Salt Partners

Processing of salt for chemical and human consumption

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Salt production world-wide

Salt type	World production
Solar salt	90,000,000 t/y
Rock salt	80,000,000 t/y
Brines	80,000,000 t/y
Total	250,000,000 t/y

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Salt consumption world-wide

Salt user	Salt consumption
Chemical industry	150,000,000 t/y
Food	70,000,000 t/y
Other	30,000,000 t/y

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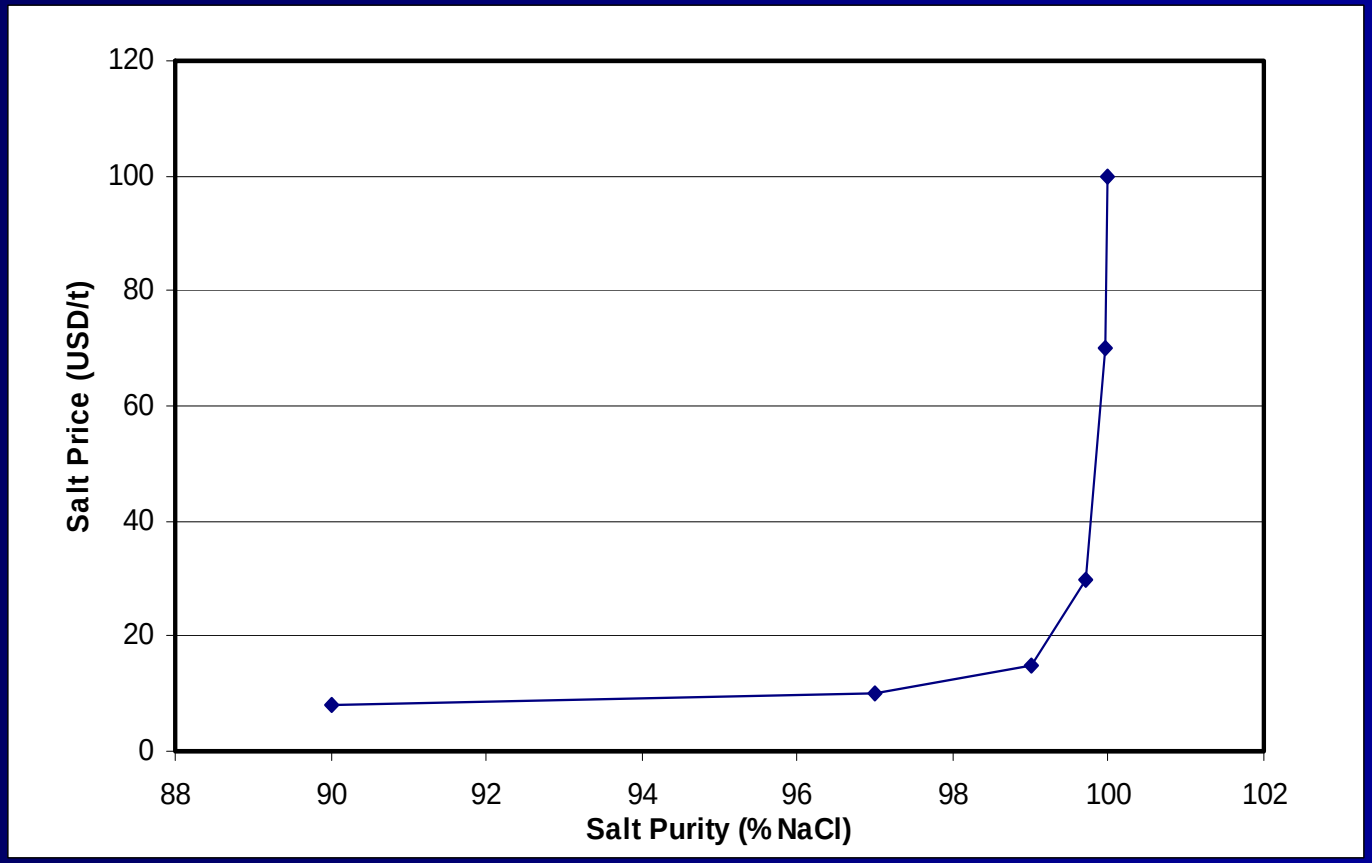
Salt Prices are Dependent on Salt Purity



Industrial salt prices vary between USD 10.-/t and USD 100.-/t depending on salt purity

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Impurities in salt

	Rock salt	Sea salt	Lake salt	Brines
CaSO4	0.5 – 2%	0.5 – 1%	0.5 – 2%	Saturated
MgSO4	Traces	0.2 – 0.6%	Traces	Traces
MgCl2		0.3 – 1%	Traces	
CaCl2			Traces	
Na2SO4			Traces	
KCl			Traces	
NaBr			Traces	
Insolubles	1 – 30%	0.1 – 1%	1 – 10%	

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Spraying of brine over salt on a wire mesh belt

Brine flows through a path of least resistance, forming channels.

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Submerging salt in brine in a spiral classifier

Intensive contact of salt and brine. Brine purity controlled by dilution with water, causing losses.

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Salt losses in a spiral classifier

Turbulence in a spiral classifier carries smaller salt crystals to the overflow, increasing the salt losses.

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Bypass flow of brine in a spiral classifier

Rotating screw pushes the salt in the direction of the rotation.

Salt level on the right is higher than on the left.

Brine flows back through the path of least resistance (that is on the left) bypassing the salt.

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In a spiral classifier, brine bypasses the salt

Salt is pushed to the left at the top of the picture.

Brine flows back to the right at the bottom of the picture. Brine is bypassing the salt.

