GREEN BIOREFINING DEMO SCALE RESIDUAL JUICE FILTRATION

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1. OBJECTIVE

- To Demonstrate technological and economic feasibility of the membrane filtration system for a residual juice (brown juice) concentrating process.

- To produce a permeate stream that contains monovalent salts such as potassium which is suitable for ferti-irrigation application possibly as a nutrient recycle to the agriculture field.

2. MATERIALS AND METHODS

- Fresh brown juice from the green biorefinery
- In-line brix meters measure the brix in feed and concentrate streams
- The Demo scale Nanofiltration plant has 98m^2 filtration area

Membrane name	Manufacturer	Surface polymer	MWCO (Dalton)	Permeate flow rate(m^3/d)	Salt rejection (%)
HL	GE	Polyamide	~ 150-300	3.0 (at 7.6 bar)	average 98%

VOLUME CONCENTRATION FACTOR

(VCF) = FEED VOLUME/CONC.VOLUME

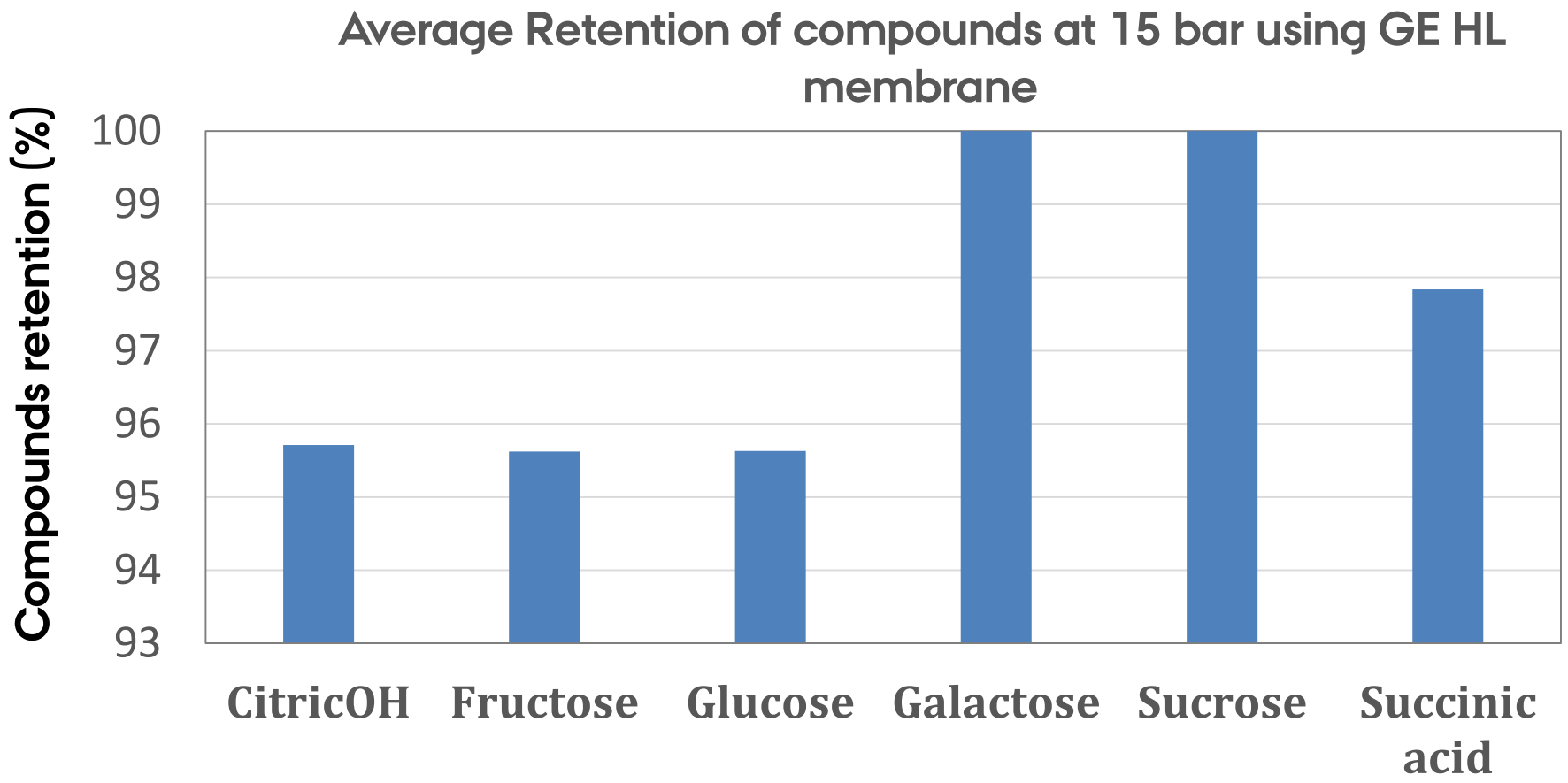
AVERAGE RETENTION=$(1-C_P/C_{AV})*100\%$

