SAFETY DATA SHEET

Version: 2.0
Date written: 19th June 2020

SECTION 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY / UNDERTAKING

Product Name	**10% Tetrahydrofuran, 5% Phosphoric acid, 2% Butylamine aqueous solution**
Product Catalogue Name	**LS-R-BPTX10**
Company:	Ludger Ltd Culham Science Centre Abingdon Oxfordshire OX14 3EB
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SECTION 2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP]
Flammable liquids (Category 2)
Acute toxicity, Oral (Category 4)
Carcinogenicity (Category 2)
Specific target organ toxicity - single exposure (Category 3), Central nervous system
Corrosive to metals (Category 1)
Serious eye damage (Category 1)
Acute toxicity, Inhalation (Category 3)
Acute toxicity, Dermal (Category 3)
Skin corrosion (Sub-category 1A)
Specific target organ toxicity - single exposure (Category 3), Respiratory system

2.2 Label elements

Signal word Danger

Hazard Statement(s)

H225	Highly flammable liquid and vapour
H302	Harmful if swallowed
H336	May cause drowsiness or dizziness
H351	Suspected of causing cancer.
H290	May be corrosive to metals.
H318	May cause serious eye damage
H311 + H331	Toxic in contact with skin or if inhaled.

H314	Causes severe skin burns and eye damage.
H335	May cause respiratory irritation

Precautionary Statement(s)

P201	Obtain special instructions before use.
P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P312 + P330+P331	IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P308 + P313	IF exposed or concerned: Get medical advice/ attention
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
303 + P361 + P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water.
P304 + P340 + P311	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor.

Supplemental Hazard Information (EU)

EUH018	In use may form a flammable/explosive vapour-air mixture.
EUH019	May form explosive peroxides.

2.3 Other hazard information:
None.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 Substances

Synonyms:	Tetrahydrofuran: THF Phosphoric acid: Orthophosphoric acid Butylamine: 1-Aminobutane, n-Butylamine
Formula:	Tetrahydrofuran: C_4H_8O Phosphoric acid: H_3O_4P Butylamine: $C_4H_{11}N$
Molecular weight:	Tetrahydrofuran: 72.11 g/mol Phosphoric acid: 97.99 g/mol Butylamine: 73.14 g/mol

Component	Concentration	Classification
Name Tetrahydrofuran	10%	Flam. Liq. 2; Acute Tox. 4; Eye Irrit. 2; Carc. 2; STOT SE 3; H225, H302, H319, H351, H336, H335 Concentration limits: >= 25 %: Eye Irrit. 2, H319; >= 25 %: STOT SE 3, H335;
CAS-No. 109-99-9		
EC-No. 203-726-8		
Index-No. 603-025-00-0		

2nd Name Phosphoric acid	5%	Met. Corr. 1; Acute Tox. 4; Skin Corr. 1B; Eye Dam. 1; H290, H302, H314, H318 Concentration limits: >= 25 %: Skin Corr. 1B, H314; 10 - < 25 %: Skin Irrit. 2, H315; 10 - < 25 %: Eye Irrit. 2, H319; >= 1 %: Met. Corr. 1, H290;
CAS-No. 7664-38-2		
EC-No. 231-633-2		
Index-No. 015-011-00-6		
3rd Name Butylamine	2%	Flam. Liq. 2; Met. Corr. 1; Acute Tox. 4; Acute Tox. 3; Skin Corr. 1A; H225, H290, H302, H331, H311, H314 Concentration limits: >= 1 %: STOT SE 3, H335;
CAS-No. 109-73-9		
EC-No. 203-699-2		
Index-No. 612-005-00-0		

SECTION 4. FIRST-AID MEASURES

4.1 Description of First Aid Measures

General Advice
Consult a physician if exposure causes ill effects and if in any doubt. Show this safety data sheet to the physician/ first responder in attendance.

If Ingested
Do NOT induce vomiting. Do not give anything by mouth if the person is unconscious. Rinse mouth well with water.

If the skin is exposed
Remove any contaminated clothing/ shoes. Wash the area well with plenty of soap and water.

If eyes are exposed
Rinse with water/ eye wash solution for at least 15 minutes, if present and safe to do so, remove contact lenses and continue rinsing.

If inhaled
Move the effect person into a source of fresh air. If not breathing, give artificial respiration.

4.2 Most important symptoms and effects, both acute and delayed
Difficulty in breathing, coughing, nausea, headache.
To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated.

4.3 Indication of immediate medical attention and special treatment needed
No data available

SECTION 5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media
Select extinguishing media appropriate to the surrounding area. Compatible media are water spray, alcohol-resistant foam, dry chemicals, or carbon dioxide.

5.2 Special hazards arising from the substance or mixture
Carbon dioxide, Nitrogen oxides (NOx), and Oxides of phosphorous.

5.3 Advice for Firefighters
Must wear self-contained breathing equipment, if necessary and spray any unopened containers with water spray to keep cool.

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Wear PPE (personal protective equipment) when handling the product. Avoid breathing in gas, vapours or mist by handling the product in an extraction cabinet/ fume hood. Non-essential staff to leave the area.

