



The current situation of lignocellulosic bioethanol – with regard to straw in Austria

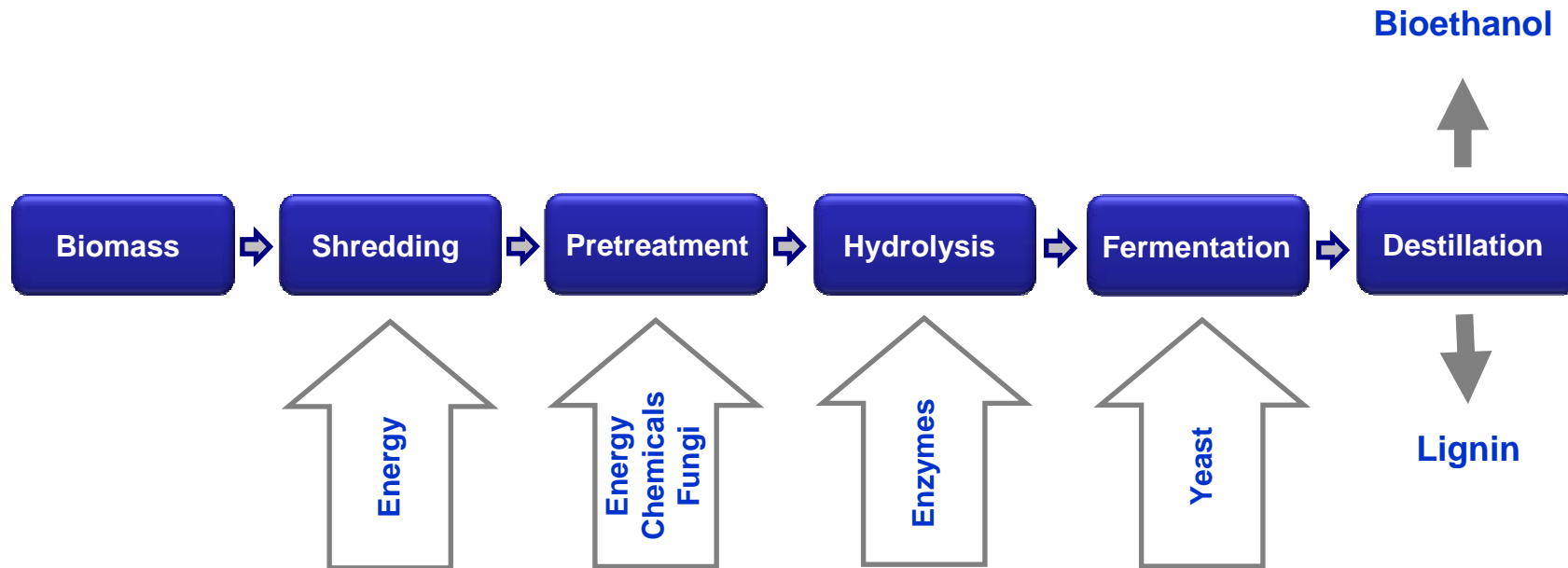
Heike Kahr, Alexander JÄGER



Bioethanol Process „basic“

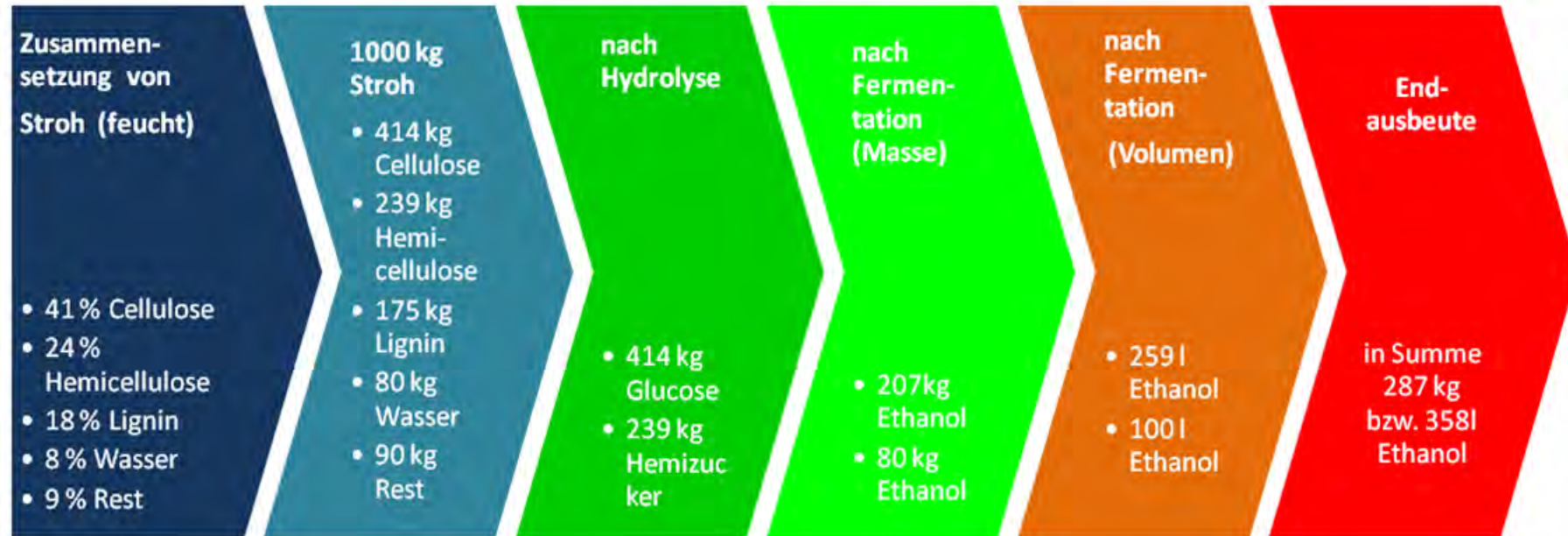


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Mass balance Bioethanol Process „basic“



