Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

1 Identification

· **Product identifier**

· **Trade name: Virent BioFormate™ - Full Range (>C3)**
· **Application of the substance / the mixture**
This material is only to be used for research and development, under the direct supervision of a technically qualified person. The toxicological properties have not been thoroughly investigated.

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Virent, Inc.
3571 Anderson Street
Madison, WI USA 53704

· **Information department:** Product safety department: dave_runnels@virent.com
· **Emergency telephone number:**
For Chemical Emergency, Spill, Leak, Fire, Exposure or Accident, Call CHEMTREC (Day or Night)
CHEMTREC: NORTH AMERICA: 800-424-9300
CHEMTREC: INTERNATIONAL: CALL 703-527-3887 (collect calls accepted)

2 Hazard(s) identification

· **Classification of the substance or mixture**

GHS02 Flame

Flam. Liq. 1	H224	Extremely flammable liquid and vapor.

GHS08 Health hazard

Muta. 1B	H340	May cause genetic defects.
Carc. 1A	H350	May cause cancer.
Repr. 2	H361	Suspected of damaging fertility or the unborn child.
STOT RE 1	H372	Causes damage to organs through prolonged or repeated exposure.

GHS09 Environment

Aquatic Chronic 2	H411	Toxic to aquatic life with long lasting effects.

GHS07

Skin Irrit. 2	H315	Causes skin irritation.
Eye Irrit. 2A	H319	Causes serious eye irritation.
STOT SE 3	H336	May cause drowsiness or dizziness.
Aquatic Acute 2	H401	Toxic to aquatic life.

· **Label elements**
· **GHS label elements** The product is classified and labeled according to the Globally Harmonized System (GHS).

(Contd. on page 2)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 1)

· **Hazard pictograms**

GHS02 GHS07 GHS08 GHS09

· **Signal word** Danger

· **Hazard-determining components of labeling:**
toluene
ethylbenzene
benzene
n-hexane

· **Hazard statements**
H224 Extremely flammable liquid and vapor.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H340 May cause genetic defects.
H350 May cause cancer.
H361 Suspected of damaging fertility or the unborn child.
H336 May cause drowsiness or dizziness.
H372 Causes damage to organs through prolonged or repeated exposure.
H401 Toxic to aquatic life.
H411 Toxic to aquatic life with long lasting effects.

· **Precautionary statements**

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ventilating/lighting/equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/fume/gas/mist/vapors/spray.
P264	Wash thoroughly after handling.
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/protective clothing/eye protection/face protection.
P303+P361+P353	If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
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.
P308+P313	IF exposed or concerned: Get medical advice/attention.
P312	Call a poison center/doctor if you feel unwell.
P314	Get medical advice/attention if you feel unwell.
P321	Specific treatment (see on this label).
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 for extinction: CO2, powder or water spray.
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.

(Contd. on page 3)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 2)

P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

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

Health = 2
Fire = 4
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = *2
Fire = 4
Reactivity = 0

· **Hazards Not Otherwise Classified** None
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **Chemical characterization: Mixtures**
· **Description:** Mixture of the substances listed below with nonhazardous additions.

· **Components:**

1330-20-7	xylene Flam. Liq. 3, H226; Acute Tox. 4, H312; Acute Tox. 4, H332; Skin Irrit. 2, H315	10-25%
108-88-3	toluene Flam. Liq. 2, H225; Repr. 2, H361; STOT RE 2, H373; Asp. Tox. 1, H304; Skin Irrit. 2, H315; STOT SE 3, H336	10-25%
25551-13-7	Trimethylbenzene Flam. Liq. 3, H226; Asp. Tox. 1, H304; Aquatic Chronic 2, H411; Acute Tox. 4, H332; Skin Irrit. 2, H315; Eye Irrit. 2A, H319; STOT SE 3, H335-H336; Aquatic Acute 2, H401	2.5-10%
95-63-6	1,2,4-trimethylbenzene Flam. Liq. 3, H226; Aquatic Chronic 2, H411; Acute Tox. 4, H332; Skin Irrit. 2, H315; Eye Irrit. 2A, H319; STOT SE 3, H335	2.5-10%
620-14-4	3-ethyltoluene Flam. Liq. 3, H226	2.5-10%
109-66-0	pentane Flam. Liq. 2, H225; Asp. Tox. 1, H304; Aquatic Chronic 2, H411; STOT SE 3, H336	2.5-10%
110-54-3	n-hexane Flam. Liq. 2, H225; Repr. 2, H361; STOT RE 2, H373; Asp. Tox. 1, H304; Aquatic Chronic 2, H411; Skin Irrit. 2, H315; STOT SE 3, H336	2.5-10%
106-97-8	butane Flam. Gas 1, H220; Press. Gas, H280	2.5-10%