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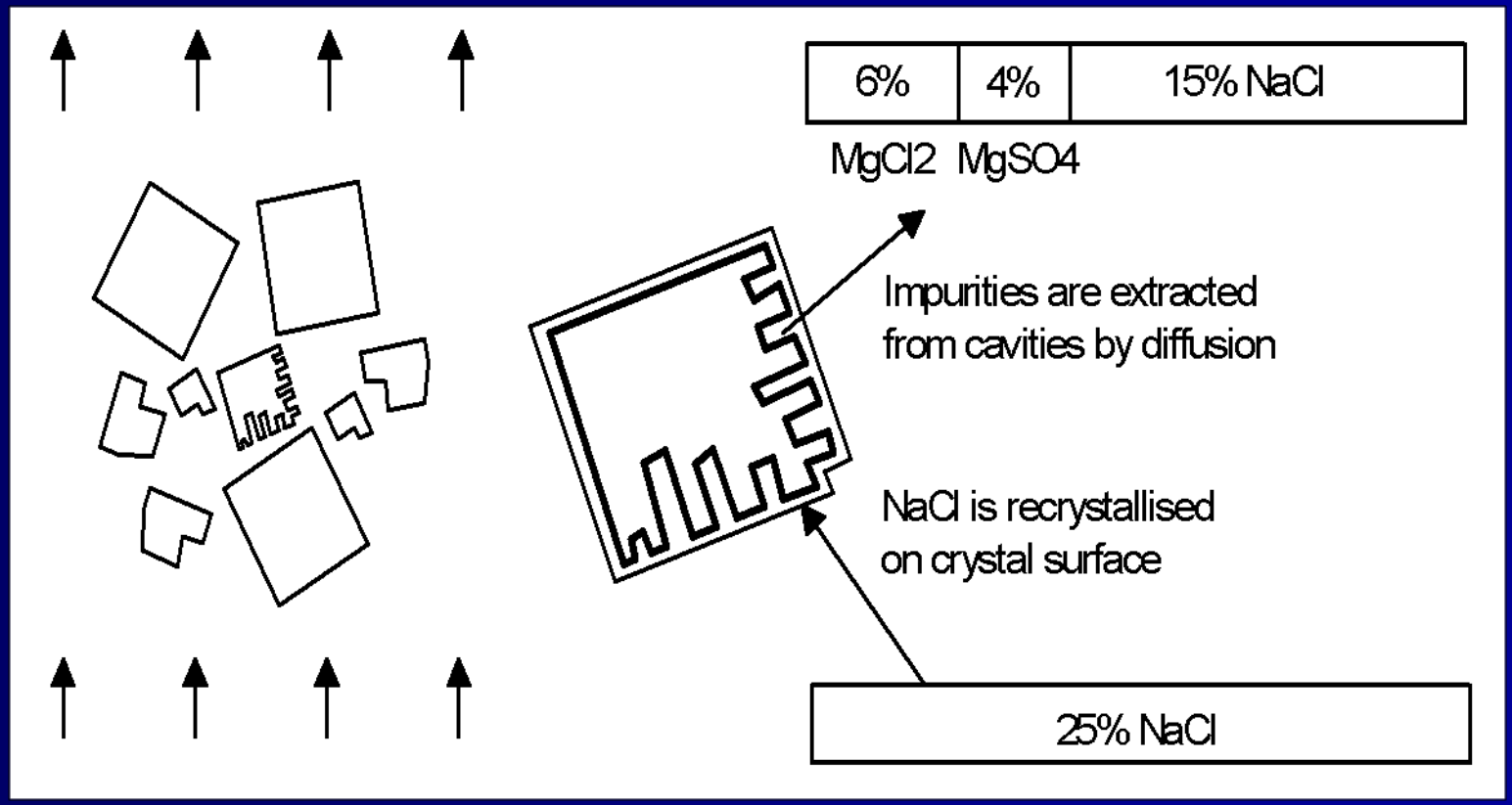
Hydroextraction



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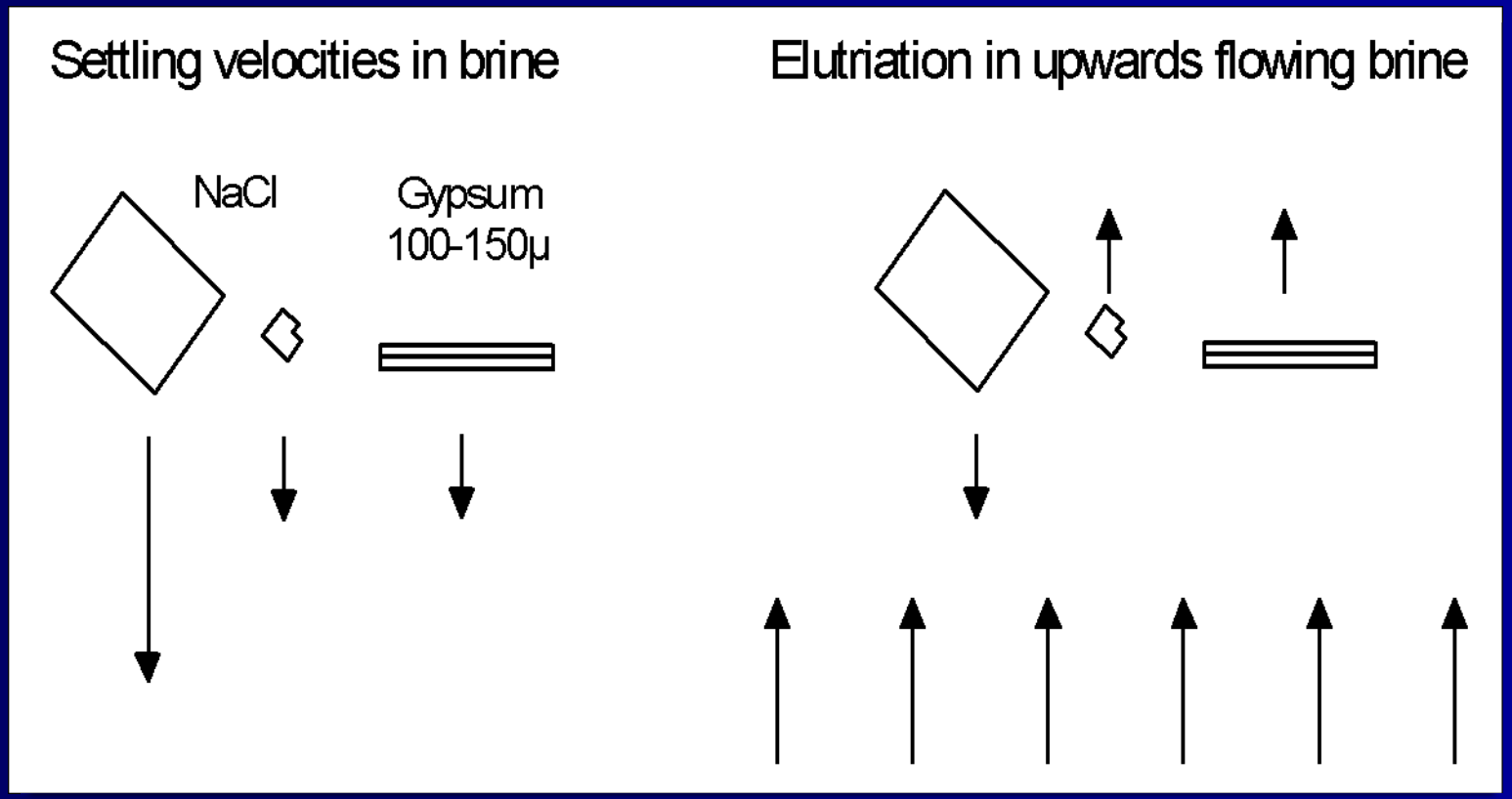
Elutriation



