

SECTION 1: IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING**1.1 Product identifier**

Trade name: **FUSION™ Activator-B**
Registration number: NA
Synonym(s): Low-Temperature Chemical Activator
Preparation/Revision date: 28 October 2015

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

Identified uses: Additive for oil and natural gas well hydraulic fracturing
Uses advised against: None known

1.3 Details of the supplier of the safety data sheetManufacturer / Supplier

Company name: CARBO Ceramics Inc.
Address: 575 N. Dairy Ashford Road, Suite 300
Houston, Texas 77079, USA
Customer service: 1-337-367-6151

1.4 Emergency telephone number

For Chemical Emergency
Spill, Leak, Fire, Exposure, or Accident
Call CHEMTREC Day or Night
Within USA and Canada: 1-800-424-9300

SECTION 2: HAZARDS IDENTIFICATION**2.1 Classification of the substance or mixture**Classification according to the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Classification: Serious Eye Damage/Eye Irritation – Category 2
Skin Corrosion/Irritation – Category 2
Skin Sensitization – Category 1

SECTION 2: HAZARDS IDENTIFICATION (CONT'D)**2.2 Label elements**

Contains:

None



Hazard pictogram:

Signal word:

WARNING!

Hazard statement:

Causes serious eye irritation. Causes skin irritation. May cause an allergic skin reaction.

Precautionary statements:

- Prevention:

Avoid breathing mist/vapors/spray. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection. Contaminated work clothing must not be allowed out of the workplace.

- Response:

IF ON SKIN: Wash with plenty of water. If skin irritation or rash occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical advice/attention.

- Storage:

None

- Disposal:

Dispose of contents/container in accordance with local, regional, national and international regulations.

Supplemental label information:

None

2.3 Other hazards

Avoid unauthorized release to the environment. Collect spillage.

Hazard summary

Physical hazards:

Not classified for physical hazards.

Health hazards:

Causes serious eye irritation. Causes skin irritation. May cause an allergic skin reaction.

Environmental hazards:

Marine pollutant. Avoid unauthorized release to the environment.

Main symptoms:

May cause eye and skin irritation. May cause skin sensitization.

SECTION 3: COMPOSITION / INFORMATION ON INGREDIENTS

3.1 Mixture

Chemical Name	Percent	CAS No.	Notes
Modified epoxy resin 1	25-50	Trade secret	-
Proprietary epoxy resin 2	20-45	Trade Secret	-
Proprietary epoxy resin 3	10-15	Trade Secret	-
Proprietary glycidyl compound	9-10	Trade Secret	-
Proprietary epoxy resin 4	4-5	Trade Secret	-
Proprietary tracer dye	< 1	Trade Secret	-
Proprietary surfactant	< 1.5	Trade Secret	-

Composition comments: Some specific formulation details are being withheld as trade secret per 29 CFR 1910.1200. All concentrations are in percent by weight unless ingredients are a gas. Gas concentrations are in percent by volume.

SECTION 4: FIRST AID MEASURES

General Information

Show this Safety Data Sheet to the doctor in attendance. If symptoms occur, follow first aid measures as appropriate.

4.1 Description of first aid measures

Inhalation:	Remove to fresh air. Get medical attention if irritation or symptoms persist.
Skin contact:	Remove immediately all contaminated clothing. Flush skin with large amounts of water. Wash contaminated clothing before reuse. If irritation develops or persists, get medical attention.
Eye contact:	Rinse immediately with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do so. Continue rinsing. If eye irritation persists, get medical advice/attention.
Ingestion:	Rinse mouth. Do not induce vomiting. Get medical attention.
Notes to Physician:	None specified

4.2 Most important symptoms and effects, both acute and delayed

Exposure may cause eye and skin irritation. May cause skin sensitization.

4.3 Indication of any immediate medical attention and special treatment needed

Provide general supportive measures and treat symptoms as needed.

SECTION 5: FIRE FIGHTING MEASURES**General fire hazards**

This product is not classified as flammable.

5.1 Extinguishing Media

Suitable extinguishing media:

Water spray, alcohol-resistant foam, dry chemical or carbon dioxide. Foam, alcohol-resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective. Water fog, applied gently, may be used as a blanket for fire extinguishment.

Unsuitable extinguishing media:

Do not use direct water stream as this may spread fire.

5.2 Special hazards arising from the substance or mixture

During fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: phenolics, carbon monoxide, and carbon dioxide. Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids. Dense smoke is emitted when burned without sufficient oxygen.