**1000 kg Stroh /
10 m³ H₂O**



**287 kg Ethanol
3,58 % Vol**



Mass balance Bioethanol Process „basic“



1000 kg Stroh /
10 m³ H₂O

Cellulose
→

207 kg Ethanol
2,58 % Vol



Bioethanol Process „basic“

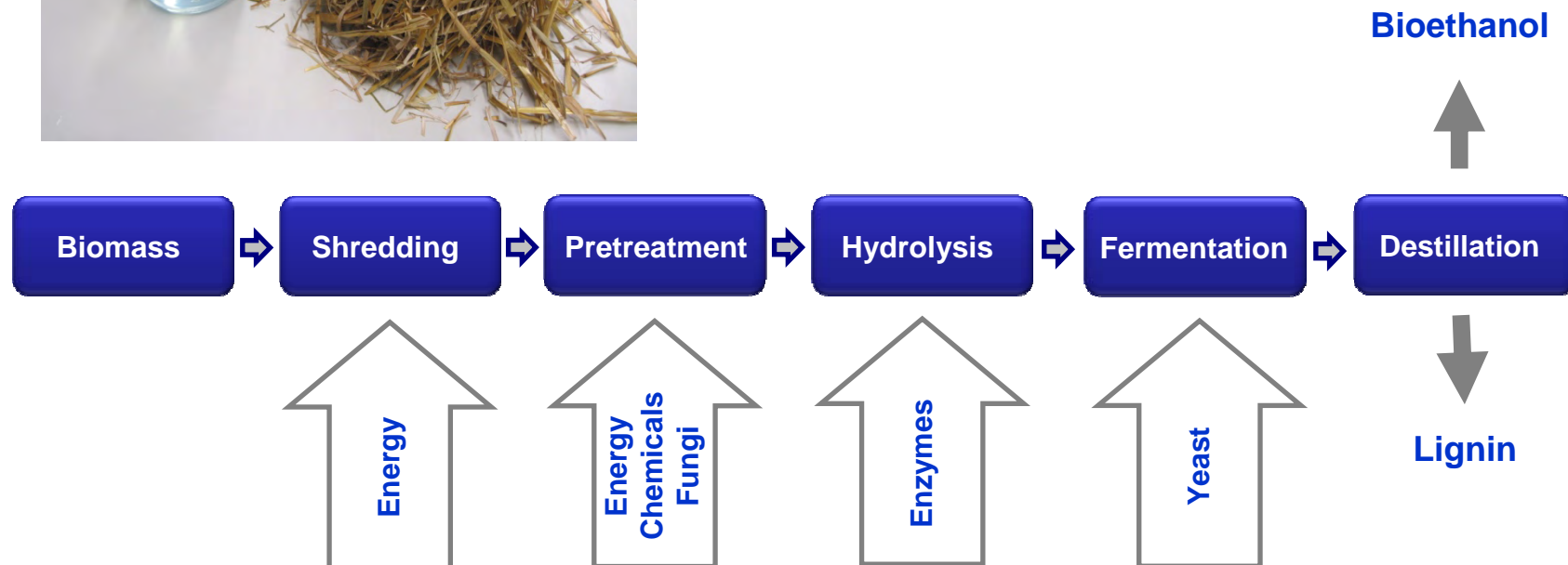