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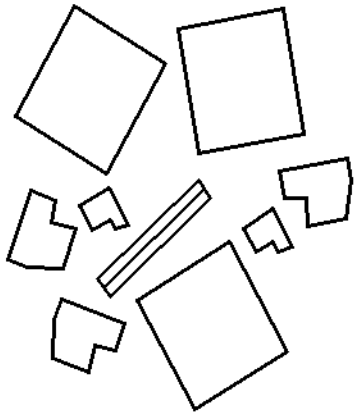
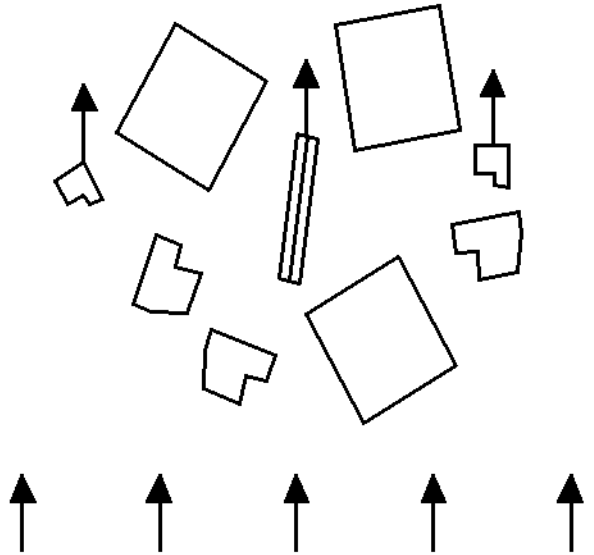
Hydroclassification

Salt bed with buried impurities



Hydroclassification of impurities in partially fluidised salt bed



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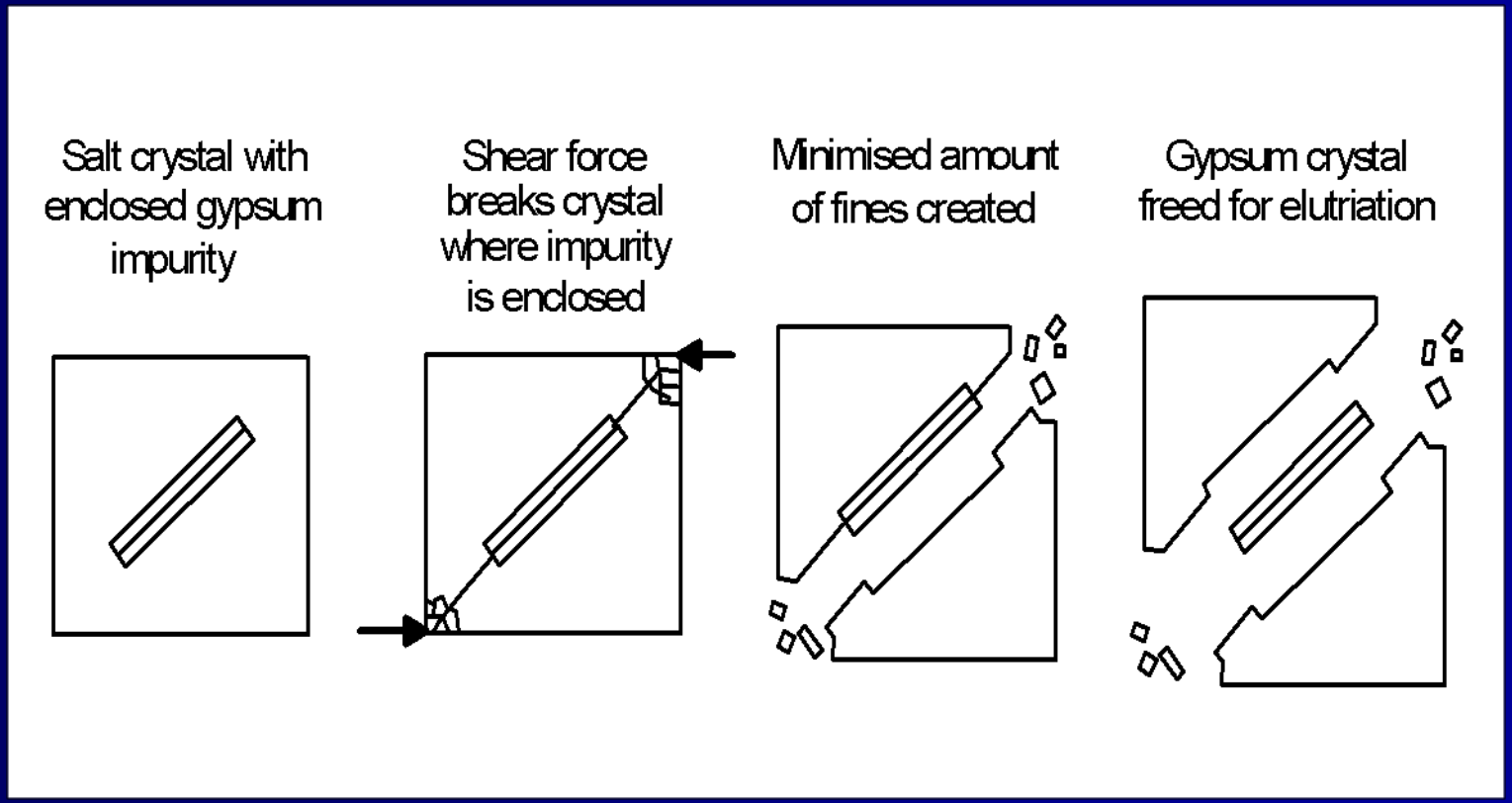
Hydromilling and shear crushing