5.3 Advice for firefighters

Special protective equipment for firefighters:

Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire-fighting clothing. Avoid contact with this material during fire-fighting operations. If contact is likely, change to full chemical resistant fire-fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protect equipment in post-fire or non-fire clean-up situations, refer to the relevant sections

Special firefighting procedures:

Isolate fire and deny unnecessary entry. Use water spray to cool fire-exposed containers and fire-affected zone until fire is extinguished and danger of re-ignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety devices or discoloration of the container.

SECTION 5: FIRE FIGHTING MEASURES (CONT'D)

Special firefighting procedures:	Do not use direct water stream (may spread fire). Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Water fog may be used as a blanket for fire extinguishment if applied gently. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review Section 6 of the SDS for Accidental Release Measures and Section 11 of the SDS for Ecological Information.
Special remarks on fire hazards:	None

SECTION 6: ACCIDENTAL RELEASE MEASURES**6.1 Personal precautions, protective equipment and emergency procedures**

For non-emergency personnel:	Use personal protective equipment as recommended in Section 8. Avoid skin contact. Avoid breathing mist/vapors/spray. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection. Contaminated work clothing must not be allowed out of the workplace.
For emergency responders:	Use personal protection recommended in Section 8 of the SDS.

6.2 Environmental Precautions

Prevent leaks and spills if safe to do so. Collect spillage. Do not allow material to be released to the environment or to reach drains.

6.3 Methods and materials for containing and cleaning up

Contain spill immediately with inert material. Transfer liquids and solid diking material to suitable containers for recovery or disposal. Residual can be removed with solvent. Follow recommended exposure guidelines and safe handling procedures for the specific solvent used. Dispose of spillage as indicated in Section 13. Store captured and reclaimed materials in suitable closed containers.

6.4 Reference to other Sections

For personal protection, see Section 8. For waste disposal, see Section 13.

SECTION 7: HANDLING AND STORAGE**7.1 Precautions for safe handling**

Avoid skin contact. Avoid breathing mist/vapors/spray. Wash thoroughly after handling. Wear protective gloves/protective clothing/eye protection/face protection. Contaminated work clothing must not be allowed out of the workplace. Avoid unauthorized release to the environment.

7.2 Conditions for safe storage, including any incompatibilities

Store in a cool, well-ventilated place. Keep container tightly closed. Store away from oxidizers, acids, bases and amines.

7.3 Specific end use(s)

Industrial use – oil & gas well stimulation.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION**8.1 Control parameters****United States. Occupational Exposure Limits**

Component	CAS No.	Type	Value	Form
Modified epoxy resin 1	Trade secret	N/A	N/A	N/A
Proprietary epoxy resin 2	Trade Secret	N/A	N/A	N/A
Proprietary epoxy resin 3	Trade Secret	N/A	N/A	N/A
Proprietary glycidyl compound	Trade Secret	N/A	N/A	N/A
Proprietary epoxy resin 4	Trade Secret	N/A	N/A	N/A
Proprietary tracer dye	Trade Secret	N/A	N/A	N/A
Proprietary surfactant	Trade Secret	N/A	N/A	N/A

Consult local authorities for acceptable exposure limits**8.2 Exposure Controls****Appropriate engineering controls:**

Prevent exposure to vapor, mist and spray. Use good general local exhaust ventilation to keep airborne levels below applicable exposure limits (typically 10 air changes per hour). Ventilation rates should be matched to conditions. Provide local eye wash and safety shower stations where possible.

SECTION 8: EXPOSURE CONTROLS / PERSONAL PROTECTION (CONT'D)**Individual Protective Measures**

General Information:

Personal protective equipment should be chosen according to applicable standards and in consultation with the supplier of the personal protective equipment.

Eye/face protection:

Wear safety glasses with side shields or goggles.

Skin protection:

- Hand protection:
- Other:

Wear protective gloves that are chemically resistant to this material. Avoid direct contact with skin. Wash skin after handling. Launder work clothes regularly.

Respiratory protection:

Use under local exhaust ventilation. If engineering controls do not maintain airborne concentrations to an acceptable level, use an appropriate respirator. Under intended handling conditions, no respiratory protection should be needed.