6.2 Environmental Precautions
Prevent further leakage/ spillage, if safe and practical to do so. Do not let the product enter the drainage system.

6.3 Methods and material for containment and cleaning up
Contain the spillage, use a spill mat or inert material such as vermiculite to soak up the product. Put the contaminated material into a suitable container and store it until collection for disposal can be arranged.

6.4 Reference to other sections
For more information on disposal see Section 13.

SECTION 7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin, eyes and breathing in vapour/mist. Handle the product the product in an extraction cabinet/ fume hood or a well-ventilated area.

7.2 Conditions for safe storage, including any incompatibilities
Store in a cool, dry, well-ventilated cabinet. Containers that have been opened must be resealed and stored upright to prevent leakage.

7.3 Specific end uses
No data available

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components of the mixture with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Tetrahydrofuran	109-99-9	STEL	100 ppm 300 mg/m3	UK. EH40 WEL-Workplace Exposure Limits.
	Remarks	Can be absorbed through the skin. The assigned substances are those for which there are concerns that the dermal absorption will lead to systemic toxicity.		
		TWA	50 ppm 150 mg/m3	UK. EH40 WEL-Workplace Exposure Limits.

	Remarks	Can be absorbed through the skin. The assigned substances are those for which there are concerns that the dermal absorption will lead to systemic toxicity.		
		TWA	50 ppm 150 mg/m3	Europe. Commission Directive 2000/39/EC establishing a first of indicative occupational exposure limit values.
	Remarks	Identifies the possibility of significant uptake through the skin. Indicative.		
		STEL	100 ppm 300 mg/m3	Europe. Commission Directive 2000/39/EC establishing a first of indicative occupational exposure limit values.
	Remarks	Identifies the possibility of significant uptake through the skin. Indicative.		

Component	**CAS-No.**	**Value**	**Control parameters**	**Basis**
Phosphoric Acid	7664-38-2	TWA	1 mg/m3	Europe. Commission Directive 2000/39/EC establishing a first of indicative occupational exposure limit values.
	Remarks	Indicative.		
		STEL	2 mg/m3	Europe. Commission Directive 2000/39/EC establishing a first of indicative occupational exposure limit values.
	Remarks	Indicative.		
		TWA	1 mg/m3	UK. EH40 WEL-Workplace Exposure Limits.
		STEL	2 mg/m3	UK. EH40 WEL-Workplace Exposure Limits.

8.2 Exposure controls

Appropriate engineering controls
Operator to wear PPE (Personal Protective Equipment), and wash hands before and after handling the product. If available use an extraction cabinet or fume hood when handling the product.

Personal Protective Equipment

Eye/face protection

Wear Safety goggles/glasses with side shields. These must conform to government standards such as NIOSH (US) or EN166 (EU).

Skin protection

Handle the product wearing gloves. These must be checked before use for tares/ holes. For removal of used gloves, the proper glove removal technique must be employed, to avoid contact with the outside of the glove with skin. Dispose of gloves as solid contaminated waste, wash and dry hands before and after handling the product.
The gloves used must satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

Body Protection

Handle the product wearing a laboratory coat or a similar covering over the outside of their clothing.

Respiratory protection

Handle the product under a fume hood or extractor unit. If respiratory protection is required use equipment that is approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Thermal hazards

No data available.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Form: Liquid, clear Colour: Colourless
Odour	No data available
Odour threshold	No data available
pH	No data available
Freezing/Melting Point	No data available
Initial boiling point and boiling range	No data available
Flash Point	No data available
Evaporation rate	No data available
Flammability	Low
Upper/lower flammability or explosive limits	No data available
Vapour Pressure	No data available
Relative Density	No data available
Solubility in water and solvents	Completely soluble
Partition coefficient	No data available
Autoignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Explosive properties	No data available
Oxidising properties	No data available

9.2 Other information

No data available.

SECTION 10. STABILITY AND REACTIVITY

10.1 Reactivity

No data available.

10.2 Chemical stability
No data available.

10.3 Possibility of Hazardous Reactions
No data available.

10.4 Conditions to Avoid
Exposure to strong oxidizing agents and strong acids. Extremes of temperature and direct sunlight.

10.5 Incompatible materials
Oxidising agents

10.6 Hazardous decomposition products
Other decomposition materials

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity
Tetrahydrofuran
LD50 Oral – Rat – 1,650 mg/kg
LD50 Oral – Guinea Pig – 2,300 mg/kg
LC50 Inhalation – Rat – 3h – 21000 ppm
Remarks: Drowsiness Lungs, Thorax or respiration: respiratory stimulation. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.
LD50 – Dermal – Rat - >2,000 mg/kg

Phosphoric Acid
LD50 Oral – Rat – 1,530 mg/kg
Remarks: Behavioural: General depressed activity. Kidney, ureter, bladder: haematuria. Skin and appendages: Other: hair.
LC50 Inhalation – Rat – 1h – 850 mg/l

Butylamine
LD50 Oral – Rat – 366 mg/kg
Remarks: Behavioural: Convulsions or effects on seizure threshold. Behavioural: Ataxia. Respiratory disorder.
LC50 Inhalation – Mouse – 2h – 800 mg/m3
LD50 Dermal – Rabbit – 626 mg/kg

Skin corrosion/irritation
Tetrahydrofuran
Skin – Rabbit – Mild skin irritation – Draize test

Phosphoric Acid
Skin – Rabbit – Causes burns – 1h
Remarks: Extremely corrosive and destructive to tissue.

