

Divergan® PALL

Chemical name of active ingredient

Polyvinylpyrrolidone (PVPP)

CAS-No. 25249-54-1

PRD-No.

30671271*

* The product is kosher and halal.

Articles

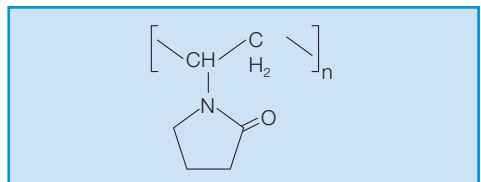
50508958 20 kg cardboard drum

Country of origin

Germany

Description

White, hygroscopic powder with a faint characteristic odor. **Divergan® PALL** is cross-linked polyvinylpyrrolidone (PVPP) that has been manufactured by means of a patented polymerization process (DP 2437629). It is insoluble in water and all the usual organic solvents.



$(C_6H_9NO)_n$ Molar mass cannot be determined as it is insoluble in all common solvents

Specification

For information see separate document: "Standard Specification" (not for regulatory purposes) available via BASF's WorldAccount: <https://worldaccount.basf.com> (registered access).

Monographs

Divergan® PALL meets the requirements of the current FCC (Crospovidon) monograph. Furthermore **Divergan® PALL** (E1202) complies with the current EU regulation laying down specifications for food additives.

Regulations

PVPP can be used as a processing aid (filtration) in beverage application in most countries. However, specific regulations in the respective

countries and for the intended use have to be observed.

Storage/Handling

In order to maintain its effectiveness, **Divergan® PALL** should be kept in its closed packaging in a dry place at ambient temperatures. Stored in its unopened original packaging, the product is stable for 3 years without loss of activity.

Function

Beer:

Haze in beer is caused mainly by polyphenol-protein complexes. **Divergan® PALL** selectively adsorbs the polyphenols that cause turbidity. Removing the excess responsible for this problem considerably improves the colloidal stability of beer.

It is known that the reduction of flavonoid polyphenols also leads to a better flavour and taste profile.

Application

Divergan® PALL is intended for reuse and it therefore requires special filtration and regeneration equipment consisting of a metering device and a filter unit installed downstream of the kieselguhr filters (see Fig. 1).

Beer:

The preferred method of introducing **Divergan® PALL** is to meter it continuously into the beer stream with a metering pump. If no separate metering unit is available, the **Divergan® PALL** can be added together with the filtration agent, usually kieselguhr. Provision must be made for a contact time of at least 3 minutes. In some breweries, silica gel is added together with the PVPP to the same supply tank. This gives a highly efficient combination of filtration and stabilisation effects that also saves on capital investment, as no further equipment is required (Fig. 1).

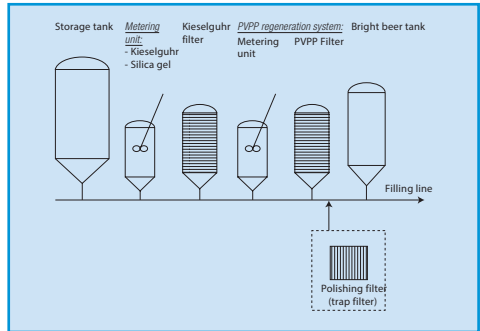


Fig. 1: Diagram of a filtration line with regenerable PVPP. The PVPP is in a separate filtration/stabilization unit.

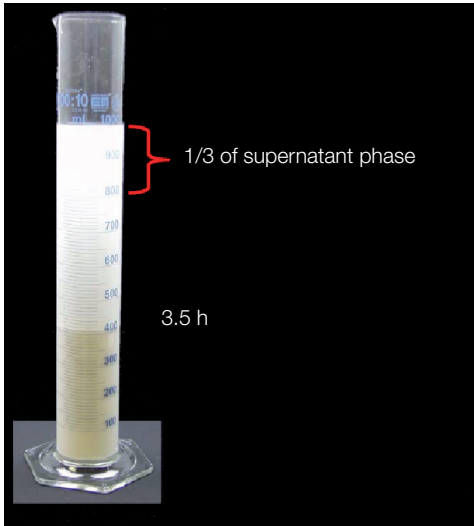
Preparation

Divergan® PALL is suspended in water in a concentration of typically 10% in the supply tank of the metering unit, where it must be continuously stirred.