Thermal hazards:

Not applicable

Hygiene measures

Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

Environmental exposure controls

Avoid unauthorized release to the environment.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Form	Liquid	Explosive properties	Not available
Color	Blue	Explosive limit	Not available
Odor	Mild	Vapor pressure	77 °F (25 °C)
Odor threshold	Not available	Vapor density	Not available
pH	Not available	Evaporation rate	Not available
Melting/freezing point	5 – 41 °F (-15 – 5 °C)	Relative density	1.1 – 1.8 (water = 1)
Boiling point, initial boiling point and boiling range	> 212 °F (> 100 °C) Decomposes	Partition coefficient (n-octanol/water)	Not available
Flash point	486 °F (252 °C)	Solubility (water)	None
Auto-ignition temperature	> 572 °F (> 300 °C)	Decomposition temperature	Not available
Flammability (solid, gas)	Not applicable	Bulk density	Not available
Flammability limit-lower%	Not available	Viscosity	6,000 – 8,000 cP at 77 °F (25 °C)
Flammability limit-upper%	Not available	VOC (weight %)	Not available
Oxidizing properties	Not available	Percent volatile	Not available

9.2 Other Information

No relevant additional information available

SECTION 10: STABILITY AND REACTIVITY

10.1 Reactivity

No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

Material is stable under recommended storage conditions

10.3 Possibility of hazardous reactions

Hazardous polymerization does not occur under normal conditions. Masses of more than one pound (0.5 kg) of product plus an aliphatic amine will cause irreversible polymerization with considerable heat build-up.

10.4 Conditions to avoid

Avoid short term exposures to temperatures above 572 °F (300 °C). Avoid prolonged exposure to temperatures above 482 °F (250 °C). Potentially violent decomposition can occur above 662 °F (350 °C). Generation of gas during decomposition can cause pressure in closed systems. Pressure build-up can be rapid.

10.5 Incompatible materials

Oxidizing agents, acids, bases, avoid unintended contact with amines.

SECTION 10: STABILITY AND REACTIVITY (CONT'D)**10.6 Hazardous decompositions products**

Decomposition products depend upon temperature, air supply and the presence of other materials. Gases are released during decomposition. Uncontrolled exothermic reaction of epoxy resins release phenolics, carbon monoxide, and water.

SECTION 11: TOXICOLOGICAL INFORMATION**General information on likely routes of exposure**

Ingestion: Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.

Inhalation: Vapor from heated material may cause respiratory irritation.

Skin contact: May cause skin irritation. May cause skin sensitization.

Eye contact: May cause severe eye irritation.

Symptoms: May cause eye and skin irritation. May cause skin sensitization

11.1 Information on toxicological effects

Acute Toxicity: No data were identified for the product as a whole. Data are for constituents:

Product / ingredient name	Result	Species	Dose	Exposure
Modified epoxy resin 1	No data	No data	No data	No data
Proprietary epoxy resin 2	No data	No data	No data	No data
Proprietary epoxy resin 3	No data	No data	No data	No data
Proprietary glycidyl compound	LD ₅₀	Rat	> 2,000 mg/kg bw	Oral
	LC ₀	Rat	0.15 mg/L (saturated atmosphere)	Inhalation
Proprietary epoxy resin 4	LD ₅₀	Rat	> 4,000 mg/kg	Oral
	LD ₅₀	Rat	> 2,000 mg/kg	Dermal
Proprietary tracer dye	LD ₅₀	Rat	>5,000 mg/kg	Oral
Proprietary surfactant	LD ₅₀	Rat	5,000 – 15,000 mg/kg	Oral
	LD ₅₀	Rabbit	2,000 – 20,000 mg/kg	Dermal

SECTION 11: TOXICOLOGICAL INFORMATION (CONT'D)**Serious Eye Damage/Irritation:**

No data were identified for this product as a whole. Proprietary epoxy resin 3 may cause mild to slight temporary eye irritation, but corneal injury is unlikely. Available studies show that proprietary glycidyl compound is a very slight irritant to non-irritating to the eye when exposed undiluted to the eye; results fully reversible within 24 hours. The proprietary tracer dye may cause slight eye irritation. The proprietary surfactant may cause eye irritation.

Skin corrosion/Irritation:

No data were identified for this product as a whole. Proprietary epoxy resin 2 caused mild to moderate irritation to the skin of rabbits. Available studies show that proprietary epoxy resin 3 is a slight skin irritant with local redness. The proprietary glycidyl compound was moderately irritating to the skin of rabbits. Brief contact with the proprietary tracer dye is essentially non-irritating to the skin. Prolonged skin contact with the proprietary surfactant may cause temporary irritation.

