Technical Information

July 2013

WF-No. 2188

Sokalan® K types

Sokalan® K 17 P
Sokalan® K 30 sol.30%
Sokalan® K 30 P
Sokalan® K 60 sol.35%
Sokalan® K 80 P
Sokalan® K 85 CQ sol.20%
Sokalan® K 85 P
Sokalan® K 90 sol.20%
Sokalan® K 90 P
Sokalan® K 115 CQ sol.10%

BASF
The Chemical Company

Chemical Character

Sokalan® K types are unbranched homopolymers of Polyvinylpyrrolidone (PVP).

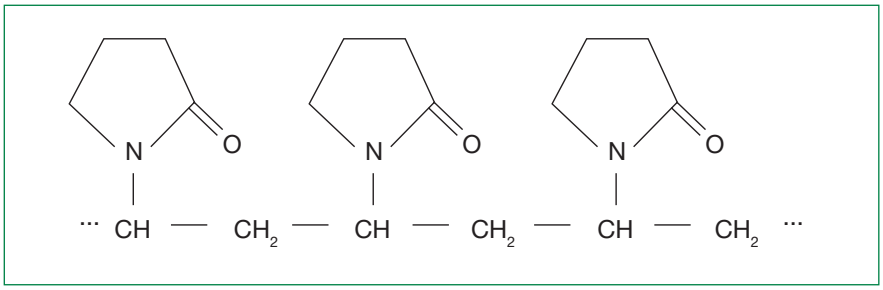

Figure 1:
The chemical structure of polyvinylpyrrolidone

Their composition is expressed by the general molecular formula:
$(C_6H_9NO)_n$
$80 < n < 20000$

The various products differ from each other in terms of their molecular weight, which is reflected in their respective K-value.

The products are available as a powder or in some cases as an aqueous solutions (refer below[1]).

[1] P = Powder
sol. = aqueous solution

PRD-Nos.*

30581851	Sokalan® K 17 P
30581849	Sokalan® K 30 sol.30%
30581847	Sokalan® K 30 P
30581985	Sokalan® K 60 sol.35%
30581978	Sokalan® K 80 P[1]
30581852	Sokalan® K 85 CQ sol.20%[2]
30581981	Sokalan® K 85 P[1]
30581850	Sokalan® K 90 sol.20%
30581846	Sokalan® K 90 P[1]
30584509	Sokalan® K 115 CQ sol.10%[2]

* BASF's commercial product numbers.

[1] Packaging under an atmosphere of nitrogen
[2] Contains approx. 0,001% Polyaminopropyl Biguanide

Properties

All the Sokalan® K types supplied in powder form range in colour from white to a feint yellow tint with different particle sizes (see Table 1).
All the liquid types are supplied clear and range in colour from colorless to a feint yellow tint aqueous solution. Their viscosity depends on the respective molecular weight and concentration (see Table 2).
In addition all Sokalan® K products are hygroscopic and have a weak characteristic odor.

Typical values of Sokalan® K types are listed in Table 1 (powder types) and Table 2 (solution types) below.

Table 1: Sokalan® K types (powder types) – typical values

Sokalan®		K 17 P	K 30 P	K 80 P	K 85 P	K 90 P
Physical form		powder	powder	powder	powder	powder
Average molar mass, Mw (GPC, BASF method)	[kg/mol]	9	50	850	1100	1400
K-value (ISO 1628-1, 1% dry substance in dist. H_20)		17[1]	30	80	86	90
Solid Content (ISO 3251)	[%]	98	98	98	98	98
Water Content (DIN 53715, K. Fischer)	[%]	2	2	2	2	2
pH value (ISO 976, 10% in dist. Water)		4	4[2]	6	7	7
Bulk Density (ISO 60)	[g/l]	450	450	450	450	450
Ash Content [3] (BASF Method)	[%]	max. 0.02	max. 0.02	max. 0.02	max. 0.02	max. 0.02
residual N-Vinylpyrrolidone (BASF method)	[%]	max. 0.01	max. 0.01	max. 0.01	max. 0.01	max. 0.01
Particle Size [4] (BASF method)		X_{10} <15 µm X_{50} <25 µm X_{90} <100 µm	X_{10} <25 µm X_{50} <75 µm X_{90} <130 µm	X_{10} <60 µm X_{50} <160 µm X_{90} <320 µm	X_{10} <90 µm X_{50} <180 µm X_{90} <350 µm	X_{10} <90 µm X_{50} <180 µm X_{90} <350 µm

