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Palatinol® N

Versatile low-viscosity plasticizer for PVC with good low temperature performance and low volatility.

Chemical nature

Phthalic acid ester with less branched isononanols, diisononyl phthalate

Molecular formula	$C_{26}H_{42}O_4$
CAS number	28553-12-0
EC number	249-079-5
Abbreviation (DIN EN ISO 1043-3)	DINP

Delivery specification

Property	Value	Unit	Test method DIN/ASTM
Dynamic viscosity* at 20 °C	68–82	mPa · s	ASTM D 7042
Density* at 20 °C	0.970–0.977	g/cm ³	DIN 51757/D 4052
Platinum-cobalt color	30 max.		DIN EN ISO 6271-2/ D 5386
Refractive index* n_D^{20}	1.484–1.488		DIN 51423/D 1045
Acid value	0.06 max.	mg KOH/g	DIN EN ISO 2114/ D 1045
Ester content	99.5 min.	% by area	GC-method BASF
Water content	0.05 max.	% by weight	DIN 51777, Part 1/ E 203

* These properties are not measured routinely.

On request, Palatinol N can also be supplied in a form stabilized with Irganox 1010. Please refer to the Technical Information of the stabilized product.

Properties

Palatinol N is a nearly colorless, clear and practically anhydrous liquid with a hardly noticeable odor. It is soluble in the usual organic solvents and is miscible and compatible with all of the monomeric plasticizers commonly used in PVC. Palatinol N is almost insoluble in water.

Physical data

The following physical data were measured in the BASF SE laboratories. They do not represent any legally-binding guarantee of properties for our sales product.

Molar mass	418.6 g/mol
Pour point (DIN ISO 3016)	-54 °C
Solution temperature at the clear point: (5 % S-PVC; K value 71; DIN 53408)	132 °C
Surface tension 20 °C (DIN EN 14370)	31 mN/m

Vapor pressure	T [°C]	p [hPa]
	50	$4.0 \cdot 10^{-7}$
	60	$1.7 \cdot 10^{-6}$
	70	$7.2 \cdot 10^{-6}$
	80	$2.6 \cdot 10^{-5}$
	90	$8.8 \cdot 10^{-5}$
	100	$2.6 \cdot 10^{-4}$
	120	$1.9 \cdot 10^{-3}$
	140	$1.1 \cdot 10^{-2}$
	160	$4.7 \cdot 10^{-2}$
	180	0.17
	200	0.56
	220	1.60
	240	4.11
	260	9.63
	280	20.9

Antoine constants for $\ln P = A + B/(C + T)$
(P in bar; T in °C)

A =	12.3452
B =	-7114.32
C =	158.79

(The Antoine constants were determined from vapor pressure data measured in the temperature range of 200 °C to 280 °C by a dynamic method in a nitrogen atmosphere. The values in the table were calculated using the Antoine equation. The data serve only as a rough guide.)

Density and viscosity

Temperature [°C]	Density* ρ [g/cm ³]	Dynamic viscosity** η [mPa · s]
-10	0.994	600
0	0.987	280
10	0.980	137
20	0.972	72
30	0.965	41
40	0.958	25
50	0.950	17

* Calculated using the following equation: $\rho = (-0.000733T + 0.9871)$ from data measured by BASF SE. (ρ = Density (g/cm³), T = Temperature (°C))

** Calculated according to Schwen und Puhl ([1], Formula 12) from data measured by BASF SE

Heat conductivity λ and specific heat C_p

Temperature [°C]	Heat conductivity λ^* [W/m · K]	Specific heat C_p [J/(g · K)]
20	0.134	
25	0.136	1.75
40	0.136	1.82
60	0.138	1.88
80	0.140	1.93
100	0.142	2.00
120	0.144	
140	0.146	

* Calculated using the following equation: $\lambda = (0.0001T + 0.13225)$ from data measured by BASF SE.

Net and gross calorific value

	Net calorific value H_u [MJ/Kg]	Gross calorific value H_o [MJ/Kg]
measured according to ISO 1716	33.8	36
Electrical conductivity 20 °C		0.055 μ S/cm
Volume resistivity 20 °C (IEC 60093)		$2 \cdot 10^{11}$ Ohm · cm

Storage & Handling

Palatinol N can be stored in tanks and drums constructed from normal carbon steel, e. g. A 283 grade. If severe demands are imposed on the product quality, we recommend that it be stored in tanks constructed from stainless steel, e. g. AISI TP 316 Ti (German steel No. 1.4541) or aluminium (AlMg₃).

It is recommended that steps be taken to ensure the exclusion of atmospheric moisture, e. g. by storing under a blanket of dry nitrogen, as otherwise the product quality may deteriorate, e. g. the water fraction may rise, or the Palatinol N may be discolored by rust in normal steel tanks.

Drums containing the product should be kept tightly closed in a well-ventilated place.

Palatinol N can be stored for one year at temperatures below 40 °C, if moisture is excluded.

Pumps:

Cast-steel centrifugal pumps with a simple slip-ring seal are suitable.

Flange seals:

An example of a suitable material for seals is chemical-resistant Polytetrafluoroethylene (PTFE). Other plastics should be checked for suitability before they are taken into use.

Literature

- [1] Schwen, R. und Puhl, H.
 "Fehlersuche bei Viskosität-Temperatur-Messungen",
 Erdöl und Kohle-Erdgas-Petrochemie, Bd. 45, April 1992:
 Teil A: "Problematik, Formelpaket und mathematisches Procedere",
 Heft 4, Seite 161 ff.
 Teil B: "Resultate, Nuetzlichkeit", Heft 6, Seite 253 ff.

Safety

When using this product, the information and advice given in our **Safety Data Sheet** should be observed. Due attention should also be given to the **precautions** necessary for handling chemicals.

Note

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out their own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed.

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