(Contd. on page 4)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 3)

622-96-8	4-ethyltoluene Flam. Liq. 3, H226	2.5-10%
78-78-4	isopentane Flam. Liq. 1, H224; Asp. Tox. 1, H304; Aquatic Chronic 2, H411; STOT SE 3, H336	2.5-10%
100-41-4	ethylbenzene Flam. Liq. 2, H225; Carc. 2, H351; STOT RE 2, H373; Asp. Tox. 1, H304; Acute Tox. 4, H332	2.5-10%
107-83-5	hexane (containing < 5 % n-hexane (203-777-6)) Flam. Liq. 2, H225; Asp. Tox. 1, H304; Aquatic Chronic 2, H411; Skin Irrit. 2, H315; STOT SE 3, H336	≤2.5%
71-43-2	benzene Flam. Liq. 2, H225; Muta. 1B, H340; Carc. 1A, H350; STOT RE 1, H372; Asp. Tox. 1, H304; Skin Irrit. 2, H315; Eye Irrit. 2A, H319	≤2.5%
96-37-7	methylcyclopentane Flam. Liq. 2, H225	≤2.5%
75-28-5	isobutane Flam. Gas 1, H220; Press. Gas, H280	≤2.5%
135-01-3	o-diethylbenzene Flam. Liq. 3, H226	≤2.5%
513-35-9	2-methylbut-2-ene Flam. Liq. 1, H224; Acute Tox. 3, H301	≤2.5%
591-76-4	2-methylhexane Flam. Liq. 2, H225; Asp. Tox. 1, H304; Aquatic Acute 1, H400; Aquatic Chronic 1, H410; Skin Irrit. 2, H315; STOT SE 3, H336	≤2.5%
103-65-1	propylbenzene Flam. Liq. 3, H226; Carc. 2, H351; Asp. Tox. 1, H304; Aquatic Chronic 2, H411; STOT SE 3, H335	≤2.5%
589-34-4	3-methylhexane Flam. Liq. 2, H225; Asp. Tox. 1, H304; Aquatic Acute 1, H400; Aquatic Chronic 1, H410; Skin Irrit. 2, H315; STOT SE 3, H336	≤2.5%
142-82-5	heptane Flam. Liq. 2, H225; Asp. Tox. 1, H304; Aquatic Acute 1, H400; Aquatic Chronic 1, H410; Skin Irrit. 2, H315; STOT SE 3, H336	≤2.5%
589-81-1	3-methylheptane Flam. Liq. 2, H225; Asp. Tox. 1, H304; Aquatic Acute 1, H400; Aquatic Chronic 1, H410; Skin Irrit. 2, H315; STOT SE 3, H336	≤2.5%
110-82-7	cyclohexane Flam. Liq. 2, H225; Asp. Tox. 1, H304; Aquatic Acute 1, H400; Aquatic Chronic 1, H410; Skin Irrit. 2, H315; STOT SE 3, H336	≤2.5%
98-82-8	cumene Flam. Liq. 3, H226; Carc. 2, H351; Asp. Tox. 1, H304; Aquatic Chronic 2, H411; STOT SE 3, H335	≤2.5%
592-27-8	2-methylheptane Flam. Liq. 2, H225; Asp. Tox. 1, H304; Aquatic Acute 1, H400; Aquatic Chronic 1, H410; Skin Irrit. 2, H315; STOT SE 3, H336	≤2.5%

(Contd. on page 5)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 4)

111-65-9	octane Flam. Liq. 2, H225; Asp. Tox. 1, H304; Aquatic Acute 1, H400; Aquatic Chronic 1, H410; Skin Irrit. 2, H315; STOT SE 3, H336	≤2.5%