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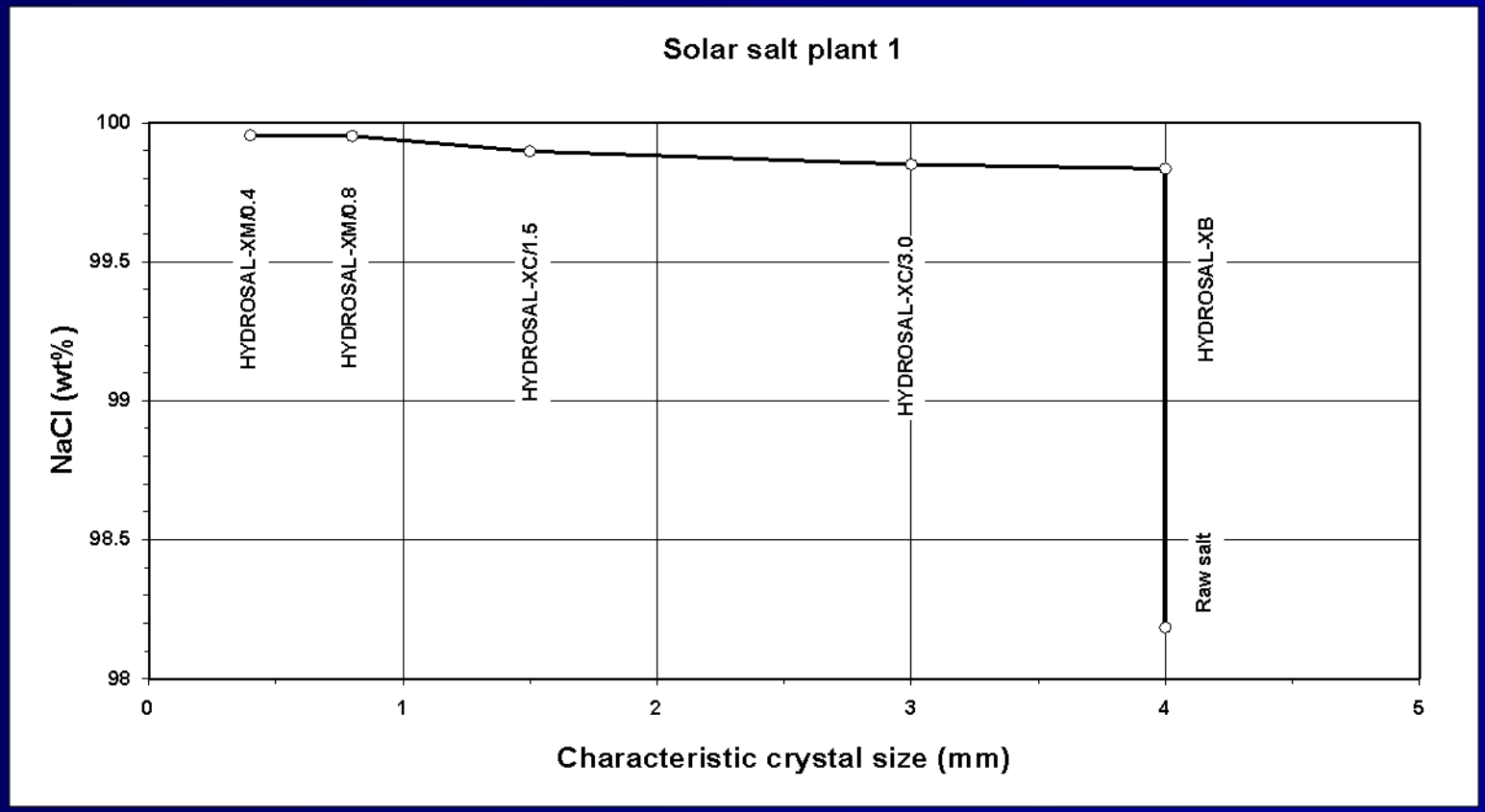
Salt upgradability test, NaCl content