[1] 5% dry substance in dist. H_20
[2] 10% dry substance in dist. Water
[3] These values (ash content) refer to the 100% strength product
[4] Xnn: share below the reported particle size

Table 2: Sokalan® K types (solution types) – typical values

Sokalan®		K 30 sol.30%	K 60 sol.35%	K 85 CQ sol.20%	K 90 sol.20%	K 115 CQ sol.10%
Physical form		liquid	liquid	liquid	liquid	liquid
Average molar mass, Mw (GPC, BASF method)	[kg/mol]	50	450	1100	1600	2200
K-value (ISO 1628-1, 1% dry substance in dist. H_20)		30	56	85	96	118[1]
Solid Content (ISO 3251)	[%]	30	35	20	20	11
Water Content (DIN 53715, K. Fischer)	[%]	70	65	80	80	89
pH value (ISO 976, 10% dry substance in dist. Water)		6	8	8	8	8
Viscosity (ISO 2555, Brookfield)	[mPa•s]	120	6000	11000	28000	3500
Density (DIN 51757, 20 °C)	[g/cm^3]	1.07	1.08	1.05	1.05	1.02
Ash Content (BASF method)	[%]	max. 0.02	max. 0.02	max. 0.02	max. 0.02	max. 0.02
residual N-Vinylpyrrolidone (BASF method)	[%]	max. 0.01	max. 0.03	max. 0.01	max. 0.01	max. 0.005

[1] 0.1% dry substance in dist. H_20

[2] These values (ash content) refer to the 100% strength product

The above data are current as at the data of publication and are not all included in the product specification.

The specified test characteristics are stated in the product specification, which may be requested from your local BASF representative.

All numerical data are approximated.

Viscosity

The viscosity of aqueous solutions of the Sokalan® K types depends on their average molecular weight. Fig. 2. shows the considerable differences in viscosity between solutions of the different Sokalan® K types in water, as a function of their concentration. While in the case of the low molecular weight K 17 and K 30 types, a 5 – 10 % increase in concentration has only a slight effect on the viscosity, changes by a factor of 5 or more occur in the high molecular weight products