4 First-aid measures

· **Description of first aid measures**
· **General information:**
Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
· **After inhalation:**
Supply fresh air. If required, provide artificial respiration. Keep patient warm. Consult doctor if symptoms persist.
In case of unconsciousness place patient stably in side position for transportation.
· **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
· **After eye contact:** Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:** If symptoms persist consult doctor.
· **Information for doctor:**
· **Most important symptoms and effects, both acute and delayed** No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:** CO2, sand, extinguishing powder. Do not use water.
· **For safety reasons unsuitable extinguishing agents:** Water with full jet
· **Special hazards arising from the substance or mixture** No further relevant information available.
· **Advice for firefighters**
· **Protective equipment:** Mouth respiratory protective device.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures**
Wear protective equipment. Keep unprotected persons away.
· **Environmental precautions:**
Inform respective authorities in case of seepage into water course or sewage system.
Do not allow to enter sewers/ surface or ground water.
· **Methods and material for containment and cleaning up:**
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
Dispose contaminated material as waste according to item 13.
Ensure adequate ventilation.
Do not flush with water or aqueous cleansing agents
· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.
· **Protective Action Criteria for Chemicals**

· **PAC-1:**		
1330-20-7	xylene	130 ppm

(Contd. on page 6)

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 5)

108-88-3	toluene	67 ppm
95-63-6	1,2,4-trimethylbenzene	140 ppm
109-66-0	pentane	3000* ppm
110-54-3	n-hexane	260 ppm
106-97-8	butane	5500* ppm
622-96-8	4-ethyltoluene	15 mg/m³
78-78-4	isopentane	3000* ppm
100-41-4	ethylbenzene	33 ppm
107-83-5	hexane (containing < 5 % n-hexane (203-777-6))	1,000 ppm
71-43-2	benzene	52 ppm
96-37-7	methylcyclopentane	14 ppm
75-28-5	isobutane	5500* ppm
513-35-9	2-methylbut-2-ene	4.2 ppm
135-98-8	sec-butylbenzene	1.2 ppm
287-92-3	cyclopentane	1800* ppm
96-14-0	3-methylpentane	1,000 ppm
115-11-7	2-methylpropene	750 ppm
611-14-3	2-ethyltoluene	20 mg/m³
103-65-1	propylbenzene	3.7 ppm
624-64-6	(E)-but-2-ene	750 ppm
563-46-2	2-methylbut-1-ene	42 ppm
590-18-1	(Z)-but-2-ene	750 ppm
99-87-6	Cymol	120 mg/m³
142-82-5	heptane	500 ppm
496-11-7	indan	20 mg/m³
108-87-2	methylcyclohexane	1200* ppm
110-82-7	cyclohexane	300 ppm
98-82-8	cumene	50 ppm
592-27-8	2-methylheptane	230 ppm

· **PAC-2:**

1330-20-7	xylene	920* ppm
108-88-3	toluene	560 ppm
95-63-6	1,2,4-trimethylbenzene	360 ppm
109-66-0	pentane	33000*** ppm
110-54-3	n-hexane	2900* ppm
106-97-8	butane	17000** ppm
622-96-8	4-ethyltoluene	160 mg/m³
78-78-4	isopentane	33000*** ppm
100-41-4	ethylbenzene	1100* ppm
107-83-5	hexane (containing < 5 % n-hexane (203-777-6))	11000** ppm
71-43-2	benzene	800 ppm
96-37-7	methylcyclopentane	160 ppm
75-28-5	isobutane	17000** ppm

(Contd. on page 7)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 6)

513-35-9	2-methylbut-2-ene	46 ppm
135-98-8	sec-butylbenzene	13 ppm
287-92-3	cyclopentane	3800* ppm
96-14-0	3-methylpentane	11000** ppm
115-11-7	2-methylpropene	2500* ppm
611-14-3	2-ethyltoluene	220 mg/m³
103-65-1	propylbenzene	41 ppm
624-64-6	(E)-but-2-ene	2400* ppm
563-46-2	2-methylbut-1-ene	460 ppm
590-18-1	(Z)-but-2-ene	2200* ppm
99-87-6	Cymol	1,300 mg/m³
142-82-5	heptane	830 ppm
496-11-7	indan	220 mg/m³
108-87-2	methylcyclohexane	1700* ppm
110-82-7	cyclohexane	1700* ppm
98-82-8	cumene	300 ppm
592-27-8	2-methylheptane	385 ppm

