

SECTION 1: Identification

Product identifiers:

Product trade name: Kalama* Benzaldehyde FCC Low BT
Company product number: BZALDLOW
Other means of identification: Benzoic aldehyde, Benzenecarbonal, Benzenecarboxaldehyde

Recommended use of the chemical and restrictions on use:

Uses: Flavor and fragrance ingredient
Restrictions on use: None identified

Details of the supplier:

Manufacturer/Supplier: Emerald Performance Materials, LLC
Emerald Kalama Chemical, LLC
1296 NW Third Street
Kalama, WA 98625 United States
Telephone: +1-360-673-2550

1499 SE Tech Center Place, Suite 300
Vancouver, WA 98683 United States
Telephone: +1-360-954-7100

For further information about this SDS: Email: product.compliance@emeraldmaterials.com

Emergency telephone number:

ChemTel (24 hours): 1-800-255-3924 (USA); +1-813-248-0585 (outside USA);
1-300-954-583 (Australia); 000-800-100-4086 (India).

SECTION 2: Hazard(s) identification

Classification of the substance or mixture:

Flammable Liquid, category 4, H227
Acute Toxicity, Oral, category 4 , H302
Skin Irritation, category 2, H315
Eye Irritation, category 2, H319
Acute Toxicity, Inhalation, category 4 , H332
STOT, single exposure, category 3, RTI , H335
Hazardous to the aquatic environment, Acute, category 2, H401
Hazardous to the aquatic environment, Chronic, category 2, H411

Label elements:

Hazard pictogram(s):



Signal word:

Warning

Hazard statements:

H227 Combustible liquid.
H302 Harmful if swallowed.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H335 May cause respiratory irritation.
H401 Toxic to aquatic life.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statements:

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P264 Wash skin thoroughly after handling.

SDS Name: Kalama* Benzaldehyde FCC Low BT

- P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P273 Avoid release to the environment.
P280 Wear protective gloves/eye protection/face protection.
P301+P312 IF SWALLOWED: Call a POISON CENTRE/doctor if you feel unwell.
P302+P352 IF ON SKIN: Wash with plenty of soap and water.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P312 Call a POISON CENTRE/doctor if you feel unwell.
P330 Rinse mouth.
P332+P313 If skin irritation occurs: Get medical advice/attention.
P337+P313 If eye irritation persists: Get medical advice/attention.
P362+P364 Take off contaminated clothing and wash it before reuse.
P370+P378 In case of fire: Use carbon dioxide, dry chemical, foam to extinguish.
P391 Collect spillage.
P403+P233 Store in a well-ventilated place. Keep container tightly closed.
P403+P235 Store in a well-ventilated place. Keep cool.
P405 Store locked up.
P501 Dispose of contents/container in accordance with local, regional and international regulations.

Supplemental information: No Additional Information

Classification and hazards statements are listed according to the United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS). Regulations in individual countries/regions may determine which classifications and hazard statements are applicable based on adopted hazard classes and categories. Precautionary statements are listed according to the United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS) - Annex III. Regulations in individual countries/regions may determine which statements are required on the product label. See product label for specifics.

Other hazards: BENZALDEHYDE: Combustible. Finely dispersed benzaldehyde may ignite spontaneously. May form peroxides in contact with air.

See Section 11 for toxicological information.

SECTION 3: Composition/information on ingredients

Substance:

<u>CAS-No.</u>	<u>Chemical Name</u>	<u>Weight%</u>
000100-52-7	Benzaldehyde	99-100

Amounts specified are typical and do not represent a specification. Remaining components are proprietary, non-hazardous, and/or present at amounts below reportable limits.

SECTION 4: First-aid measures

Description of first aid measures:

General: If irritation or other symptoms occur or persist from any route of exposure, remove the affected individual from the area: see a physician/get medical attention.

Eye contact: Immediately flush eyes with plenty of clean water for an extended time, not less than fifteen (15) minutes. Flush longer if there is any indication of residual chemical in the eye. Ensure adequate flushing of the eyes by separating the eyelids with fingers and roll eyes in a circular motion. If eye irritation persists: Get medical advice/attention.

