

Product Overview

Saltstream 300 is an advanced molten salt for heat transfer and thermal energy storage systems operating as low as 56 °C and up to 300 °C.

Highlights

- Lowest melting molten salt product on the market
- Water soluble
- Near zero vapor pressure
- Higher operating temperature than most oils

Technical Specifications

Melting Point	56 °C
Maximum Operating Temperature	300 °C
Heat Capacity at 100 °C	1.59 J/(g·K)
Heat of Fusion	<<5 J/g
Density at 56 °C	2.02 kg/m ³
Density at 300 °C	1.90 kg/m ³

Applications

- Manufacturing processes
- Thermal energy storage

Formula

<u>Compound</u>	<u>Weight %</u>
Potassium Nitrate / KNO ₃	3.56
Potassium Nitrite / KNO ₂	45.20
Lithium Chloride / LiCl	1.04
Lithium Nitrate / LiNO ₃	19.34
Calcium Nitrite / Ca(NO ₂) ₂	18.66
Sodium Nitrite / NaNO ₂	12.20

Cost

<u>Cost (\$/tonne)</u>	<u>Weighted Cost (\$)</u>
\$1,411	\$50
\$12,346	\$5,580
\$16,200	\$169
\$19,401	\$3,752
\$1,837	\$343
\$1,845	\$225
Total (\$/tonne)	\$10,119

Product Overview

Saltstream 500 is an advanced molten salt for heat transfer and thermal energy storage in concentrating solar power applications or other high temperature industrial processes.

Technical Specifications

Melting Point	65 °C
Maximum Operating Temperature	500 °C
Heat Capacity at 150 °C	1.22 J/(g·K)
Heat of Fusion	<<5 J/g

Applications

- Thermal energy storage
- Electrolyte for thermal batteries

Formula

<u>Compound</u>	<u>Weight %</u>
Lithium Nitrate / LiNO ₃	7.38%
Sodium Nitrate / NaNO ₃	5.54%
Potassium Nitrate / KNO ₃	21.23%
Cesium Nitrate / CsNO ₃	40.61%
Calcium Nitrate Tetrahydrate / Ca(NO ₃) ₂ ·4H ₂ O	25.24%

Cost

<u>Cost (\$/tonne)</u>	<u>Weighted Cost (\$)</u>
\$19,401	\$1,432
\$882	\$49
\$1,587	\$337
\$300,500	\$122,033
\$838	\$211
Total (\$/tonne)	\$124,062

Product Overview

Saltstream XL is a low melting salt mixture made from earth abundant components that give it an unbeatable combination of price and performance.

Highlights

- ▶ Formulated with earth abundant components available in commercial scale quantities from leading chemical suppliers
- ▶ Non-flammable, low hygroscopic behavior, very low vapor pressure at elevated temperatures
- ▶ Compatible with common steel alloys

Technical Specifications

Melting Point	120 °C
Maximum Operating Temperature	500 °C
Heat Capacity at 300 °C	1.45 J/(g·K)
Thermal Conductivity at 450 °C	0.519 W/(m·K)
Heat of Fusion	<<5 J/g
Density at 450 °C	1,868 kg/m ³
Viscosity at 450 °C	1.63 cP

Applications

- ▶ Thermal energy storage

Formula

<u>Compound</u>	<u>Weight %</u>
Sodium Nitrate / NaNO ₃	12.66%
Potassium Nitrate / KNO ₃	36.30%
Calcium Nitrate Tetrahydrate / Ca(NO ₃) ₂ ·4H ₂ O	51.04%

Cost

<u>Cost (\$/tonne)</u>	<u>Weighted Cost (\$)</u>
\$882	\$112
\$1,587	\$576
\$838	\$428
Total (\$/tonne)	\$1,115

Product Overview

Saltstream HTS is a low melting salt mixture with a low viscosity that makes it suitable for a wide range of industrial processes.