· **PAC-3:**

1330-20-7	xylene	2500* ppm
108-88-3	toluene	3700* ppm
95-63-6	1,2,4-trimethylbenzene	480 ppm
109-66-0	pentane	200000*** ppm
110-54-3	n-hexane	8600** ppm
106-97-8	butane	53000*** ppm
622-96-8	4-ethyltoluene	960 mg/m³
78-78-4	isopentane	200000*** ppm
100-41-4	ethylbenzene	1800* ppm
107-83-5	hexane (containing < 5 % n-hexane (203-777-6))	66000*** ppm
71-43-2	benzene	4000* ppm
96-37-7	methylcyclopentane	940 ppm
75-28-5	isobutane	53000*** ppm
513-35-9	2-methylbut-2-ene	280 ppm
135-98-8	sec-butylbenzene	81 ppm
287-92-3	cyclopentane	23000*** ppm
96-14-0	3-methylpentane	66000*** ppm
115-11-7	2-methylpropene	11000** ppm
611-14-3	2-ethyltoluene	1,300 mg/m³
103-65-1	propylbenzene	240 ppm
624-64-6	(E)-but-2-ene	14000** ppm
563-46-2	2-methylbut-1-ene	2800* ppm
590-18-1	(Z)-but-2-ene	13000** ppm
99-87-6	Cymol	1,900 mg/m³
142-82-5	heptane	5000* ppm

(Contd. on page 8)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 7)

496-11-7	indan	1,300 mg/m³
108-87-2	methylcyclohexane	10000** ppm
110-82-7	cyclohexane	10000** ppm
98-82-8	cumene	730 ppm
592-27-8	2-methylheptane	5,000 ppm

7 Handling and storage

· **Handling:**
· **Precautions for safe handling**
Ensure good ventilation/exhaustion at the workplace.
Open and handle receptacle with care.
Prevent formation of aerosols.
· **Information about protection against explosions and fires:**
Keep ignition sources away - Do not smoke.
Protect from heat.
Protect against electrostatic charges.
Keep respiratory protective device available.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** Store in a cool location.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:**
Keep receptacle tightly sealed.
Store in cool, dry conditions in well sealed receptacles.
Protect from heat and direct sunlight.
· **Specific end use(s)** No further relevant information available.

8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see item 7.

· **Control parameters**
· **Components with limit values that require monitoring at the workplace:**
The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit.
At this time, the other constituents have no known exposure limits.

1330-20-7 xylene (10-25%)	
PEL	Long-term value: 435 mg/m³, 100 ppm
REL	Short-term value: 655 mg/m³, 150 ppm Long-term value: 435 mg/m³, 100 ppm
TLV	Short-term value: 651 mg/m³, 150 ppm Long-term value: 434 mg/m³, 100 ppm BEI
108-88-3 toluene (10-25%)	
PEL	Long-term value: 200 ppm Ceiling limit value: 300; 500* ppm *10-min peak per 8-hr shift

(Contd. on page 9)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 8)

REL	Short-term value: 560 mg/m³, 150 ppm Long-term value: 375 mg/m³, 100 ppm
TLV	Long-term value: 75 mg/m³, 20 ppm BEI
95-63-6 1,2,4-trimethylbenzene (2.5-10%)	
REL	Long-term value: 125 mg/m³, 25 ppm
TLV	Long-term value: 123 mg/m³, 25 ppm
109-66-0 pentane (2.5-10%)	
PEL	Long-term value: 2950 mg/m³, 1000 ppm
REL	Long-term value: 350 mg/m³, 120 ppm Ceiling limit value: 1800* mg/m³, 610* ppm *15-min
TLV	Long-term value: 2950 mg/m³, 1000 ppm
110-54-3 n-hexane (2.5-10%)	
PEL	Long-term value: 1800 mg/m³, 500 ppm
REL	Long-term value: 180 mg/m³, 50 ppm
TLV	Long-term value: 176 mg/m³, 50 ppm Skin; BEI
106-97-8 butane (2.5-10%)	
REL	Long-term value: 1900 mg/m³, 800 ppm
TLV	Short-term value: 2370 mg/m³, 1000 ppm (EX)
78-78-4 isopentane (2.5-10%)	
PEL	Long-term value: 2950 mg/m³, 1000 ppm
TLV	Long-term value: 2950 mg/m³, 1000 ppm
100-41-4 ethylbenzene (2.5-10%)	
PEL	Long-term value: 435 mg/m³, 100 ppm
REL	Short-term value: 545 mg/m³, 125 ppm Long-term value: 435 mg/m³, 100 ppm
TLV	Long-term value: 87 mg/m³, 20 ppm BEI
107-83-5 hexane (containing < 5 % n-hexane (203-777-6)) (≤2.5%)	
REL	Long-term value: 350 mg/m³, 100 ppm Ceiling limit value: 1800* mg/m³, 510* ppm *15-min
TLV	Short-term value: 3500 mg/m³, 1000 ppm Long-term value: 1760 mg/m³, 500 ppm
71-43-2 benzene (≤2.5%)	
PEL	Short-term value: 15* mg/m³, 5* ppm Long-term value: 3* mg/m³, 1* ppm *table Z-2 for exclusions in 29CFR1910.1028(d)
REL	Short-term value: 1 ppm Long-term value: 0.1 ppm See Pocket Guide App. A