Skin contact: Immediately remove contaminated clothing and shoes. Wash the affected area with plenty of soap and water until no evidence of the chemical remains (at least 15-20 minutes). Launder clothing before reuse. If skin irritation occurs: Get medical advice/attention.

Inhalation: If affected, remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Call a POISON CENTER or doctor/physician if you feel unwell.

Ingestion: Do not induce vomiting. Never give anything by mouth to an unconscious person. Rinse out the mouth with water. Get medical attention immediately.

Protection of first aid responders: Wear proper personal protective clothing and equipment.

Most important symptoms and effects, both acute and delayed: Dizziness, Drowsiness, Headache, Irritation, Nausea. Preexisting sensitization, skin and/or respiratory disorders or diseases may be aggravated. See section 11 for additional information.

Indication of any immediate medical attention and special treatment needed, if necessary: Treat symptomatically.

SECTION 5: Fire-fighting measures

Extinguishing media:

Suitable: Use dry chemical, "alcohol" foam, carbon dioxide or water spray.

Unsuitable: None known.

Special hazards arising From the chemical:

Unusual fire/explosion hazards: Issue warning: combustible liquid. Eliminate all ignition sources. Ventilate the area. If spill is large, be prepared to isolate the hazard area. Deny access to the spill area to persons who are not involved in the cleanup and/or who have not been properly trained in spill management of hazardous/flammable liquids. Vapors may explode if ignited in an enclosed area. Run off to sewer may cause a fire or explosion hazard. Protect product from flames of any kind; maintain proper clearance when using heat devices, etc. Closed container may rupture (due to build up in pressure) when exposed to extreme heat. Product may burn if an ignition source is present. BENZALDEHYDE: Finely dispersed benzaldehyde may ignite spontaneously. Rags used to wipe up spills or activated carbon used to absorb vapors of benzaldehyde have been known to ignite spontaneously. Benzaldehyde has a low autoignition temperature and can be ignited by exposed low pressure steam piping or other heated surfaces. Explosion is possible above the upper explosion limit due to the partial oxidation of benzaldehyde to benzoic acid. May form peroxides in contact with air.

Hazardous combustion products: Irritating or toxic substances will be emitted upon burning, combustion or decomposition. See section 10 (Hazardous decomposition products) for additional information.

Special protective equipment and precautions for fire-fighters: Use water/water spray to keep fire-exposed containers cool. Water spray may be used to flush spills away from exposures and to dilute spills to non-combustible mixtures. Do not flush combustible liquids into sewer as a fire or vapor explosion hazard may result. Never direct a hose stream directly onto a burning flammable/combustible liquid. Solid or straight hose stream will cause fire to spread if directed onto a burning spill or into an open container of burning liquid. Wear self-contained breathing apparatus (SCBA) equipped with a full facepiece and operated in a pressure-demand mode (or other positive pressure mode) and approved protective clothing. Personnel without suitable respiratory protection must leave the area to prevent significant exposure to hazardous gases from combustion, burning or decomposition. In an enclosed or poorly ventilated area, wear SCBA during cleanup immediately after a fire as well as during the attack phase of firefighting operations.

See section 9 for additional information.

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures: See Section 8 for recommendations on the use of personal protective equipment. Eliminate ignition sources. Ventilate areas of spill. Personal Protective Equipment must be worn.

Environmental precautions: Do not flush liquid into public sewer, water systems or surface waters.

Methods and materials for containment and cleaning up: Contain by diking with sand, earth or other non-combustible material. Wear proper personal protective clothing and equipment. Absorb spill with an inert material. Place into labeled, closed container; store in safe location to await disposal. Change contaminated clothing and laundry before reuse.

SECTION 7: Handling and storage

Precautions for safe handling: As with any chemical product, use good laboratory/workplace procedures. Do not cut, puncture, or weld on or near the container. Do not breathe dust, vapor, aerosol, mist or gas. Do not ingest, taste, or swallow. Wash thoroughly after handling this product. Always wash up before eating, smoking or using the facilities. Use under well-ventilated conditions. Avoid eye and skin contact. Wash contaminated clothing before reuse. Provide eyewash fountains and safety showers in the work area. Bond and ground all containers when transferring chemical. Eliminate ignition sources (e.g., sparks, static buildup, excessive heat, etc.). Use spark-proof tools and equipment. Vapors may travel to distant ignition sources.