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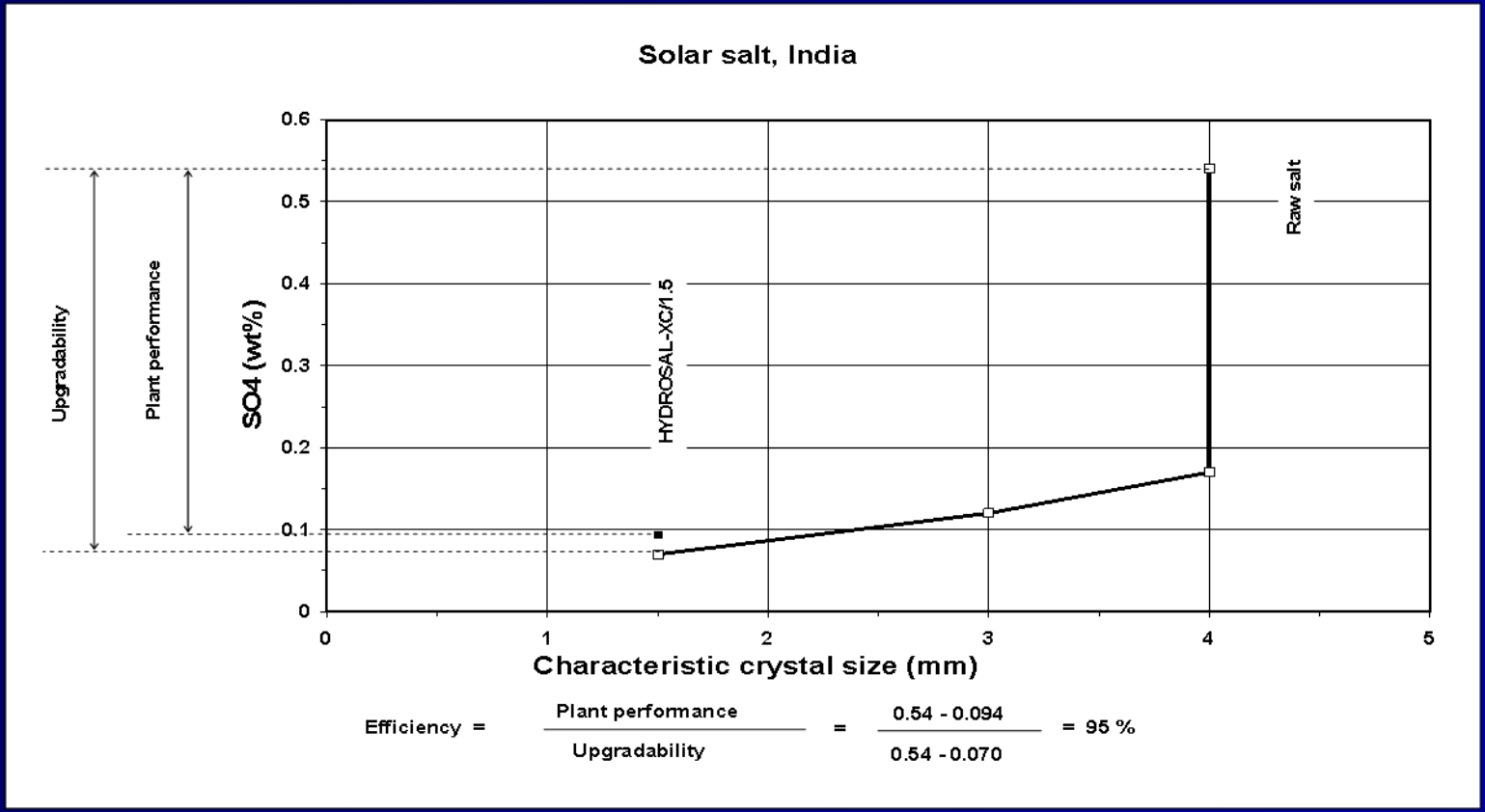
Plant efficiency calculation, sulphate



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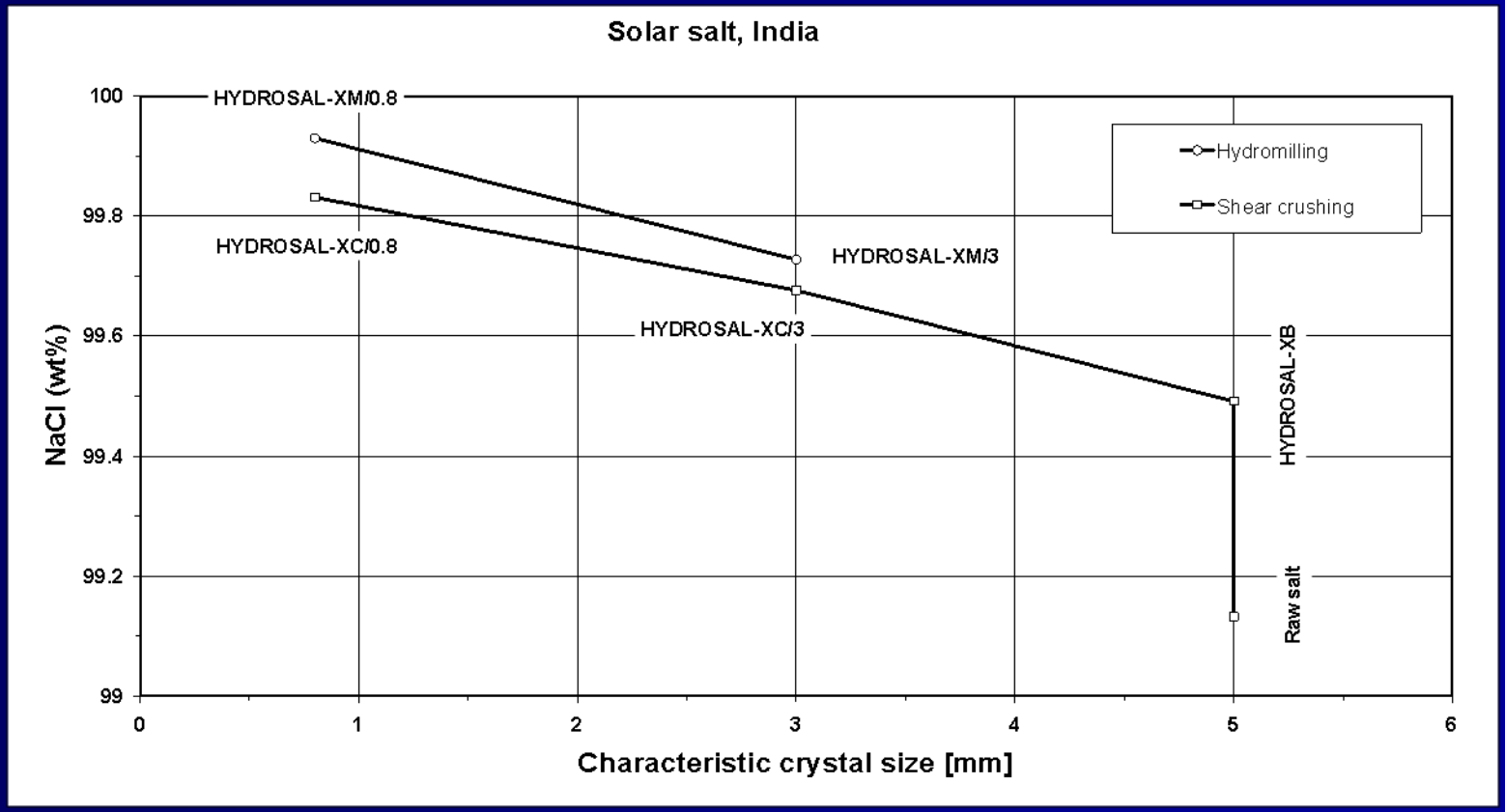