If larger quantities of fresh **Divergan® PALL** are introduced into the system, e. g. a complete filling or even a replenishment of major losses, they should be subjected to the regeneration process once before use. This provides an ideal conditioning for the material as follows.

Conditioning for the 1st filling with Divergan® PALL

- Preparation of an aqueous suspension of Divergan® PALL (10% by weight)
- 2 – 4 h swelling time with stirring
- Stop stirring
- Sedimentation for approx. 2 – 3 h
- Removal of max. 30% of the supernatant phase, containing fines by use of a flexible tube (= siphoning)
- Addition of water
- Adjustment of Divergan® PALL content by gravimetric method
- Regeneration in PVPP filter according to filter supplier's recommendation
- Re-adjustment of Divergan® PALL
- Start continuous application



Typical losses (conditioning)

- Typical losses of decanting: < 5%
- Typical losses during continuous application: 0.3 – 1.0%

Decantation Process for the removal of fine particles from a PVPP suspension

- Stir the Divergan® PALL suspension in the dosing vessel
- Stop stirring and take a sample of the PVPP suspension
- Sample taking: The sample should be taken from the middle of the dosing vessel. Please use a bottle with a narrow bottleneck hole to avoid that the complete sample volume gets in the bottle at once
- Fill the sample in a one litre glass cylinder
- Observe the decantation time (different phases will occur after 15 – 20 minutes)
- Decantation time depends on the concentration of the PVPP suspension
- Homogenization of Divergan® PALL suspension through stirring
- Stop stirring
- Sedimentation time for 2 – 3.5 hours
- Removal of max. 30% of the supernatant phase via siphoning (please use a plastic tube e.g. water tube with low diameter 45 mm)
- Addition of water until dosing vessel is full
- Adjustment of Divergan® PALL concentration (recommendation 10%)
- Regeneration according to the filter supplier's guideline

Continuous metering

After the beer stream has been filtered through kieselguhr and clarified, the Divergan® PALL suspension is continuously added via the dosing pump.

The PVPP loaded with polyphenols is filtered off after a contact time of at least 3 minutes. The contact time is dictated by the design of the filter.

Regeneration

When the filtration/stabilization process is complete, the filter is either blown out or the beer is displaced with water.

The PVPP filter cake is washed with 1 – 2% caustic soda at 80 – 85 °C.

The different filter manufacturers recommend either a one alkali or a two alkali process. The alkali treatment converts the adsorbed polyphenols into water-soluble anions that can be washed out of the filter cake as a dark-colored solution. Often, the PVPP also gradually turns brown with use, but this does not detract from its effectiveness.

After it has been regenerated, the filter cake is washed with hot water (50 – 70 °C) to remove the remaining polyphenols and alkali. It is then neutralised with a diluted mineral acid e.g. 0.5% nitric acid or 1% phosphoric acid. The filter is then blown out with CO₂ and the filter cake is removed while still moist.

Horizontal filters can be spun to remove the filter cake. The PVPP is then returned to the metering vessel and any losses are made up. It is essential to follow the recommendations of the filter manufacturer throughout the filtration/stabilisation process to avoid damage to the equipment.

Losses

A small loss of PVPP of the order of 0.3 – 0.5% must be expected with each regeneration and filtration cycle. To determine the loss, it is recommended to regularly check and adjust the solids content of the PVPP suspension, preferably after each regeneration. Only gravimetric methods should be used for this purpose.

Dosage

The optimum rate of addition depends on many factors. A major factor is the stability to be achieved – shelf lives of more than 12 months are possible. Other factors include the raw materials used, the cellar equipment, the degree of clarification prior to filtration, and the type and quantity of other stabilising auxiliaries used.

	Divergan® PALL alone	Divergan® PALL when combined with silica gel
Beer from 100% malt	20 – 50 g/hl	15 – 40 g/hl
Beer brewed with adjuncts (ratio approx. 30%)	15 – 35 g/hl	10 – 30 g/hl

Table 1: Addition rates for Divergan® PALL

Note

Divergan® PALL must be handled in accordance with the Safety Data Sheet.

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March 2020