Respiratory/Skin Sensitization:

No data were identified for this product as a whole. Proprietary epoxy resin 2 reported results of moderate sensitization in guinea pigs. Proprietary epoxy resin 3 reported allergic skin reactions in animal testing. Proprietary glycidyl compound produced reactions suggestive of hypersensitivity when tested on the skin of guinea pigs. The proprietary tracer dye did not cause allergic skin reactions when tested in guinea pigs. The proprietary surfactant is not expected to cause skin sensitization.

Germ Cell Mutagenicity:

No data were identified for this product as a whole. Proprietary glycidyl compound is not regarded as mutagenic. Proprietary tracer dye in vitro genetic toxicity studies were negative in some cases and positive in other cases.

Carcinogenicity:

No data were identified for this product as a whole. Compounds related to the proprietary glycidyl compound are not classified as a carcinogen by the International Agency for Research on Cancer (IARC). Although some weak evidence of carcinogenicity has been reported in animals, the weight of evidence does not show that compounds related to proprietary glycidyl compound are carcinogenic. The proprietary surfactant is not considered to be a carcinogen by IARC, ACGIH, NTP and OSHA.

SECTION 11: TOXICOLOGICAL INFORMATION (CONT'D)

Reproductive Toxicity:	No data were identified for this product as a whole. Resins based on compounds related to proprietary glycidyl compound did not cause birth defects and/or other adverse effects on the fetus when tested dermally and orally in animals. Proprietary glycidyl compound caused no reproductive and/or developmental effects in animal studies. Residual liquid epoxy resin did not interfere with reproduction in animal studies. Proprietary surfactant is not expected to cause reproductive or developmental effects.
Developmental Effects:	No data were identified for this product as a whole. Resins based on compounds related to proprietary glycidyl compound did not cause birth defects and/or other adverse effects on the fetus when tested dermally and orally in animals. Proprietary glycidyl compound caused no reproductive and/or developmental effects in animal studies. Residual liquid epoxy resin did not interfere with reproduction in animal studies.
STOT – Single Exposure:	No data were identified for this product or its constituents.
STOT – Repeated Exposure:	No data were identified for this product as a whole. No significant toxicity was observed in animal studies with proprietary glycidyl compound at concentrations requiring classification. Prolonged inhalation of insoluble, respirable (less than 10 micron) dusts can lead to pulmonary damage. Use standard hygienic practices to minimize exposure to dusts that may form. Prolonged exposure to the proprietary surfactant may be harmful.
Aspiration Hazard:	No data were identified for this product or its constituents.
Conclusion/Summary	May cause eye and skin irritation. May cause skin sensitization. Vapor from heated material may cause respiratory irritation.

SECTION 12: ECOLOGICAL INFORMATION

12.1 Toxicity / Aquatic ecotoxicity

Product / ingredient name	Test	Result (mg/L)	Species	Exposure
Modified epoxy resin 1	No data	No data	No data	No data
Proprietary epoxy resin 2	LC ₅₀	2 mg/L	<i>Oncorhynchus mykiss</i>	96h
	EC ₅₀	1.8 mg/L (immobilization)	<i>Daphnia magna</i>	48h
	EC ₅₀	11 mg/L (growth rate)	<i>Scenedesmus capricornutum</i>	72h
	IC ₅₀	>42.6 mg/L	<i>Daphnia magna</i>	18h
	NOEC	0.3 mg/L	<i>Daphnia magna</i>	21d
Proprietary epoxy resin 3	No data	No data	No data	No data
Proprietary glycidyl compound	LC ₅₀	>5,000 mg/L	<i>Oncorhynchus mykiss</i>	96h
	LC ₀	1,800 mg/L	<i>Lepomis macrochirus</i>	96h
	EC ₅₀	7.2 mg/L (mobility)	<i>Daphnia magna</i>	48h
	EC ₅₀	843 mg/L (growth inhibition)	<i>Pseudokirchneriella subcapitata</i>	72h
	NOEC	500 mg/L (growth inhibition)	<i>Pseudokirchneriella subcapitata</i>	72h
Proprietary epoxy resin 4	LC ₅₀	160 mg/L	<i>Leuciscus idus</i>	48h
	EC ₅₀	220 mg/L	<i>Daphnia magna</i>	96h
Proprietary tracer dye	No data	No data	No data	No data
Proprietary surfactant	EC ₅₀	800 – 5243 mg/L	Crustacea	48h
	LC ₅₀	<1,000 mg/L	Fish	96h

12.2 Persistence and degradability

No data available for this product as a whole. Proprietary epoxy resin 2 is not readily biodegradable and has a moderate potential for bioaccumulation. Proprietary glycidyl compound is readily biodegradable. Proprietary epoxy resin 4 is not readily biodegradable.