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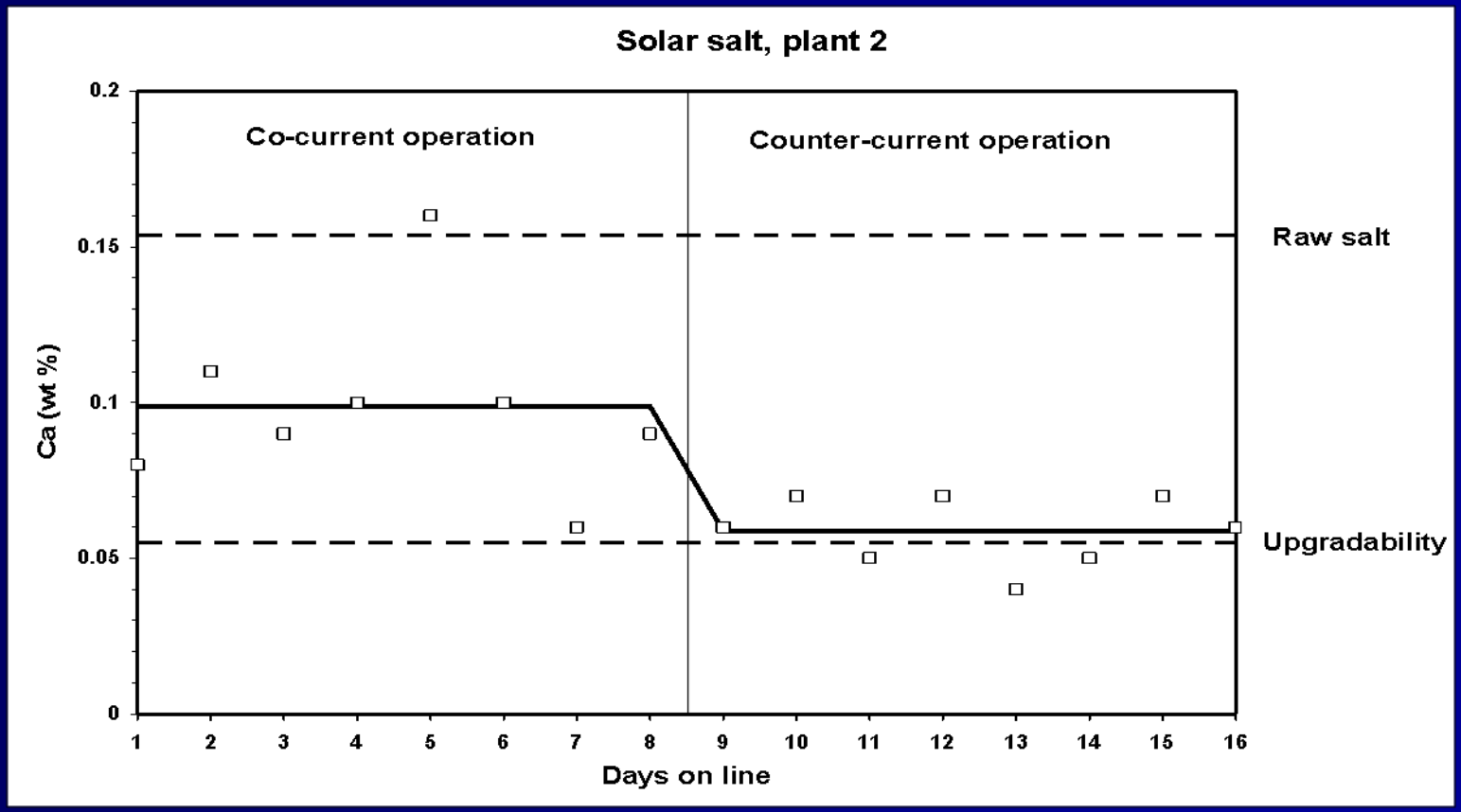
Co-current vs. counter-current process performance



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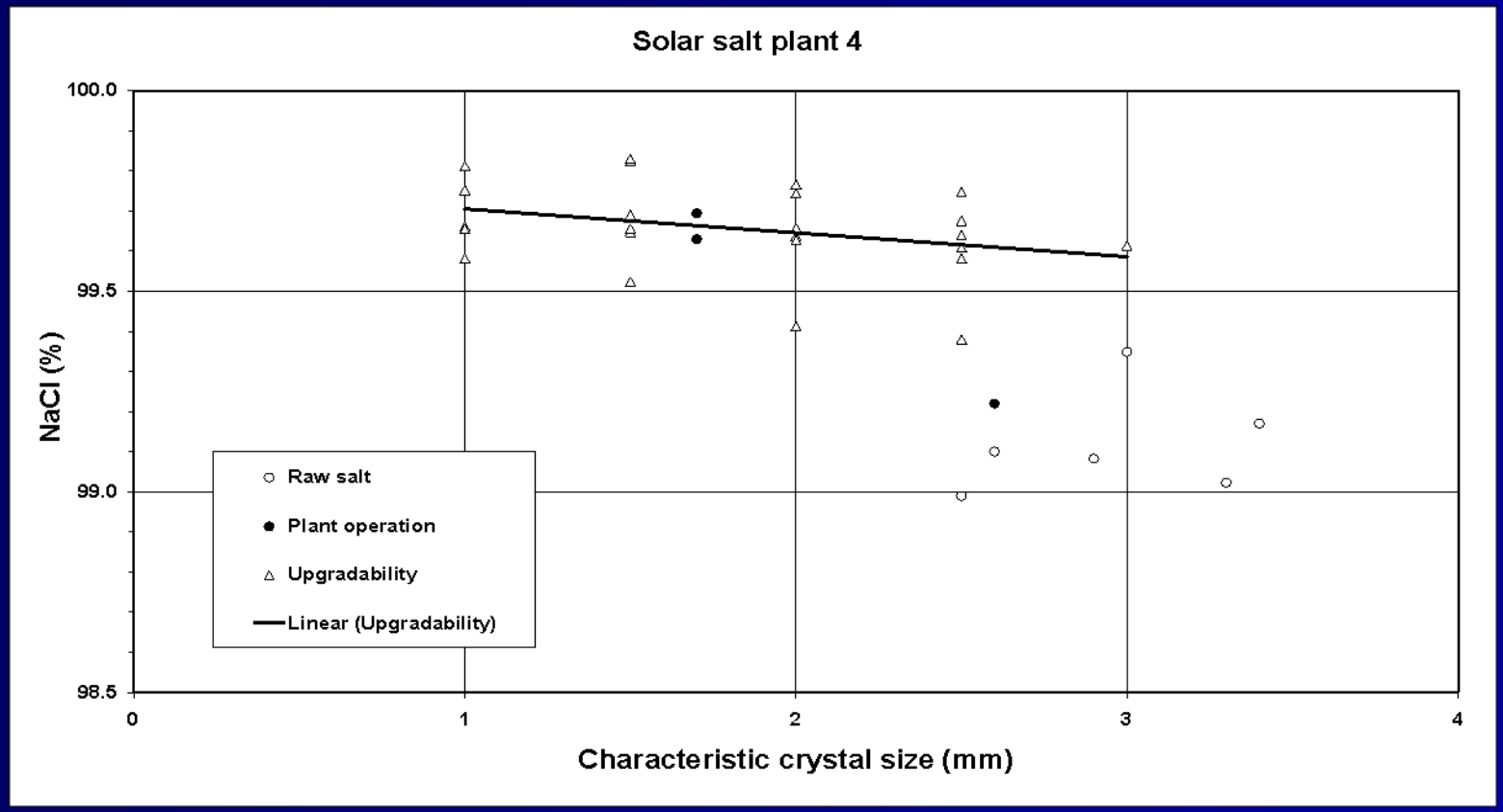
Upgradability of Indian salts