AVERAGE FLUX= $V_P/(A*T)$

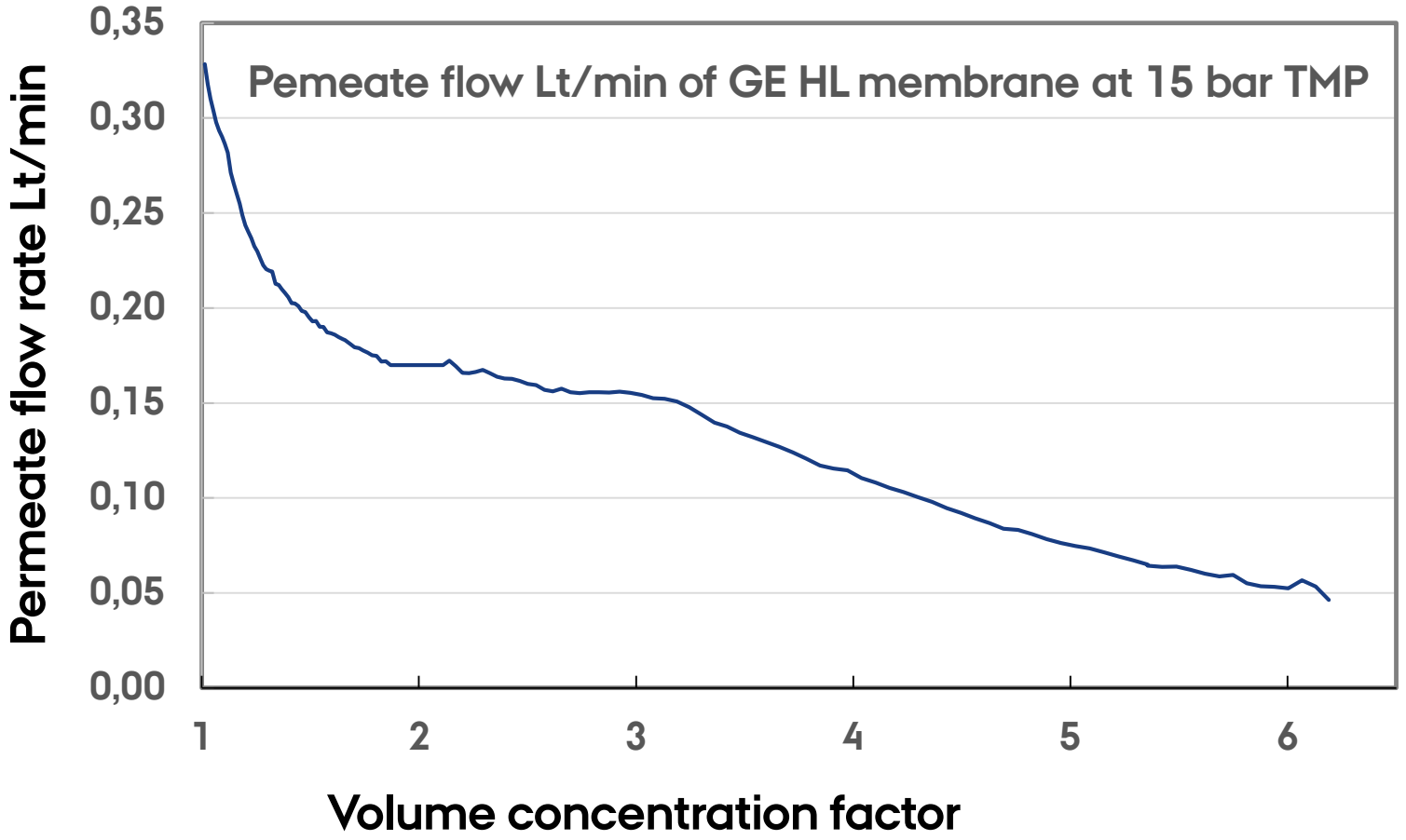
3. RESULTS

- Filtration of high sugar brown juice using pilomem pilot plant at 15 bar and 25°C
- Characterization of high sugar brown juice feed, permeate and concentrate

	Brix	Citric acid	Glucose	Fructose	galactose	Sucrose	Succinic acid	Lactic acid
Stream	°Bx	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
feed	4,0	1103	6938	4770	226	1871	278	nd
Permeate	1,1	98	2561	1566	0,00	0,00	9	nd
Concentrate	15,7	3467	22371	13115	272	16386	546	nd


Average Retention of compounds at 15 bar using GE HL membrane
Compounds retention (%)
100
99
98
97
96
95
94
93
CitricOH
Fructose
Glucose
Galactose
Sucrose
Succinic acid

FLUX RESULTS OF GE HL MEMBRANE AT 15 BAR USING PILOMEM TEST UNIT



Using the pilomem test unit the high sugar grass brown juice was concentrated to a volume concentration factor of 6,2 and concentrate brix of 15,7

RESULTS OF DEMO SCALE FILTRATION

- Demo scale filtration of the high sugar grass brown juice was tested using feed volume of 2,03m^3.
- The feed brix was 2,66^oBx, the filtration was operated at 15 bar and 3o^oC using GE HL membranes(the low feed brix is mainly due to washing water used before the pressing step).
- The brown juice was concentrated to 19^oBx with concentrate volume of 0,12 m^3 and volume reduction factor of 16,9.

Next steps

- ❑ Analyzing the permeate, feed and concentrate stream from demo plant test for all organic acids, sugars and monovalent salts.

- ❑ Testing the permeate for ferti-irrigation application (test field trial).

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