/l Fresh water	Algae - Selenastrum sp.	96 hours
	Acute EC50 9230 µg/l Fresh water	Daphnia - Daphnia magna - Neonate	48 hours
	Acute LC50 21000 µg/l Marine water	Crustaceans - Artemia salina - Nauplii	48 hours
	Acute LC50 5.28 ul/L Fresh water	Fish - Oncorhynchus gorbuscha - Fry	96 hours
	Chronic NOEC 98 mg/l Fresh water	Daphnia - Daphnia magna	21 days
	Chronic NOEC 1.5 to 5.4 ul/L Marine water	Fish - Morone saxatilis - Juvenile (Fledgling, Hatchling, Weanling)	4 weeks
1,4-Dioxane	Acute LC50 6700000 µg/l Marine water	Fish - Menidia beryllina	96 hours

12.2 Persistence and degradability

Not available.

12.3 Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
13C S/N ASTM			
(2H6)benzene	2.13	11	low
1,4-Dioxane	-0.42	0.3 to 0.7	low
19F S/N			
(2H6)benzene	2.13	11	low
15N S/N			
Formamide	-0.82	-	low

Section 12. Ecological information

di[($^2H_3$)Methyl] sulphoxide	-1.35	3.16	low
31P S/N			
(^{2}H)Chloroform	1.97	690	high
13C S/N ASTM doped			
(2H6)benzene	2.13	11	low
1,4-Dioxane	-0.42	0.3 to 0.7	low

12.4 Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

12.5 Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

13.1 Waste treatment methods

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

United States - RCRA Toxic hazardous waste "U" List

Ingredient	CAS #	Status	Reference number
13C S/N ASTM			
1,4-Dioxane; 1,4-Diethyleneoxide	123-91-1	Listed	U108
31P S/N			
Chloroform; Methane, trichloro-	865-49-6	Listed	U044
13C S/N ASTM doped			
1,4-Dioxane; 1,4-Diethyleneoxide	123-91-1	Listed	U108

Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.

The information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

Section 14. Transport information

This Safety Data Sheet is written based on the encapsulated substance or mixture in this article. Since the hazardous ingredient is encapsulated, the risk of exposure by inhalation, ingestion, skin contact and eyes contact is minimum.

Regulatory information

Additional information : **Remarks**
De minimis quantities

DOT / IMDG / IATA : Not regulated.

Section 15. Regulatory information

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

U.S. Federal regulations : **TSCA 8(a) PAIR**: Formamide
United States inventory (TSCA 8b): All components are listed or exempted.
Clean Water Act (CWA) 307: Chromium(III) 4-oxopent-2-ene-2-olate; (^{2}H)Chloroform
Clean Water Act (CWA) 311: (^{2}H)Chloroform

Clean Air Act (CAA) 112 regulated toxic substances: (^{2}H)Chloroform

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

Name	%	EHS	SARA 302 TPQ		SARA 304 RQ	
			(lbs)	(gallons)	(lbs)	(gallons)
31P S/N (^{2}H)Chloroform	≥90	Yes.	-	-	-	-

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Fire hazard
Immediate (acute) health hazard
Delayed (chronic) health hazard

Composition/information on ingredients

Section 15. Regulatory information

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
13C S/N ASTM						
(2H6)benzene	≥50 - ≤75	Yes.	No.	No.	Yes.	Yes.
1,4-Dioxane	≥25 - ≤50	Yes.	No.	No.	Yes.	Yes.
19F S/N						
(2H6)benzene	≥90	Yes.	No.	No.	Yes.	Yes.
15N S/N						
Formamide	≥90	No.	No.	No.	Yes.	Yes.
di[($^2H_3$)Methyl] sulphoxide	≥10 - ≤25	Yes.	No.	No.	Yes.	No.
31P S/N						
(^{2}H)Chloroform	≥90	No.	No.	No.	Yes.	Yes.
13C S/N ASTM doped						
(2H6)benzene	≥50 - ≤75	Yes.	No.	No.	Yes.	Yes.
1,4-Dioxane	≥25 - ≤50	Yes.	No.	No.	Yes.	Yes.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	**13C S/N ASTM**		
	(2H6)benzene	1076-43-3	≥50 - ≤75
	1,4-Dioxane	123-91-1	≥25 - ≤50
	19F S/N		
	(2H6)benzene	1076-43-3	≥90
	31P S/N		
	(^{2}H)Chloroform	865-49-6	≥90
	13C S/N ASTM doped		
	(2H6)benzene	1076-43-3	≥50 - ≤75
	1,4-Dioxane	123-91-1	≥25 - ≤50
Supplier notification	**13C S/N ASTM**		
	(2H6)benzene	1076-43-3	≥50 - ≤75
	1,4-Dioxane	123-91-1	≥25 - ≤50
	19F S/N		
	(2H6)benzene	1076-43-3	≥90
	31P S/N		
	(^{2}H)Chloroform	865-49-6	≥90
	13C S/N ASTM doped		
	(2H6)benzene	1076-43-3	≥50 - ≤75
	1,4-Dioxane	123-91-1	≥25 - ≤50

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed: BENZENE; 1,4-DIOXANE; CHLOROFORM; FORMAMIDE

Section 15. Regulatory information

New York : The following components are listed: Benzene; 1,4-Dioxane; Chloroform; Methane, trichloro-

New Jersey : The following components are listed: BENZENE; 1,4-DIOXANE; 1,4-DIETHYLENE DIOXIDE; CHLOROFORM; METHANE, TRICHLORO-; FORMAMIDE; DIMETHYL SULFOXIDE; METHANE, SULFINYLBIS-

Pennsylvania : The following components are listed: BENZENE; 1,4-DIOXANE; METHANE, TRICHLORO-; FORMAMIDE; di[($^{2}H_{3}$)Methyl] sulphoxide

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
13C S/N ASTM				
(2H6)benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)
1,4-Dioxane	Yes.	No.	Yes.	No.
19F S/N				
(2H6)benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)
31P S/N				
(^{2}H)Chloroform	Yes.	Yes.	20 µg/day (ingestion) 40 µg/day (inhalation)	No.
13C S/N ASTM doped				
(2H6)benzene	Yes.	Yes.	6.4 µg/day (ingestion) 13 µg/day (inhalation)	24 µg/day (ingestion) 49 µg/day (inhalation)
1,4-Dioxane	Yes.	No.	Yes.	No.

Canada inventory : At least one component is not listed in DSL but all such components are listed in NDSL.

International regulations

International lists : **Australia inventory (AICS)**: All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Japan inventory (ENCS): All components are listed or exempted.
Japan inventory (ISHL): All components are listed or exempted.
Korea inventory: Not determined.
Malaysia Inventory (EHS Register): All components are listed or exempted.
New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.
Philippines inventory (PICCS): Not determined.
Taiwan Chemical Substances Inventory (TCSI): All components are listed or exempted.
Turkey inventory: Not determined.

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Section 15. Regulatory information

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

Section 16. Other information

History

Date of issue : 12/31/2015

Date of previous issue : 10/31/2013.

Version : 3

Indicates information that has changed from previously issued version.

Notice to reader

Disclaimer: The information contained in this document is based on Agilent's state of knowledge at the time of preparation. No warranty as to its accurateness, completeness or suitability for a particular purpose is expressed or implied.