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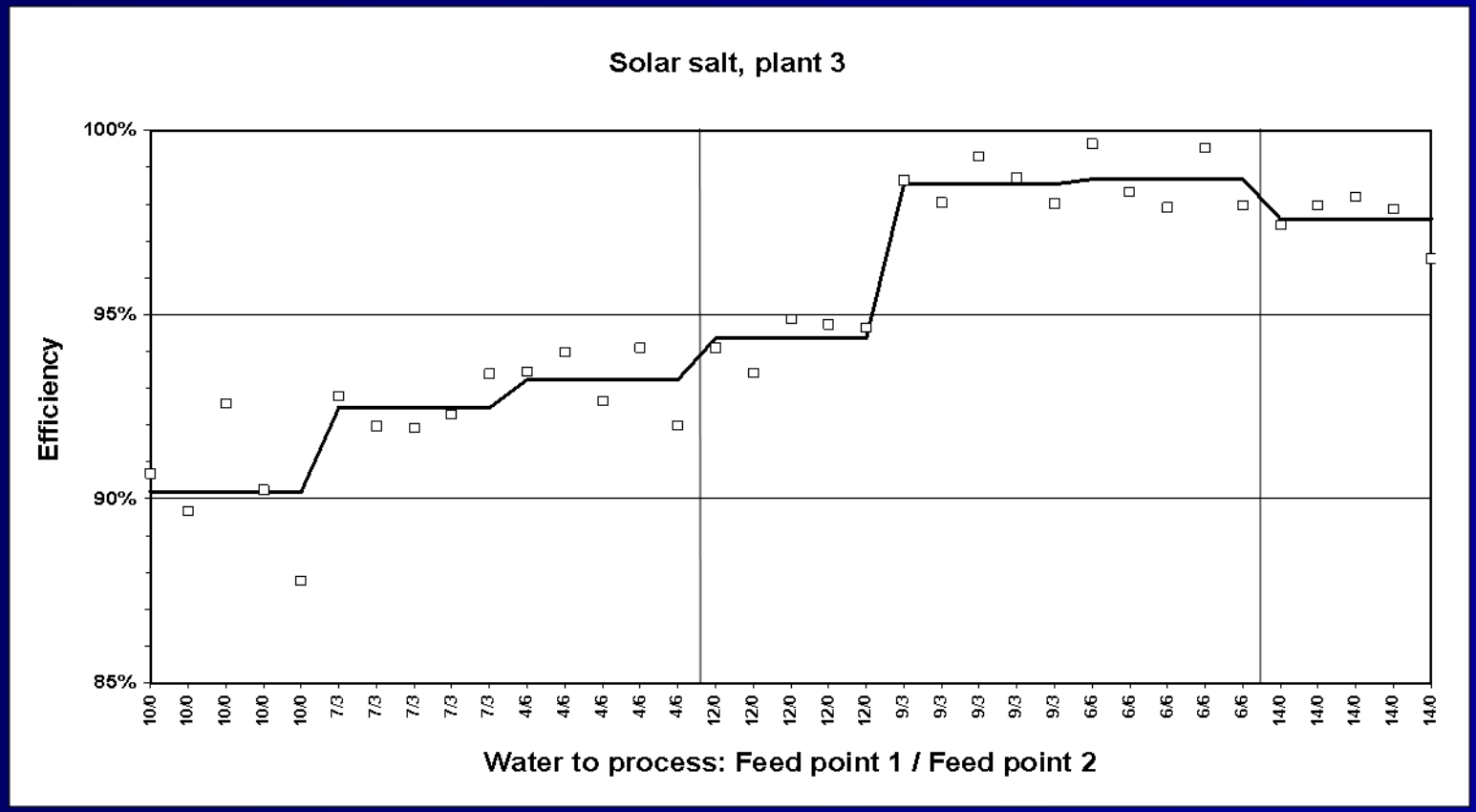
HYDROSAL optimisation test, NaCl efficiencies



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HYDROSAL refined solar salt vs. Swiss vacuum salt

		HYDROSAL refined salt	Swiss vacuum salt
CaSO4	ppm	136	17
MgSO4	ppm	55	5
MgCl2	ppm	74	
Na2SO4	ppm		420
Insolubles	ppm	20	20
NaCl	%	99.972%	99.954%