Conditions for safe storage, including any incompatibilities: Store in combustible storage area and away from heat and open flame. Keep away from heat, sparks and open flames. Store under well-ventilated conditions. Keep container upright, when not in use, to prevent leakage. Avoid storing containers in direct sunlight as vapors may accumulate in the head space creating pressure. Store this material away from incompatible substances (see section 10). Do not store in open, unlabeled or mislabeled containers. Keep container closed when not in use. Emptied container may contain residual vapors or liquid which may ignite or explode. Do not reuse empty container without commercial cleaning or reconditioning. Bond and ground all containers when transferring chemical. Avoid storage in aluminum or iron containers. Product can easily oxidize. It is recommended that opened containers be padded with nitrogen. Protect from light. Storage tank openings should be inspected frequently since benzoic acid can form from oxidation of product and may clog openings.

SECTION 8: Exposure controls / personal protection

Control parameters:

Occupational exposure limits (OEL):

Chemical Name Benzaldehyde	ACGIH - TWA/Ceiling N/E		ACGIH - STEL N/E	
Chemical Name Benzaldehyde	Australia N/E	New Zealand N/E	Korea N/E	Indonesia N/E
Chemical Name	Japan ISHL	Japan JSOH	Taiwan	Malaysia

SDS Name: Kalama* Benzaldehyde FCC Low BT

Chemical Name

Benzaldehyde

Chemical Name

Benzaldehyde

Japan ISHL

N/E

Philippines

N/E

Japan JSOH

N/E

Singapore

N/E

Taiwan

N/E

Malaysia

N/E

N/E=Not established (no exposure limits established for the listed substances for listed country/region/organization).

Exposure controls:

Appropriate engineering controls: Always provide effective general and, when necessary, local exhaust ventilation to draw spray, aerosol, fume, mist and vapor away from workers to prevent routine inhalation. Ventilation must be adequate to maintain the ambient workplace atmosphere below the exposure limit(s) outlined in the SDS. Eliminate ignition sources (e.g., sparks, static buildup, excessive heat, etc.).

Individual protection measures, such as personal protective equipment:

Eye/face protection: Safety glasses or goggles required.

Skin and body protection: Wear chemical resistant (impervious) gloves. Use good laboratory/workplace procedures including personal protective clothing: labcoat, safety glasses and protective gloves.

Respiratory protection: In case of insufficient ventilation, wear suitable respiratory equipment. Wear an approved respirator (e.g., an organic vapor respirator, a full face air purifying respirator for organic vapors, or a self-contained breathing apparatus) whenever exposure to aerosol, mist, spray, fume or vapor exceed the applicable exposure limit(s) of any chemical substance listed in this SDS.

Further information: Eyewash fountains and safety showers are recommended in the work area.

SECTION 9: Physical and chemical properties

Form:	Liquid	pH:	Not Available
Appearance:	Colorless to light yellow	Relative density:	1.041-1.046 @ 25°C
Odor:	Almond	Partition coefficient (n-octanol/water):	1.4 @ 25°C
Odor threshold:	Not Available	% Volatile by weight:	100%
Solubility in water:	6.95 g/l @ 25°C	VOC:	100%
Evaporation rate:	0.04 (Butyl acetate=1)	Boiling point °C:	179 °C @760 mm Hg
Vapor pressure:	169 Pa @ 25°C	Boiling point °F:	354 °F @760 mm Hg
Vapor density:	3.66 (Air=1)	Flash point:	62-64 °C (144-147 °F) Closed Cup
Viscosity:	1.321 centipoise @ 25 °C	Auto-ignition temperature:	192 °C (378 °F)
Melting point/Freezing point:	-26 °C (-15 °F) @ 760 mm Hg	Flammability (solid, gas):	Not Applicable (liquid)
Oxidizing properties:	Not oxidizing	Flammability or explosive limits:	LFL/LEL: 1.4%
Explosive properties:	Not explosive		UFL/UEL: 8.5%
Decomposition temperature:	Not Available	Surface tension:	70.5 mN/m @ 20 °C (1 g/L)

Other information: Amounts specified are typical and do not represent a specification.