(Contd. on page 10)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 9)

TLV	Short-term value: 8 mg/m³, 2.5 ppm Long-term value: 1.6 mg/m³, 0.5 ppm Skin; BEI
96-37-7 methylcyclopentane (≤2.5%)	
REL	Long-term value: 350 mg/m³, 100 ppm Ceiling limit value: 1800* mg/m³, 510* ppm *15-min
TLV	Short-term value: 3500 mg/m³, 1000 ppm Long-term value: 1760 mg/m³, 500 ppm
75-28-5 isobutane (≤2.5%)	
TLV	Short-term value: 2370 mg/m³, 1000 ppm (EX)
591-76-4 2-methylhexane (≤2.5%)	
TLV	Short-term value: 2050 mg/m³, 500 ppm Long-term value: 1640 mg/m³, 400 ppm
589-34-4 3-methylhexane (≤2.5%)	
TLV	Short-term value: 2050 mg/m³, 500 ppm Long-term value: 1640 mg/m³, 400 ppm
142-82-5 heptane (≤2.5%)	
PEL	Long-term value: 2000 mg/m³, 500 ppm
REL	Long-term value: 350 mg/m³, 85 ppm Ceiling limit value: 1800* mg/m³, 440* ppm *15-min
TLV	Short-term value: 2050 mg/m³, 500 ppm Long-term value: 1640 mg/m³, 400 ppm
589-81-1 3-methylheptane (≤2.5%)	
TLV	Long-term value: 1401 mg/m³, 300 ppm
110-82-7 cyclohexane (≤2.5%)	
PEL	Long-term value: 1050 mg/m³, 300 ppm
REL	Long-term value: 1050 mg/m³, 300 ppm
TLV	Long-term value: 344 mg/m³, 100 ppm
98-82-8 cumene (≤2.5%)	
PEL	Long-term value: 245 mg/m³, 50 ppm Skin
REL	Long-term value: 245 mg/m³, 50 ppm Skin
TLV	Long-term value: (246) NIC-0.5 mg/m³, (50) NIC-0.1 ppm NIC-A2
592-27-8 2-methylheptane (≤2.5%)	
TLV	Long-term value: 1401 mg/m³, 300 ppm
111-65-9 octane (≤2.5%)	
PEL	Long-term value: 2350 mg/m³, 500 ppm n-Octane only
REL	Long-term value: 350 mg/m³, 75 ppm Ceiling limit value: 1800* mg/m³, 385* ppm *15 min

(Contd. on page 11)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 10)

TLV	Long-term value: 1401 mg/m³, 300 ppm

· **Ingredients with biological limit values:**

1330-20-7 xylene (10-25%)

BEI	1.5 g/g creatinine Medium: urine Time: end of shift Parameter: Methylhippuric acids

108-88-3 toluene (10-25%)

BEI	0.02 mg/L Medium: blood Time: prior to last shift of workweek Parameter: Toluene 0.03 mg/L Medium: urine Time: end of shift Parameter: Toluene 0.3 mg/g creatinine Medium: urine Time: end of shift Parameter: o-Cresol with hydrolysis (background)

110-54-3 n-hexane (2.5-10%)

BEI	0.4 mg/L Medium: urine Time: end of shift at end of workweek Parameter: 2.5-Hexanedione without hydrolysis

100-41-4 ethylbenzene (2.5-10%)

BEI	0.7 g/g creatinine Medium: urine Time: end of shift at end of workweek Parameter: Sum of mandelic acid and phenylglyoxylic acid (nonspecific, semi-quantitative) - Medium: end-exhaled air Time: not critical Parameter: Ethyl benzene (semi-quantitative)

71-43-2 benzene (≤2.5%)

BEI	25 µg/g creatinine Medium: urine Time: end of shift Parameter Parameter: S-Phenylmercapturic acid (background 500 µg/g creatinine Medium: urine Time: end of shift Parameter: t,t-Muconic acid (background)

· **Additional information:** The lists that were valid during the creation were used as basis.