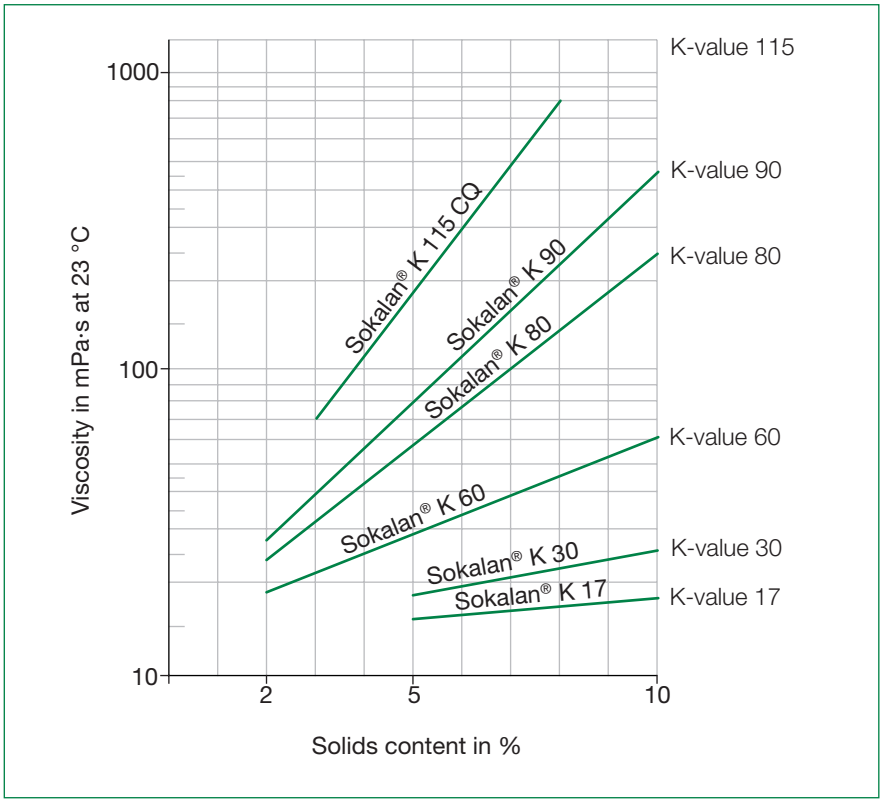

Figure 2:
Relationship between viscosity and solids content of different Sokalan® K types as aqueous solution.

Additionally in terms of impact from temperature on the viscosity, Sokalan® K 30 P (for example) in water of up to 10%, is hardly affected by temperature (Fig.3). At higher concentrations, however the viscosity decreases rapidly with increasing temperature.

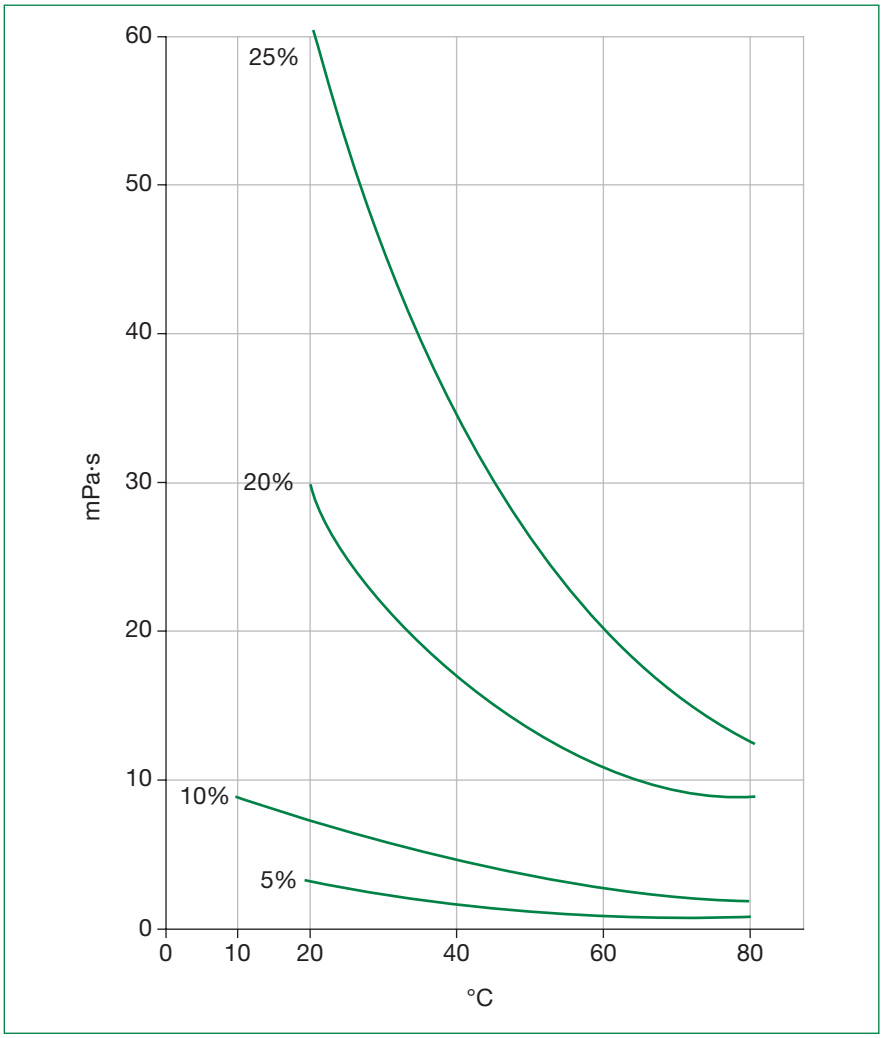

Figure 3:
Typical viscosity of different Sokalan® K 30 P solutions in water as a function of temperature

Humidity

Polyvinylpyrrolidone is a hygroscopic substance. Fig. 4 shows the moisture absorption curve as a function of relative humidity. It applies to all Sokalan® K types and is one of the few parameters that is largely independent of the molecular weight.