SECTION 10: Stability and reactivity

Reactivity: BENZALDEHYDE: Benzaldehyde readily undergoes oxidation by air to form benzoic acid.

Chemical stability: This product is stable. BENZALDEHYDE: Stable at normal temperatures and pressures. Benzaldehyde readily undergoes oxidation by air, particularly in the presence of minute traces of iron or on exposure to light. May discolor on exposure to light or air.

Possibility of hazardous reactions: Hazardous polymerization will not occur. BENZALDEHYDE: May form peroxides in contact with air.

Conditions to avoid: BENZALDEHYDE: Avoid exposure to air, light, moisture, ignition sources and elevated temperatures.

Incompatible materials: Reacts violently with peroxyformic acid. Avoid contact with strong oxidizing agents, reducing agents, acids, bases, iron, phenol, aluminum, brass, copper, bronze, alkali metals and oxygen. Attacks some forms of plastics, rubbers, and coatings.

Hazardous decomposition products: Carbon monoxide, carbon dioxide, peroxides, benzoic acid.

SECTION 11: Toxicological information

Information on likely routes of exposure:

SDS Name: Kalama* Benzaldehyde FCC Low BT

General: Caution must be exercised through the prudent use of protective equipment and handling procedures to minimize exposure. BENZALDEHYDE: Liver, kidney, and central nervous system effects have been observed during testing in laboratory animals.

Eyes: Causes serious eye irritation.

Skin: Causes skin irritation. May be absorbed through the skin. Prolonged or repeated contact with skin may defat the skin and may cause contact dermatitis. Sensitive individuals may develop a rash from contact with benzaldehyde.

Inhalation: Harmful if inhaled. May cause respiratory tract irritation. May act as a local anesthetic and narcotic at high concentrations. Inhalation of concentrated vapors may irritate the nose and throat and may produce central nervous system depression with possible respiratory failure. Overexposure may cause nausea, headache and vomiting.

Ingestion: Harmful if swallowed. Overexposure may cause nausea, headache and vomiting.

Acute toxicity information: Harmful if inhaled - Category 4. Harmful if swallowed - Category 4.

<u>Chemical Name</u>	<u>Inhalation LC50</u>	<u>Species</u>	<u>Oral LD50</u>	<u>Species</u>	<u>Dermal LD50</u>	<u>Species</u>
Benzaldehyde	>1-<5 mg/L (4 hours)	Rat/ adult	1430 mg/kg	Rat/ adult male	>2000 mg/kg (based on benzoic acid)	Rabbit/ adult

Skin corrosion/irritation: Causes skin irritation - Category 2.

<u>Chemical Name</u>	<u>Skin irritation</u>	<u>Species</u>
Benzaldehyde	Mild-moderate irritant	Weight of evidence

Serious eye damage/irritation: Causes serious eye irritation - Category 2 (2A).

<u>Chemical Name</u>	<u>Eye irritation</u>	<u>Species</u>
Benzaldehyde	Slight irritant	Rabbit/ adult

Respiratory or skin sensitization: Not classified (based on available data, the classification criteria are not met).

<u>Chemical Name</u>	<u>Skin sensitisation</u>	<u>Species</u>
Benzaldehyde	Non-sensitizer	Guinea pig and Human

Carcinogenicity: Not classified (based on available data, the classification criteria are not met). BENZALDEHYDE: Under the conditions of the two year gavage study, there was no evidence of carcinogenic activity of benzaldehyde for male or female 344/N rats receiving 200 or 400 mg/kg bw/day. NOAEL (carcinogenicity), rat: >400 mg/kg bw/day. Under the conditions of the two year gavage study, there was some evidence of carcinogenic activity of benzaldehyde for male and female mice at 300 mg/kg bw/day and above, as indicated by increased incidences of squamous cell papillomas (benign) and hyperplasia of the forestomach. LOAEL (chronic), mice: >300 mg/kg bw/day. No carcinomas were observed. It cannot be excluded that the observed effects on the forestomach are related to the irritant properties of benzaldehyde.

