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Publication date:
2012

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Citation for published version (APA):
Christensen, K. V., Limkilde Ohm, M., & Garrigues Horn, V. (2012). Towards a membrane process based path to concentrate willow extract. Poster session presented at Euromembrane 2012, London, United Kingdom.

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Towards a Membrane Process Based part to Concentrate Willow

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Abstract

With this work, a membrane based free liquid extraction process for producing a willow extract concentrate has been tested. It has been shown that it is possible to retain saligenine, producing a concentrate of 1.2 g/L saligenine and a concentrate with a total dry matter content of 5 weight%. The process is a combination of microfiltration, ultrafiltration and reverse osmosis.

Introduction

Extracts from willow have been known as an analgesic, anti-inflammatory and antipyretic drug for over 3000 years. Since the 1820s the main therapeutically effect has been associated with the compound saligenine isolated from the extract and from willow bark. The extract is a mixture of water soluble and water insoluble components that also contain tannin-like compounds. The latter may be synergistic with the activity of saligenine and other components. The bioactive component of willow bark, saligenine, has been shown to have an analgesic effect.

The obvious starting point is to go back to the original extract from willow (AlfaLaval) membrane with a mean pore size of 0.45 μm, pressure and osmotic pressure difference between retentate and permeate respectively.

Experiment and Methods

Large particles can be removed by sieving, microorganisms and minor solids by MF. Vira and constituents in the willow extract concentrate (see figure 2).

Figure 2: Solids from initial sieving

The driving force for MF, UF and RO is the total pressure difference modified by the osmotic pressure difference between retentate and permeate respectively.

The MF, UF and RO the experimental setup consisted of a Lab Stak® M20 DSS from Alfa Laval with appropriate external cooling system to keep the willow extract temperature constant.

References

Acknowledgement

The authors want to express their gratitude to NY Vørs Blomstergrower, Odense, Nyvørs Vegetabilie Teknikkum for supplying the willow extract.

Results and Discussion

Apart from salicine and salicine derivatives, the extract contains flavonoids and known beneficial flavonoids, tannins and salicine derivatives. As an indicator for the content of salicine derivatives saligenine was chosen and for flavonoids epicatechin was tried. Both was analysed using HPLC with an UV detector.

Figure 3: a. Microfiltration permeate flux as a function of process time. b. Microfiltration after use.

Figure 4: a. Ultrafiltration permeate flux as a function of process time. b. Pure water flux recovery as a function of UF cycles.

Figure 5: a. Reverse osmosis permeate flux as a function of process time. b. Pure water flux recovery as a function of RO cycles.

Figure 6: Saligenine concentration and total dry matter content as a function of process time.

Figure 7: Tested process design