

Technical Information

October 2016

Supersedes issue 08_080654 dated May 2013

09_080654e-00/Page 1 of 8

Last change WF-No. 9266

® = Registered trademark of BASF
in many countries.

Lutron® HF 1

Ingredient of fluxes used in the production of printed circuit boards

Component of brightener additives for the electroplating industry

Heat-transfer fluid

Chemical nature

Modified polyglycol ether

PRD-No.

30042719

* BASF's commercial product numbers.

Appearance

Lutron® HF 1 is a clear, colorless or yellowish liquid.

Handling and Storage**Handling**

- a) It can gradually darken in colour over long periods in storage, but this has no effect on its performance. It can also become cloudy if it is stored at low temperatures, but the cloudiness can be dissipated by briefly heating it to 40 – 50 °C.
- b) Lutron® HF 1 is slightly hygroscopic, and so it should always be stored in tightly sealed containers.
- c) Its viscosity is low enough to allow it to be pumped at temperatures down to around 0 °C.
- d) Please refer to the latest Safety Data Sheet for detailed information on product safety.

Shelf life

Lutron® HF 1 has a shelf life of at least 2 years in its sealed, original packaging.

Properties

Some physical properties are listed in the table below. These are typical values only and not all of them are monitored on a regular basis. They are correct at the time of publication and do not necessarily form part of the product specification. A detailed product specification is available on request or via BASF's WorldAccount: <https://worldaccount.basf.com> (registered access).

Lutron® HF 1	Unit	Value
Water content (DIN EN 13267)	%	<0.5
Density (DIN 51757, ASTM 1298, 23 °C)	g/cm ³	1.13 – 1.17
Viscosity (DIN 51562 part 1, ASTM D 445, 23 °C)	mm ² /s	220 – 280
Flash point (ISO 2592)	°C	>290
Pour point (ISO 3016)	°C	<-39
Ignition temperature (DIN 51794)	°C	approx. 390

Solubility

Lutron® HF 1 is miscible with water in all proportions. It is nonionic, and is therefore not affected by water hardness.

Physical properties

The figures below were obtained for one single representative batch. They are not tested on a regular basis.

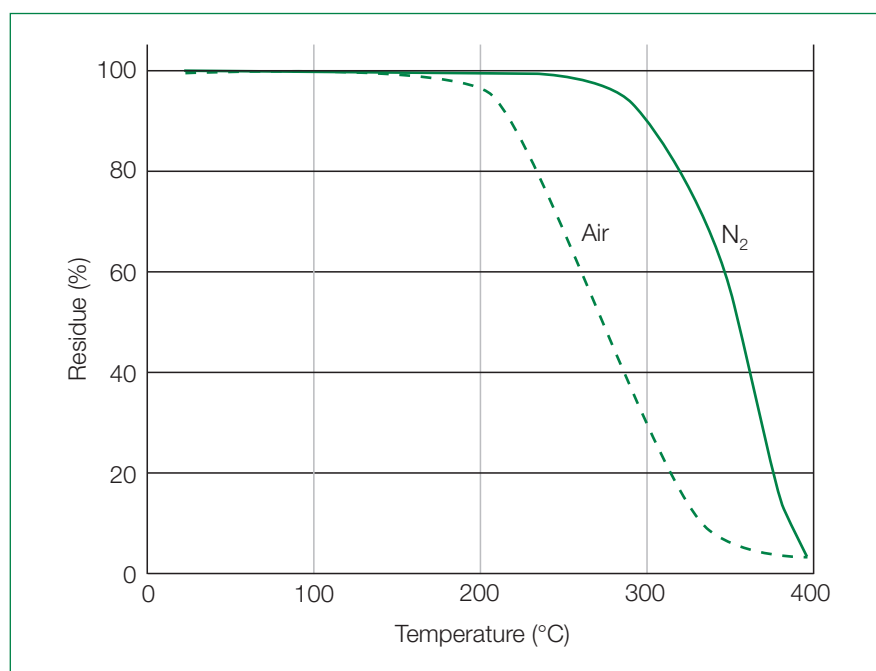
Temperature °C	Density (DIN 51757) g/cm ³	Specific heat (DIN 51007) kJ/(kg · K)	Kinematic viscosity (DIN 51562) mm ² /s	Thermal conductivity* W/(m · K)
20	1.1553	1.99	300.0	0.176
40	1.1401	2.04	90.0	0.178
60	1.1249	2.10	39.0	0.184
80	1.1097	2.15	19.5	0.186
100	1.0945	2.20	12.0	0.192
120	1.0792	2.25	8.5	0.201
140	1.0640	2.30	5.5	0.204
160	1.0488	2.35	4.1	0.217
180	1.0336	2.41	2.7	0.221

* BASF concentric sphere method

Thermal stability

No exothermic processes take place when Lutron® HF 1 is heated from room temperature. Differential thermal analysis has shown that Lutron® HF 1 continues to absorb energy until the temperature reaches approx. 215 °C.

The loss in weight can be reduced by heating Lutron® HF 1 in an inert atmosphere.



Thermogravimetric analysis of Lutron® HF 1

The loss in weight is due to volatile decomposition products being liberated, which are mainly responsible for the vapour pressure of 5×10^{-2} mbar measured after 10 hours at 180 °C (gas saturation method SOP 04/01). A higher figure for the vapour pressure is obtained initially, which is due to the evaporation of the residual water.