Butylamine
Skin – Rabbit – Open irritation test – 24h

Serious eye damage/irritation
Tetrahydrofuran

Eyes – Rabbit – Risk of serious damage to eyes – Draize test.

Butylamine
Eyes – Rabbit – Severe eye irritation – 24h

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
Tetrahydrofuran
In vivo tests did not show mutagenic effects.

Butylamine
Genotoxicity in vivo – rat – Oral
Cytogenic analysis

Carcinogenicity
Butylamine
Carcinogenicity – Mouse – Intraperitoneal
Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Lungs, thorax or respiration: Tumours. Skin and appendages: Others: tumours.

Mixture
IARC: No component of this product presents at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

STOT-single exposure
Tetrahydrofuran
Inhalation – May cause respiratory irritation.
May cause drowsiness or dizziness – Nervous system.

STOT-repeated exposure
This mixture is not classified as a specific target organ toxicant, repeated exposure.

Aspiration hazard.
No data available

Potential Health Hazards

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation. Vapours may cause drowsiness and dizziness.
Ingestion	Harmful if swallowed.
Skin	May be harmful if absorbed through the skin. May cause skin irritation.
Eyes	Causes eye burns.

Signs and symptoms of exposure
Difficulty in breathing, coughing, nausea, headache.
To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated.

Additional information
Tetrahydrofuran
RTECS: LU5950000

Butylamine
RTECS: EO2975000

SECTION 12. ECOLOGICAL INFORMATION

12.1 Toxicity
Tetrahydrofuran
Toxicity to Fish: LC50 – pimephales promelas (Fathead minnow) – 2,160 mg/l – 96h
Toxicity to Algae: Growth inhibition NOEC – Algae – 3,700 mg/l – 192h

Phosphoric Acid
No data available

Butylamine
Toxicity to Fish: LC50 – Leuciscus idus (Golden orfe) – 23.7 mg/l – 96h

12.2 Persistence and Degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
No data available

12.6 Other adverse effects
Harmful to aquatic life, do not enter into the drainage system.

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods
Contact a professional, licensed chemical waste disposal company for disposal of this product. This product and its waste can be burnt in a chemical incinerator equipped with an afterburner and scrubber when mixed with a combustible solvent.
Contaminated packaging
Dispose of it as chemical-contaminated solid waste.

SECTION 14. TRANSPORT INFORMATION

14.1 UN Number
Tetrahydrofuran
ADR/RID: 2056 IMDG: 2056 IATA: 2056

Phosphoric Acid
ADR/RID: 1805 IMDG: 1805 IATA: 1805

Butylamine
ADR/RID: 1125 IMDG: 1125 IATA: 1125

14.2 UN Proper Shipping Name
Tetrahydrofuran

ADR/RID: TETRAHYDROFURAN
IMDG: TERAHYDROFURAN
IATA: Tetrahydrofuran

Phosphoric Acid
ADR/RID: PHOSPHORIC ACID SOLUTION
IMDG: PHOSPHORIC ACID SOLUTION
IATA: Phosphoric acid, solution

Butylamine
ADR/RID: n-BUTYLAMINE
IMDG: n-BUTYLAMINE
IATA: n-Butylamine

14.3 Transport hazard class(es)

Tetrahydrofuran
ADR/RID: 3 IMDG: 3 IATA: 3

Phosphoric Acid
ADR/RID: 8 IMDG: 8 IATA: 8

Butylamine
ADR/RID: 3 (8) IMDG: 3 (8) IATA: 3 (8)

14.4 Packing group

Tetrahydrofuran
ADR/RID: II IMDG: II IATA: II

Phosphoric Acid
ADR/RID: III IMDG: III IATA: III

Butylamine
ADR/RID: II IMDG: II IATA: II

14.5 Environmental hazards

Tetrahydrofuran
ADR/RID: no IMDG Marine pollutant: no IATA: no

Phosphoric Acid
ADR/RID: no IMDG Marine pollutant: no IATA: no

Butylamine
ADR/RID: no IMDG Marine pollutant: no IATA: no

14.6 Special precautions for user

No data available

SECTION 15. REGULATORY INFORMATION

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

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

No data available

15.2 Chemical Safety Assessment
No data available

Please note that the label elements that used to go in Section 15 are now in Section 2.

SECTION 16. OTHER INFORMATION

The advice offered is derived from the currently available information on the hazardous materials in this product and its component(s). Consideration has been made regarding the quantities offered in the pre-dispensed container. The advice offered is, therefore not all-inclusive nor should it be taken as the descriptive of the compound generally.