Germ cell mutagenicity: Not classified (based on available data, the classification criteria are not met). BENZALDEHYDE: Several In-vitro mutation studies (bacteria reverse mutation (Ames OECD 471), mouse lymphoma (OECD 490), micronucleus (OECD 487)) were negative with and without metabolic activation. Mutagenic effects have been observed on tests in the mouse lymphoma, sister chromatid exchanges (in Chinese hamster ovary (CHO) cells) and chromosome aberrations (in Chinese hamster lung (CHL) cells) assays. Mutagenicity was negative in in-vivo sex-linked recessive lethal mutation assays with Drosophila melanogaster. No adequate in vivo data are available that confirm the weakly positive in-vitro results.

Reproductive toxicity: Not classified (based on available data, the classification criteria are not met). BENZALDEHYDE - READ-ACROSS: Reproductive toxicity (benzoic acid), 4-generation oral study in rats: NOAEL (no-observed adverse-effect-level) of 500 mg/kg/day. Developmental toxicity (sodium benzoate), oral, rats and mice: NOAEL of ≥ 175 mg/kg bw/day can be established for developmental effects.

Specific target organ toxicity (STOT) - single exposure: May cause respiratory irritation - Category 3. BENZALDEHYDE: Based on acute inhalation toxicity studies on sensory irritation, it cannot be excluded that benzaldehyde induces sensory irritation in rodents.

Specific target organ toxicity (STOT) - repeated exposure: Not classified (based on available data, the classification criteria are not met). BENZALDEHYDE: Repeated dose toxicity study, rat, inhalation (vapor), 14 days: LOAEC (Lowest-Observed-Adverse-Effect-Concentration) - 2200 mg/m³. Repeated dose (long-term inclusive) oral toxicity studies showed a LOAEL (Lowest-Observed-Adverse-Effect-Level) of 300 mg/kg bw/day (mouse); NOAEL (No-Observed-Adverse-Effect-Level), oral, rat - 400 mg/kg bw/day.

Aspiration hazard: Not classified (based on available data, the classification criteria are not met).

Other toxicity information: No additional information available.

SECTION 12: Ecological information

Ecotoxicity:

<u>Chemical Name</u>	<u>Species</u>	<u>Acute</u>	<u>Acute</u>	<u>Chronic</u>
Benzaldehyde	Fish	LC50 1.07 mg/L (96 hours)	LC50 11.2 mg/L(96 hours)	NOEC 0.12 mg/L (7 days)
Benzaldehyde	Invertebrates	EC50 19.7 mg/L (48 hours) (geometric mean measured)	EC50 50 mg/L(24 hours)	N/E
Benzaldehyde	Algae	EC50 33.1 mg/L (72 hours) (growth rate)	EC50 8.05 mg/L(72 hours) (biomass)	EC10 0.021 mg/L (biomass), 0.039 mg/L (growth rate)(72 hours) (geometric mean measured)
Benzaldehyde	Micro-organisms	EC50 759 mg/L (3 hours)		

Persistence and degradability:

<u>Chemical Name</u>	<u>Biodegradation</u>
Benzaldehyde	Readily biodegradable (weight of evidence)

Bioaccumulative potential:

<u>Chemical Name</u>	<u>Bioconcentration Factor (BCF)</u>	<u>Log Kow</u>
Benzaldehyde	N/E	1.4 @ 25°C

Mobility in soil:

<u>Chemical Name</u>	<u>Mobility in soil (Koc/Kow)</u>
Benzaldehyde	56 (calculated)

Other adverse effects: No additional information available.

SECTION 13: Disposal considerations

Dispose of unused contents (incineration) in accordance with national and local regulations. Dispose of container in accordance with national and local regulations. Ensure the use of properly authorized waste management companies, where appropriate.

See Section 8 for recommendations on the use of personal protective equipment.