(Contd. on page 12)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 11)

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.
Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Store protective clothing separately.
Avoid contact with the skin.
Avoid contact with the eyes and skin.
· **Breathing equipment:**
In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.
· **Protection of hands:**

Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation
· **Material of gloves**
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
· **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
· **Eye protection:**

Tightly sealed goggles

9 Physical and chemical properties

· **Information on basic physical and chemical properties**	
· **General Information**	
· **Appearance:**	
Form:	Liquid
Color:	Colorless to yellow
· **Odor:**	Characteristic
· **Odor threshold:**	Not determined.
· **pH-value:**	Not determined.
· **Change in condition**	
Melting point/Melting range:	Not determined.
Boiling point/Boiling range:	>28 °C (>82.4 °F)
· **Flash point:**	< 23 °C (<73.4 °F)

(Contd. on page 13)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 12)

· **Flammability (solid, gaseous):**	Not applicable.
· **Ignition temperature:**	240 °C (464 °F)
· **Decomposition temperature:**	Not determined.
· **Auto igniting:**	Product is not selfigniting.
· **Danger of explosion:**	Product is not explosive. However, formation of explosive air/vapor mixtures are possible.
· **Explosion limits:**	
Lower:	1.2 Vol %
Upper:	7.6 Vol %
· **Vapor pressure at 20 °C (68 °F):**	29 hPa (21.8 mm Hg)
· **Density:**	Not determined.
· **Relative density**	Not determined.
· **Vapor density**	Not determined.
· **Evaporation rate**	Not determined.
· **Solubility in / Miscibility with**	
Water:	Not miscible or difficult to mix.
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not determined.
Kinematic:	Not determined.
· **Solvent content:**	
Organic solvents:	64.6 % Not tested
VOC content:	67.46 % 674.6 g/l / 5.63 lb/gl
Solids content:	0.1 %
· **Other information**	No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability**
· **Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.
· **Conditions to avoid** No further relevant information available.
· **Incompatible materials:** No further relevant information available.
· **Hazardous decomposition products:** No dangerous decomposition products known.

(Contd. on page 14)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 13)

11 Toxicological information

· **Information on toxicological effects**
· **Acute toxicity:**

· **LD/LC50 values that are relevant for classification:**		
1330-20-7 xylene		
Oral	LD50	4,300 mg/kg (rat)
Dermal	LD50	2,000 mg/kg (rabbit)
Inhalative	LC50/4 h	11 mg/l (ATE)
108-88-3 toluene		
Oral	LD50	5,000 mg/kg (rat)
Dermal	LD50	12,124 mg/kg (rabbit)
Inhalative	LC50/4 h	5,320 mg/l (mouse)
25551-13-7 Trimethylbenzene		
Oral	LD50	8,970 mg/kg (rat)
Inhalative	LC50/4 h	11 mg/l (ATE)
95-63-6 1,2,4-trimethylbenzene		
Oral	LD50	5,000 mg/kg (rat)
Inhalative	LC50/4 h	11 mg/l (ATE)
71-43-2 benzene		
Oral	LD50	4,894 mg/kg (rat)
Dermal	LD50	48 mg/kg (mouse)
Inhalative	LC50/4 h	9,980 mg/l (mouse)
110-82-7 cyclohexane		
Oral	LD50	12,705 mg/kg (rat)

· **Primary irritant effect:**
· **on the skin:** Irritant to skin and mucous membranes.
· **on the eye:** No irritating effect.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**
The product shows the following dangers according to internally approved calculation methods for preparations:
Harmful
Irritant
Carcinogenic.
The product can cause inheritable damage.