Technical Specifications

Melting Point	142 °C
Maximum Operating Temperature	454 °C
Heat Capacity at 300 °C	1.56 J/(g·K)
Thermal Conductivity at 450 °C	0.297 W/(m·K)
Heat of Fusion	108 J/g
Density at 450 °C	1,920 kg/m ³
Viscosity at 455 °C	1.63 cP

Applications

- Thermal energy storage
- Endothermic reaction control

Formula

<u>Compound</u>	<u>Weight %</u>
Potassium Nitrate / KNO ₃	53%
Sodium Nitrate / NaNO ₃	7%
Sodium Nitrite / NaNO ₂	40%

Cost

<u>Cost (\$/tonne)</u>	<u>Weighted Cost (\$)</u>
\$1,587	\$841
\$882	\$62
\$1,845	\$738
Total (\$/tonne)	\$1,641

Product Overview

Saltstream 60/40 is an advanced molten salt for heat transfer and thermal energy storage in concentrating solar power applications or other high temperature industrial processes.

Technical Specifications

Melting Point	240 °C
Maximum Operating Temperature	565 °C
Heat Capacity at 300 °C	1.53 J/(g·K)
Heat of Fusion	120 J/g
Density at 250 °C	2,008 kg/m ³
Density at 550 °C	1,861 kg/m ³
Viscosity at 300 °C	6.77 cP
Viscosity at 550 °C	2.27 cP

Applications

- Thermal energy storage

Formula

<u>Compound</u>	<u>Weight %</u>
Potassium Nitrate / KNO ₃	40%
Sodium Nitrate / NaNO ₃	60%

Cost

<u>Cost (\$/tonne)</u>	<u>Weighted Cost (\$)</u>
\$1,411	\$564
\$1,080	\$648
Total (\$/tonne)	\$1,212

Product Overview

Saltstream 565 is beneficial for applications requiring low cost and high temperature performance.

Highlights

- Formulated with earth abundant components available in commercial scale quantities from leading chemical suppliers
- Non-flammable, low hygroscopic behavior, very low vapor pressure at elevated temperatures
- Compatible with common steel alloys

Technical Specifications

Melting Point	240 °C
Maximum Operating Temperature	565 °C
Heat Capacity at 300 °C	1.51 J/(g·K)
Heat of Fusion	115 J/g
Density at 300 °C	1,920 kg/m ³
Density at 565 °C	1,730 kg/m ³

Applications

- Solar thermal energy storage
- Alumina production
- Melamine production

Formula

<u>Compound</u>	<u>Weight %</u>
Potassium Nitrate / KNO ₃	29.55%
Potassium Sulfate / K ₂ SO ₄	3.06%
Sodium Carbonate / Na ₂ CO ₃	2.33%
Sodium Nitrate / NaNO ₃	65.06%

Cost

<u>Cost (\$/tonne)</u>	<u>Weighted Cost (\$)</u>
\$1,411	\$417
\$1,918	\$59
\$529	\$12
\$1,080	\$703
Total (\$/tonne)	\$1,191

Product Overview

Saltstream 700 is an advanced molten salt for heat transfer and thermal energy storage systems operating at high temperatures of up to 700 °C.

Highlights

- Highest maximum operating temperature molten salt product on the market

Technical Specifications

Melting Point	257 °C
Maximum Operating Temperature	700+ °C
Heat Capacity at 300 °C	0.79 J/(g·K)
Heat of Fusion	87 J/g
Density at 300 °C	2,310 kg/m ³
Density at 700 °C	2,100 kg/m ³
Viscosity at 300 °C	16.9 cP
Viscosity at 700 °C	1.0 cP

Applications

- Solar thermal energy storage
- In-situ shale conversion
- Chemical synthesis processes

Formula

<u>Compound</u>	<u>Weight %</u>
Potassium Chloride / KCl	25.61%
Sodium Chloride / NaCl	13.62%
Zinc Chloride / ZnCl ₂	60.77%

Cost

<u>Cost (\$/tonne)</u>	<u>Weighted Cost (\$)</u>
\$816	\$209
\$220	\$30
\$2756	\$1,675
Total (\$/tonne)	\$1,914

Product Overview

Saltstream 700e is an advanced molten salt similar to Saltstream 700, but with a reduced melting point at a slightly higher cost.

Highlights

- Lowest melting chloride-based molten salt on the market

Technical Specifications

Melting Point	205 °C
Maximum Operating Temperature	700+ °C
Heat Capacity at 300 °C	0.76 J/(g·K)
Heat of Fusion	56.6 J/g
Density at 300 °C	2,240 kg/m ³
Density at 700 °C	2,000 kg/m ³

Applications

- Solar thermal energy storage
- In-situ shale conversion
- Chemical synthesis processes

Formula

<u>Compound</u>	<u>Weight %</u>
Potassium Chloride / KCl	15.06%
Sodium Chloride / NaCl	9.98%
Zinc Chloride / ZnCl ₂	74.96%

Cost

<u>Cost (\$/tonne)</u>	<u>Weighted Cost (\$)</u>
\$816	\$123
\$220	\$22
\$2756	\$2,066
Total (\$/tonne)	\$2,211

Product Overview

Haloglass CK has extremely low viscosity even at low temperatures making applications possible in extreme environments.