SECTION 14: Transport information

The information below is provided to assist in documentation. It may supplement the information on the package. The package in your possession may carry a different version of the label depending on the date of manufacture. Depending on inner packaging quantities and packaging instructions, it may be subject to specific regulatory exceptions.

UN number: UN1990

UN proper shipping name:

Benzaldehyde

Transport hazard class(es):

U.S. DOT hazard class: 9
 Canada TDG hazard class: 9
 Europe ADR/RID hazard class: 9
 IMDG Code (ocean) hazard class: 9
 ICAO/IATA (air) hazard class: 9

A "N/A" listing for the hazard class indicates the product is not regulated for transport by that regulation.

Packing group: III**Environmental hazards:**

Marine pollutant: Marine Pollutant (IMDG code 2.9.3).
Hazardous substance (USA): Not Applicable

Special precautions for user: Not Applicable

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC code:

Not Applicable

SECTION 15: Regulatory information

Safety, health and environmental regulations specific for the product in question:

Japan regulations:

Japan Industrial Safety and Health Law:

Chemical name
Benzaldehyde

Category
Dangerous Substance, Mutagen (new and existing)

Japan Fire Service Law:

Chemical name
Benzaldehyde

Category
Group 4 - Flammable liquids

Japan Poisonous and Deleterious Substances:

Chemical name
No subject chemicals

Category Threshold

Japan Prevention of Marine Pollution and Disaster:

Chemical name
No subject chemicals

Category

Japan Chemical Substances Control Law:

Chemical name
No subject chemicals

Category Notes

Other regulations: No Additional Information

Chemical inventories:

<u>Regulation</u>	<u>Status</u>
Australian Inventory of Industrial Chemicals (AIIC):	Y
Canadian Domestic Substances List (DSL):	Y
Canadian Non-Domestic Substances List (NDSL):	N
China Inventory of Existing Chemical Substances (IECSC):	Y
European EC Inventory (EINECS, ELINCS, NLP):	Y
Japan Existing and New Chemical Substances (ENCS):	Y
Japan Industrial Safety and Health Law (ISHL):	Y
Korean Existing and Evaluated Chemical Substances (KECL):	Y
New Zealand Inventory of Chemicals (NZIoC):	Y
Philippines Inventory of Chemicals and Chemical Substances (PICCS):	Y
Taiwan Inventory of Existing Chemicals:	Y
U.S. Toxic Substances Control Act (TSCA) (Active):	Y

A "Y" listing indicates all intentionally added components are either listed or are otherwise compliant with the regulation. A "N" listing indicates that for one or more components: 1) there is no listing on the public inventory (or is not on the ACTIVE inventory for U.S. TSCA); 2) no information is available; or 3) the component has not been reviewed. A "Y" for New Zealand may mean that a qualified group standard may exist for the components in this product.

Chemical inventory notes: New Zealand: One or more components may be covered by a group standard.

Europe REACH (EC) 1907/2006: Applicable components are registered, exempt or otherwise compliant. EU REACH is only relevant to substances either manufactured or imported into the EU. Emerald Performance Materials has met its obligations under the EU REACH regulation. EU REACH information regarding this product is provided for informational purposes only. Each Legal Entity may have differing EU REACH obligations, depending on their place in the supply chain. For material manufactured outside of the EU, the importer of record must understand and meet their specific obligations under the regulation.

SECTION 16: Other information

Legend:

* : Trademark owned by Emerald Performance Materials, LLC.
 ACGIH: American Conference of Governmental Industrial Hygienists
 N/A: Not Applicable
 N/E: None Established
 STEL: Short Term Exposure Limit
 TWA: Time Weighted Average (exposure for 8-hour workday)

Users Responsibility/Disclaimer of Liability:

The information set forth herein is based on our current knowledge, and is intended to describe the product solely with respect to health, safety and the environment. As such, it must not be interpreted as a guarantee of any specific property of the product. As a result, the customer shall be solely responsible for deciding whether said information is suitable and beneficial.

Safety Data Sheet Preparer:
 Product Compliance Department
 Emerald Performance Materials, LLC
 1499 SE Tech Center Place, Suite 300
 Vancouver, WA 98683
 United States