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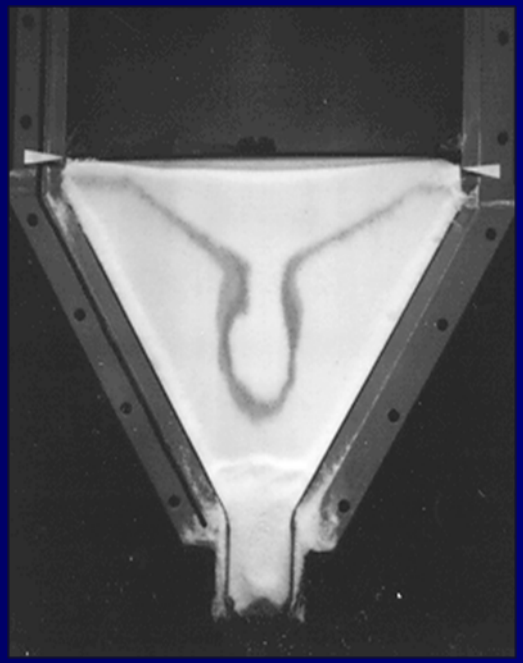
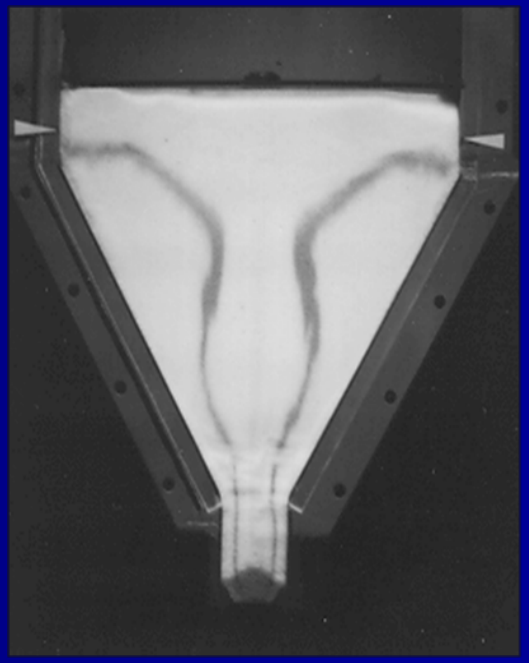
Hydroextraction does not work in all vessels



In this vessel salt flows out mainly through the centre



In the centre of the vessel rat hole develops

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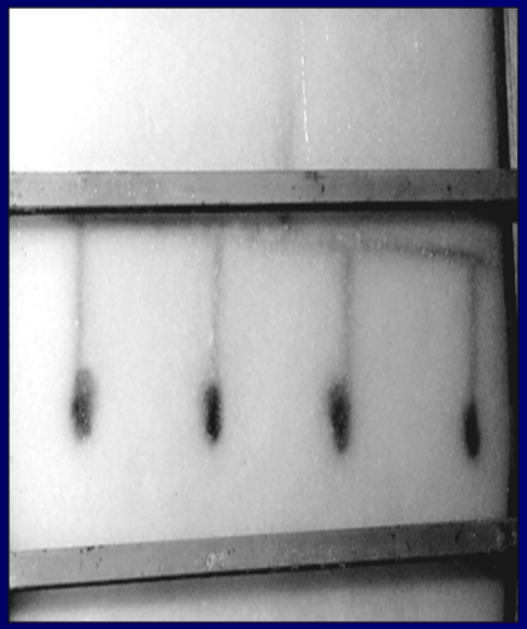
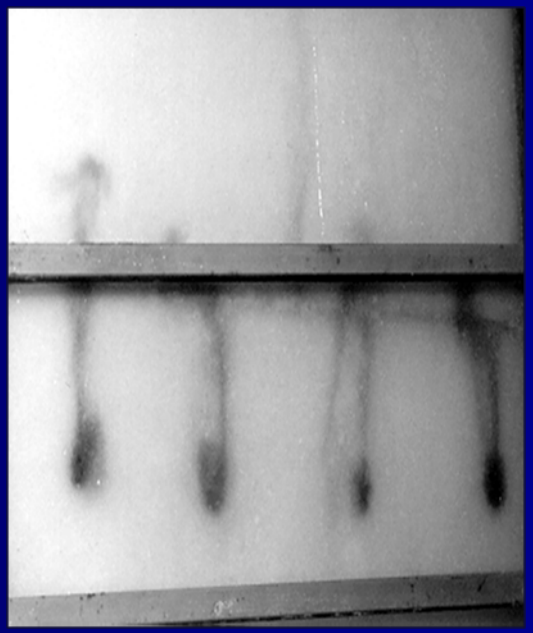
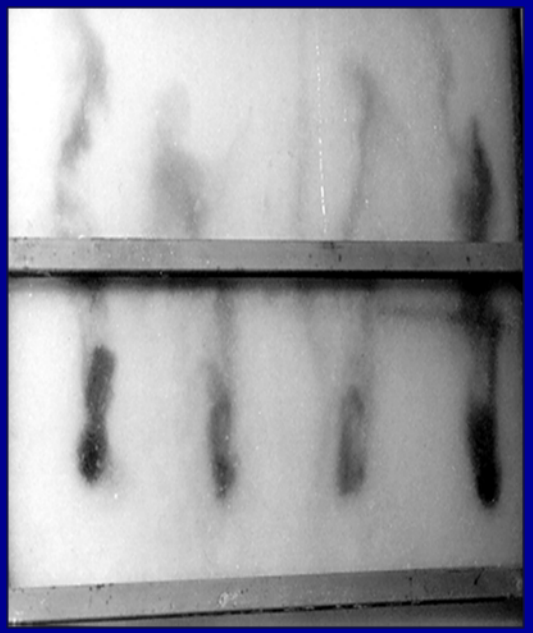
Hydroextraction works only with plug flow of salt



Picture 1: Injection of black ink into brine flowing upwards through salt flowing downwards in plug flow



Picture 2: Black ink flows upwards with brine in counter-current flow



Picture 3: Second black ink injection. There are no traces of black colour in the salt flowing downwards in plug flow

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SALEXPOR 15 t/h solar salt refining plant in Portugal

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9th International Symposium on Salt 2009

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100 t/h industrial salt upgrading plant in Spain

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Solution mining for natural gas storage, co-generation, brine purification, salt crystallisation and refining plant in Portugal

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40 t/h salt upgrading plant in Portugal producing purest industrial salt in Europe

		Performance test
Ca	ppm	0.6
Mg	ppm	0.2
SO4	ppm	53

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Why not turn your salt into gold?

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