12.3 Bioaccumulative potential

No data available for this product as a whole. Proprietary glycidyl compound is not expected to bioaccumulate.

12.4 Mobility

No data available for this product as a whole. Proprietary glycidyl compound is expected to be relatively immobile in soil (Koc > 5,000).

12.5 Results of PBT and vPvB assessment

No data available

12.6 Other adverse effects

None known

Conclusion/Summary

Marine pollutant. Avoid unauthorized release to the environment. Collect spillage.

SECTION 13: DISPOSAL CONSIDERATIONS**13.1 Waste treatment methods**

Residual waste:	Dispose of in accordance with all applicable regulations. Contact a licensed waste disposal company to ensure proper handling.
Contaminated packaging:	Empty containers should be taken to an approved waste handling site for recycling or disposal.
Disposal methods/information:	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local, regional, national, international regulations.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

SECTION 14: TRANSPORT INFORMATION

14.1 UN Number	UN3082
14.2 UN proper shipping name	Environmentally hazardous substance, liquid, n.o.s. (epoxy resin)
14.3 Transport hazard class(es)	9
14.4 Packing group	III
14.5 Environmental hazards	Marine Pollutant
14.6 Special precautions for user	None
14.7 Transport in bulk according to Annex II MARPOL73/78 and the IBC Code	Not applicable

Note: Shipments via road and rail under US DOT regulations are not regulated as dangerous for transport.

The transport regulation may vary based on the country of use. Check for the appropriate regulations in the country of transport or usage of this product.

SECTION 15: REGULATORY INFORMATION**15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture****USA Federal Regulations**

29 CFR 1910.1200 Hazard Communication Standard (HCS):	Hazardous
TSCA - U.S. Inventory (TSCA 8b):	Exempt/Compliant
SARA Title III – Section 302, Extremely Hazardous Substances (EHS):	Not listed
CERCLA - Hazardous substances:	Not listed

Release of CERCLA hazardous substances in excess of any reportable quantity threshold to the environment requires notification to the National Response Center (+1-800-424-8802 or +1-202-267-2675).

SARA Title III – 311/312, Hazard Classes:

Fire / Flammability	No
Reactivity	No
Release of Pressure	No
Acute Health Hazard	Yes
Chronic Health Hazard	No

SARA 313 – Toxic Chemicals: Not listed

USA State Regulations

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under any State Regulations.

Other Regulations

None specified

SECTION 16: OTHER INFORMATION**Label Requirements**

This product has been classified as hazardous and requires labeling.

List of abbreviations

ACGIH	American Conference for Governmental Industrial Hygienists
CAS	Chemical Abstract Service
CERCLA	Comprehensive Emergency Response, Compensation and Liability Act
CFR	Code of Federal Regulations
EC ₅₀	Effective Concentration, 50%
EHS	Extremely Hazardous Substance
IARC	International Agency for Research on Cancer

SECTION 16: OTHER INFORMATION (CONT'D)**List of abbreviations (cont'd)**

IC ₅₀	Inhibitory Concentration, 50%
LC ₀	Lethal Concentration, 0%
LC ₅₀	Lethal Concentration, 50%
LD ₅₀	Lethal Dose, 50%
NIOSH	National Institute of Occupational Safety and Health
NOEC	No Observable Effect Concentration
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
PBT	Persistent, Bioaccumulative and Toxic
SARA	Superfund Amendments and Reauthorization Act
SDS	Safety Data Sheet
TSCA	Toxic Substances Control Act
UN	United Nations
VOC	Volatile Organic Compound
vPvB	Very Persistent and Very Bioaccumulative

References

ChemAdvisor List of Lists (LOLI)
IARC Monographs. Overall Evaluation of Carcinogenicity
IUCLID Data Set
Supplier SDSs

Information on evaluation method leading to the classification of mixture

The classification for health and environmental hazards is derived by a combination of calculation methods and test data, if available. For details refer to Sections 9, 11 and 12.

Training information

Follow training instructions when handling this material.

SDS Revisions

SDS prepared on 28 October 2015.

Disclaimer

The information in the sheet was written based on the best knowledge and experience currently available.