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**		
1330-20-7	xylene	3
108-88-3	toluene	3
100-41-4	ethylbenzene	2B
71-43-2	benzene	1
98-82-8	cumene	2B

· **NTP (National Toxicology Program)**		
71-43-2	benzene	K
98-82-8	cumene	R

(Contd. on page 15)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 14)

· **OSHA-Ca (Occupational Safety & Health Administration)**

71-43-2	benzene

12 Ecological information

· **Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Ecotoxical effects:**
· **Remark:** Toxic for fish
· **Additional ecological information:**
· **General notes:**
Water hazard class 3 (Self-assessment): extremely hazardous for water
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
Also poisonous for fish and plankton in water bodies.
Toxic for aquatic organisms
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.

14 Transport information

· **UN-Number**	
· **DOT, ADR, IMDG, IATA**	UN3295
· **UN proper shipping name**	
· **DOT**	Hydrocarbons, liquid, n.o.s.
· **ADR**	3295 Hydrocarbons, liquid, n.o.s., ENVIRONMENTALLY HAZARDOUS
· **IMDG, IATA**	HYDROCARBONS, LIQUID, N.O.S.

(Contd. on page 16)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 15)

· **Transport hazard class(es)**

· **DOT**

· **Class** 3 Flammable liquids

· **ADR**

· **Class** 3 Flammable liquids

· **IMDG, IATA**

· **Class** 3 Flammable liquids

· **Packing group**
· **ADR, IATA** I

· **Environmental hazards:**
· **Special marking (ADR):** Symbol (fish and tree)

· **Special precautions for user** Warning: Flammable liquids
· **EMS Number:** F-E,S-D

· **Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code** Not applicable.

· **Transport/Additional information:**

· **ADR**
· **Excepted quantities (EQ)** Code: E3
Maximum net quantity per inner packaging: 30 ml
Maximum net quantity per outer packaging: 300 ml

· **UN "Model Regulation":** UN 3295 HYDROCARBONS, LIQUID, N.O.S., 3, I, ENVIRONMENTALLY HAZARDOUS

15 Regulatory information

· **Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **Sara**

· **Section 355 (extremely hazardous substances):**

95-48-7	o-cresol

· **Section 313 (Specific toxic chemical listings):**

1330-20-7	xylene

(Contd. on page 17)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 16)

108-88-3	toluene
95-63-6	1,2,4-trimethylbenzene
110-54-3	n-hexane
100-41-4	ethylbenzene
71-43-2	benzene
110-82-7	cyclohexane
98-82-8	cumene
78-93-3	butanone
95-48-7	o-cresol

· **TSCA (Toxic Substances Control Act):**

1330-20-7	xylene
108-88-3	toluene
25551-13-7	Trimethylbenzene
95-63-6	1,2,4-trimethylbenzene
109-66-0	pentane
110-54-3	n-hexane
106-97-8	butane
622-96-8	4-ethyltoluene
78-78-4	isopentane
100-41-4	ethylbenzene
107-83-5	hexane (containing < 5 % n-hexane (203-777-6))
71-43-2	benzene
96-37-7	methylcyclopentane
75-28-5	isobutane
513-35-9	2-methylbut-2-ene
135-98-8	sec-butylbenzene
141-93-5	m-diethylbenzene
287-92-3	cyclopentane
96-14-0	3-methylpentane
115-11-7	2-methylpropene
591-76-4	2-methylhexane
611-14-3	2-ethyltoluene
103-65-1	propylbenzene
589-34-4	3-methylhexane
624-64-6	(E)-but-2-ene
563-46-2	2-methylbut-1-ene
590-18-1	(Z)-but-2-ene
99-87-6	Cymol
646-04-8	trans-pent-2-ene
142-82-5	heptane

· **TSCA new (21st Century Act) (Substances not listed)**

620-14-4	3-ethyltoluene
135-01-3	o-diethylbenzene

(Contd. on page 18)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 17)

591-76-4	2-methylhexane
589-34-4	3-methylhexane
589-81-1	3-methylheptane
592-27-8	2-methylheptane

· **Proposition 65**

· **Chemicals known to cause cancer:**	
100-41-4	ethylbenzene
71-43-2	benzene
98-82-8	cumene

· **Chemicals known to cause reproductive toxicity for females:**
Sample not tested

· **Chemicals known to cause reproductive toxicity for males:**	
71-43-2	benzene

· **Chemicals known to cause developmental toxicity:**	
108-88-3	toluene
71-43-2	benzene