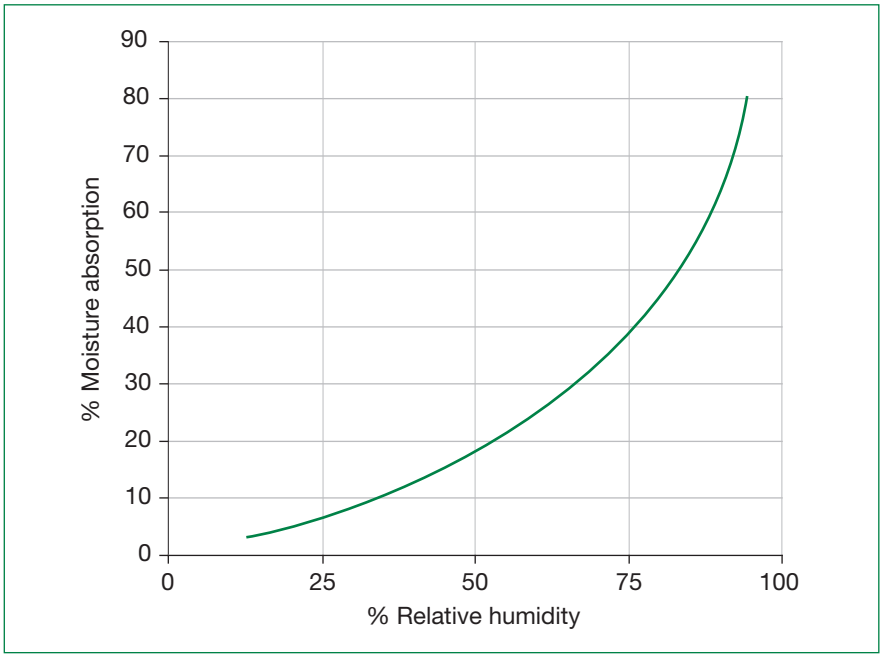

Figure 4:
Moisture absorption of the soluble Sokalan® K types at 25 °C after 7 days.

Storage/Stability

Powder types

a) Powder types are hygroscopic and soluble in water, with the result that they absorb moisture very quickly. Drums and bags should be tightly resealed after material is taken from them. We strongly recommend for the higher molecular powder types Sokalan® K 80 P, Sokalan® K 85 P, Sokalan® K 90 P storage under an inert atmosphere of nitrogen.

b) We recommend storage temperatures below 25 °C, preferably between 10 – 25 °C.

Aqueous solution types

a) The viscosity of aqueous solutions with a pH value over 6 can increase during prolonged storage at elevated temperatures.

b) Acidic solutions with a concentration below 30% tend to grow mould during storage.

c) We recommend storage temperatures below 25 °C, preferably between 10 – 25 °C. At temperatures below 0 °C, the products may solidify, but brief heating to a maximum of 40 °C and stirring reverses the process.

Shelf life

Sokalan® K 17 P, Sokalan® K 30 P, Sokalan® K 80 P, Sokalan® K 85 P, Sokalan® K 90 P, powder types have a shelf life of at least three years in the unopened original packaging between 10 – 25 °C.

Sokalan® K 30 sol.30%, Luvitec® K 60 sol.35%, Luvitec® K 85 CQ sol.20%, Luvitec® K 90 sol.20% and Luvitec® K 115 CQ sol.10% solution types have a shelf life of at least two years in the unopened original packaging between 10 – 25 °C.

Safety

We know of no ill effects that could have resulted from using Sokalan® K types 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, Sokalant® K types 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.

Please refer to the latest Safety Data Sheet for detailed information on product safety.

Note

July 2013