Hitec® Solar Salt

Product Information

Coastal Chemical Hitec® solar nitrate salt is composed of high purity Sodium nitrate and Potassium nitrate salts. This composition provides thermal performance identical to the eutectic mixture, but at a lower cost.

Coastal Chemical Hitec® solar salt, when used as a heat transfer and heat storage medium, has been shown to be effective, both from an economic and performance standpoint.

The major performance advantage of Coastal Chemical Hitec® solar salt is its ability to store large amounts of heat in a small volume. This is shown by the heat density of 43 BTU/ft^3 °F. This heat density is about 2.7 times greater than most liquid metal fluids (~16 BTU/ft^3 °F). It is also chemically stable up to 1100 °F.

Product specifications are shown in Table 1. Physical property data are given in Table 2.

Charging

Charging of a solar salt unit can be accomplished by taking the dry salt and melting it in a tank heated electrically or by steam, oil, or gas. The melter has the capability to melt and to bring the melt temperature up to 550 °F, and then to pump the molten salt to the heat-traced and insulated cold storage tank.

Toxicological Properties

The acute oral LD_{50} for Coastal Chemical Hitec® solar salt is 4g/kg. Coastal Chemical Hitec® solar salt is considered toxic from this route of exposure according to criteria established by the Federal Hazardous Substances Act. No information is available on the toxicity from dermal or inhalation exposure but, in all probability, it would not be considered toxic from either of these routes of exposure. Coastal Chemical Hitec® solar salt will not present a hazard to health when used according to normal industrial handling practices.

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Table 1 – Specifications

Component	Minimum, %	Maximum, %
$NaNO_3$	59	61
KNO_3	39	41
NaCI		0.30
Na_2SO_4		0.30
CaO		0.03
MgO		0.03
SiO_2		0.02
AI_2O_3		0.025
Fe_2O_3		0.025
Insolubles		0.06
Na_2CO_3		0.15

Table 2 – Physical Properties

Solid	
Bulk Density (lb/ft^3)	70-80
Melting Point (°F)	431
(°C)	222
Specific Heat (BTU/lb °F)	0.29
Latent Heat of Fusion (BTU/lb)	57
Energy Required to Melt and Bring Melt to 550 °F (BTU/lb)	206
Liquid	
Specific Heat, average (BTU/lb °F)	0.37
Density (lb/ft^3)	112
Viscosity (cp)	2.1
Thermal Conductivity (BTU/hr ft, °F)	0.31
Heat Transfer Coefficient (BTU/hr ft^2, °F)	1164
Energy Density (BTU/ft^3 °F)	43

Personal Protection

Use with adequate ventilation. Wear goggles, coveralls, impervious gloves, and boots.

Handling and Storage

Coastal Chemical Hitec® solar salt flows easily if kept dry. This can be accomplished by storing packaged salt in a warehouse. Similarly, bulk quantities can be stored in bins provided in bulk warehouses or outside if covered by tarpaulins or air buildings.

Storage inventories can be retrieved by standard mechanical bulk handling equipment, and transported to the charging facilities.

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Spill and Leak Procedures

Remove all sources of ignition. Wear a NIOSH/MSHA approved dust respirator. Follow OSHA regulations for respirator use. (See Title 29, Section 1910.134, *Code of Federal Regulations*.) Wear goggles, coveralls, impervious gloves, and boots. Minimize contamination with organic material. Do not return to original container. Place in a fresh container and isolate outside or in a well-ventilated area. Do not seal container. Flush any residual material with large quantities of water. Wash off contaminated clothing before reuse.

Disposal

Dispose of unused product in a manner approved for this material. Consult appropriate Federal, state, and local regulatory agencies to ascertain proper disposal procedures.

Shipping

Coastal Chemical Hitec® solar salt is available in 400 lb weather pack fiber drums, 25 ton pneumatic truck trailers, and 50 and 100 ton hopper rail cars.

Technical Assistant

Technical assistance is available to facilitate your further investigation of Coastal Chemical Hitec® solar salt. If you have a question or need more information, please call or write Coastal Chemical Co., L.L.C., P.O. Box 820, Abbeville, Louisiana 70511-0820, 318-893-3862.

References

1. Carling, R.W., et al., Molten Salt Technology Development Status Report, Sandia National Laboratories, Livermore, SAND80-8052, March 1981.

2. Perry, R.H., Chemical Engineers' Handbook, 4th ed., McGraw-Hill Book Company, New York, 1963.

3. Coastal Chemical Co., Internal Communication.

4. Martin Marietta Corporation, RFQ21881, February, 1981.

5. Janz, G.J., et al., Physical Properties Data Compilations Relevant to Energy Storage II. Molten Salts, NSRDS, April, 1979.

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