· **Cancerogenity categories**

· **EPA (Environmental Protection Agency)**		
1330-20-7	xylene	I
108-88-3	toluene	II
95-63-6	1,2,4-trimethylbenzene	II
110-54-3	n-hexane	II
100-41-4	ethylbenzene	D
71-43-2	benzene	A, K/L
142-82-5	heptane	D
110-82-7	cyclohexane	I
98-82-8	cumene	D, CBD
78-93-3	butanone	I
95-48-7	o-cresol	C

· **TLV (Threshold Limit Value established by ACGIH)**		
1330-20-7	xylene	A4
108-88-3	toluene	A4
100-41-4	ethylbenzene	A3
71-43-2	benzene	A1
115-11-7	2-methylpropene	A4

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**	
71-43-2	benzene

· **GHS label elements** The product is classified and labeled according to the Globally Harmonized System (GHS).

(Contd. on page 19)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 18)

· **Hazard pictograms**

GHS02 GHS07 GHS08 GHS09

· **Signal word** Danger

· **Hazard-determining components of labeling:**
toluene
ethylbenzene
benzene
n-hexane

· **Hazard statements**
H224 Extremely flammable liquid and vapor.
H315 Causes skin irritation.
H319 Causes serious eye irritation.
H340 May cause genetic defects.
H350 May cause cancer.
H361 Suspected of damaging fertility or the unborn child.
H336 May cause drowsiness or dizziness.
H372 Causes damage to organs through prolonged or repeated exposure.
H401 Toxic to aquatic life.
H411 Toxic to aquatic life with long lasting effects.

· **Precautionary statements**

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P240	Ground/bond container and receiving equipment.
P241	Use explosion-proof electrical/ventilating/lighting/equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P260	Do not breathe dust/fume/gas/mist/vapors/spray.
P264	Wash thoroughly after handling.
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/protective clothing/eye protection/face protection.
P303+P361+P353	If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
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.
P308+P313	IF exposed or concerned: Get medical advice/attention.
P312	Call a poison center/doctor if you feel unwell.
P314	Get medical advice/attention if you feel unwell.
P321	Specific treatment (see on this label).
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 for extinction: CO2, powder or water spray.
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.

(Contd. on page 20)

VIRENT

Safety Data Sheet
acc. to OSHA HCS

Printing date 10/23/2017 Reviewed on 10/23/2017

Trade name: Virent BioFormate™ - Full Range (>C3)

(Contd. of page 19)

P405 Store locked up.
P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

· **National regulations:**

· **Information about limitation of use:**
Workers are not allowed to be exposed to the hazardous carcinogenic materials contained in this preparation. Exceptions can be made by the authorities in certain cases.
· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Date of preparation / last revision** 10/23/2017 / -
· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
BEI: Biological Exposure Limit
Flam. Gas 1: Flammable gases – Category 1
Press. Gas: Gases under pressure – Compressed gas
Flam. Liq. 1: Flammable liquids – Category 1
Flam. Liq. 2: Flammable liquids – Category 2
Flam. Liq. 3: Flammable liquids – Category 3
Acute Tox. 3: Acute toxicity – Category 3
Acute Tox. 4: Acute toxicity – Category 4
Skin Irrit. 2: Skin corrosion/irritation – Category 2
Eye Irrit. 2A: Serious eye damage/eye irritation – Category 2A
Muta. 1B: Germ cell mutagenicity – Category 1B
Carc. 1A: Carcinogenicity – Category 1A
Carc. 2: Carcinogenicity – Category 2
Carc. 2: Carcinogenicity – Category 2
Repr. 2: Reproductive toxicity – Category 2
STOT SE 3: Specific target organ toxicity (single exposure) – Category 3
STOT RE 1: Specific target organ toxicity (repeated exposure) – Category 1
STOT RE 2: Specific target organ toxicity (repeated exposure) – Category 2
Asp. Tox. 1: Aspiration hazard – Category 1
Aquatic Acute 1: Hazardous to the aquatic environment - acute aquatic hazard – Category 1
Aquatic Acute 2: Hazardous to the aquatic environment - acute aquatic hazard – Category 2
Aquatic Chronic 1: Hazardous to the aquatic environment - long-term aquatic hazard – Category 1
Aquatic Chronic 2: Hazardous to the aquatic environment - long-term aquatic hazard – Category 2