Behaviour at elevated temperatures

In many applications, it is necessary to go to the very limits of Lutron® HF 1's thermal stability. Lutron® HF 1 takes on a dark coloration fairly quickly at temperatures above 150 °C, but this has no effect on its performance as a heat-transfer fluid. The working life of the bath can be prolonged by preventing the fluid from coming into contact with air, provided this is technically feasible. Air can be excluded by blanketing the liquid with an inert gas, and antioxidants can be added. Lutron® HF 1 has a low viscosity, even after long periods at elevated temperatures.

If Lutron® HF 1 does decompose, it does not normally form any hard deposits or sludge. Tools and equipment can simply be cleaned with water.

Lutron® HF 1 has a high flash point and it is stable at high temperatures. It can be used at temperatures of up to approx. 170 °C in long-term heat-transfer applications, and at up to approx. 250 °C as a soldering flux.

No exothermic processes take place when Lutron® HF 1 is heated to temperatures of up to 350 °C, but its ignition temperature can be lower if it is present in the form of very finely divided droplets (such as on insulating material).

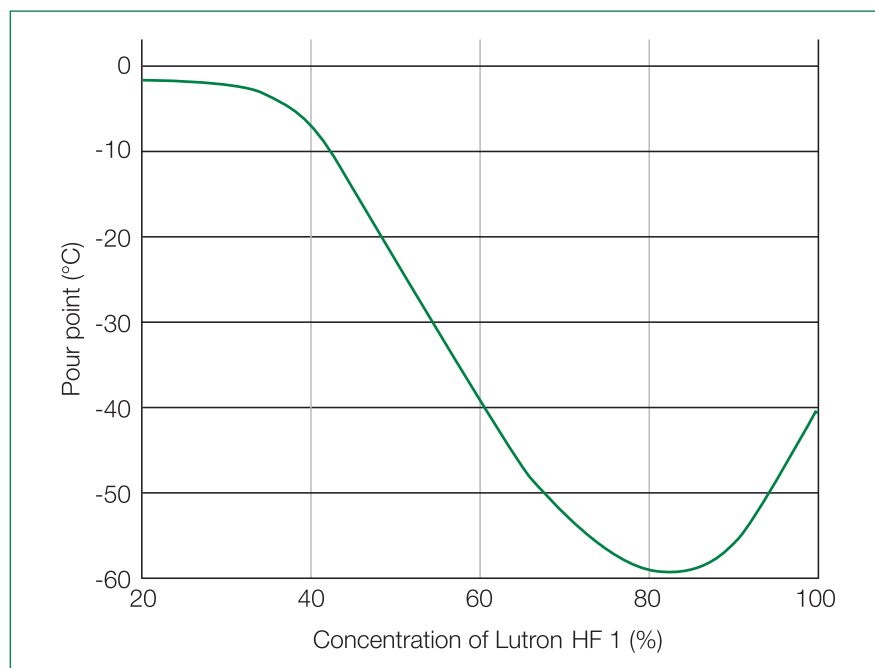
Decomposition products

Volatile decomposition products are released if Lutron® HF 1 is heated strongly in air. Care must be taken to ensure that the workplace is well ventilated.

Glycol esters and acetals are released alongside water vapour, carbon dioxide and glycols when Lutron® HF 1 is heated to 200 °C in a stream of air. A pungent odour can be caused by the liberation of volatile aldehydes such as formaldehyde, acetaldehyde and acrolein at concentrations in the order of a few ppm.

Behaviour at low temperatures

Lutron® HF 1 has a low pour point, which means that it can also be used as a refrigerant. It performs particularly well if it is diluted with 10 – 30% water, because mixtures of this type have a lower pour point than Lutron® HF 1 itself. The pour points of mixtures of Lutron® HF 1 and water are shown by the following curve.



Pour points of mixtures of Lutron® HF 1 and water

Corrosion

Lutron® HF 1 is not very corrosive to ferrous metals, even after prolonged periods at elevated temperatures. It can be made alkaline by adding triethanolamine, which reduces corrosion even further.

The corrosive effects of Lutron® HF 1 on other combinations of metals need to be assessed in individual tests.

The compatibility of Lutron® HF 1 and plastics also has to be verified by testing.

Safety

We are not aware of any ill effect that can result from using Lutron® HF 1 for the purpose for which it is intended and from processing it in accordance with current practices.

According to the experience that we have gained over many years and other information at our disposal, Lutron® HF 1 does not exert harmful effects on health, provided it is used properly, due attention is given to the precautions necessary for handling chemicals, and the information and advice given in our Safety Data Sheets are observed.

Labelling

Please consult the current Safety Data Sheets for information on the classification and labelling of our products and other information relevant to safety.

Disclaimer

This document, or any answers or information provided herein by BASF, does not constitute a legally binding obligation of BASF. While the descriptions, designs, data and information contained herein are presented in good faith and believed to be accurate, it is provided for your guidance only. Because many factors may affect processing or application/use, we recommend that you make tests to determine the suitability of a product for your particular purpose prior to use. It does not relieve our customers from the obligation to perform a full inspection of the products upon delivery or any other obligation. NO WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE MADE REGARDING PRODUCTS DESCRIBED OR DESIGNS, DATA OR INFORMATION SET FORTH, OR THAT THE PRODUCTS, DESIGNS, DATA OR INFORMATION MAY BE USED WITHOUT INFRINGING THE INTELLECTUAL PROPERTY RIGHTS OF OTHERS. IN NO CASE SHALL THE DESCRIPTIONS, INFORMATION, DATA OR DESIGNS PROVIDED BE CONSIDERED A PART OF OUR TERMS AND CONDITIONS OF SALE.

October 2016