Highlights

- Thermal management in aerospace applications
- Waste heat capture in industrial processes
- Specialty fluid for isothermal temperature control

Technical Specifications

Melting Point	400 °C
Maximum Operating Temperature	1200 °C
Heat Capacity at 450 °C	1.22 J/(g·K)
Density	2,890 kg/m ³
Viscosity at 400 °C	78 cP
Viscosity at 1200 °C	<1 cP

Applications

- Thermal energy storage

Formula

<u>Compound</u>	<u>Weight %</u>
Vanadium (V) Pentoxide / V ₂ O ₅	62.65%
Potassium Carbonate / K ₂ CO ₃	31.24%
Sodium Carbonate / Na ₂ CO ₃	1.15%
Lithium Carbonate / Li ₂ CO ₃	1.65%
Chromium (VI) Oxide / CrO ₃	3.31%

Raw Material Cost

<u>Cost (\$/tonne)</u>	<u>Weighted Cost (\$)</u>
\$13,095	\$8,204
\$2,359	\$737
\$1,257	\$14
\$7,165	\$118
\$22,401	\$741
Total (\$/tonne)	\$9,815
Yield	88.6%
Actual Total (\$/tonne)	\$11,078

Product Overview

Haloglass RX has an earth abundant, stable oxide composition making its performance unbeatable in large scale applications.

Highlights

- Grid scale thermal electricity storage systems
- Thermal energy storage at full combustion temperature
- Hot isostatic pressing fluid for metal alloy production

Technical Specifications

Melting Point	450 °C
Maximum Operating Temperature	1200 °C
Heat Capacity at 450 °C	1.36 J/(g·K)
Thermal Conductivity	0.8 W/(m·K)
Density	2,400 kg/m ³
Viscosity at 450 °C	10,064 cP
Viscosity at 1200 °C	11 cP

Applications

- Thermal energy storage

Formula

<u>Compound</u>	<u>Weight %</u>
Sodium Carbonate / Na ₂ CO ₃	4.55%
Potassium Sulfate / K ₂ SO ₄	7.49%
Lithium Carbonate / Li ₂ CO ₃	3.20%
Boric Acid / H ₃ BO ₃	1.60%
Ammonium Dihydrogen Phosphate / NH ₄ H ₂ PO ₄	83.16%

Raw Material Cost

<u>Cost (\$/tonne)</u>	<u>Weighted Cost (\$)</u>
\$1,257	\$57
\$3,968	\$297
\$7,165	\$229
\$2,756	\$44
\$4,167	\$3,465
Total (\$/tonne)	\$4,093
Yield	23.8%
Actual Total (\$/tonne)	\$17,179

Saltstream™ Products

Pricing Information

	1 kg Sample	25 kg Bag (\$/kg)	Bulk* (\$/mt)
Saltstream 300	\$59	\$29	\$9,699
Saltstream 500	\$179	\$144	\$37,699
Saltstream XL	\$45	\$21	\$2,989
Saltstream HTS	\$49	\$22	\$3,489
Saltstream 565	\$47	\$20	\$3,079
Saltstream 60/40	\$49	\$21	\$3,099
Saltstream 700	\$54	\$22	\$3,749
Saltstream 700e	\$59	\$23	\$3,989

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Terms and Conditions

- Prices listed above are FCA Seller's Emeryville, California manufacturing facility. Invoice price determined by ship date, not order date. Prices are subject to change without notice.
- Seller retains the right to select the mode and routing of shipments unless otherwise agreed in writing with Buyer. Shipping not included in the above quote.
- Bulk pricing is for raw material and may require onsite mixing and melting.
- Sample products are developed for testing purposes and may be produced with high purity components depending on application. For industrial applications, please contact Halotechnics.

Halotechnics Products Manufacturing Costs

* Batch size: 20 kg

Total Manufacturing Cost (\$/kg)