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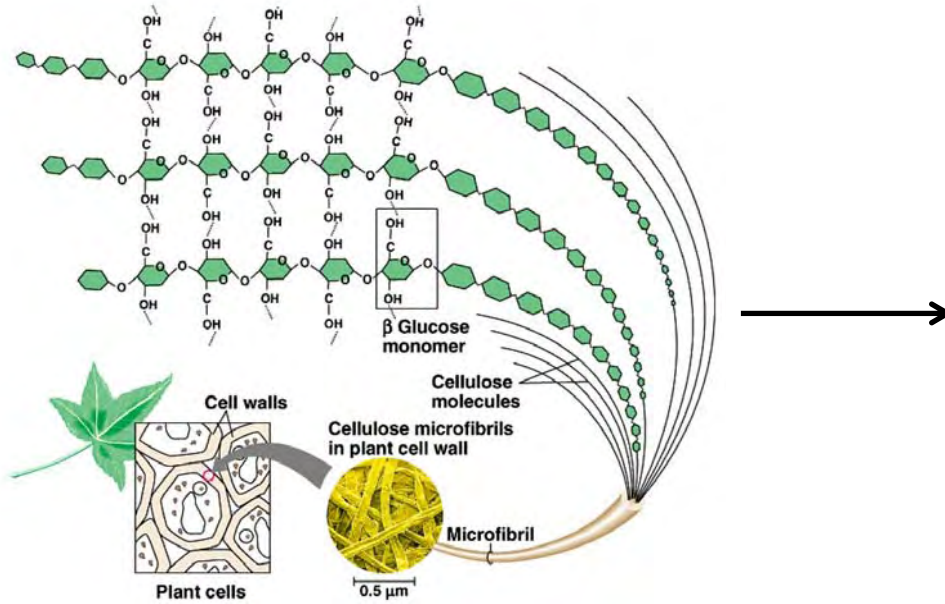
10 % Straw
→

207 kg Ethanol/t
2,6 % Vol. Ethanol





„Basic Process“ Wels





„Basic Process“ Wels



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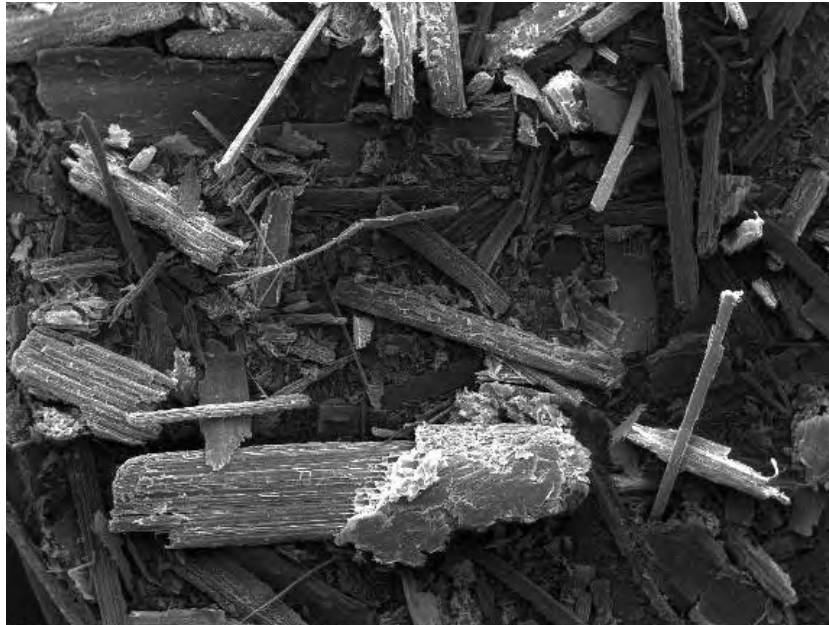




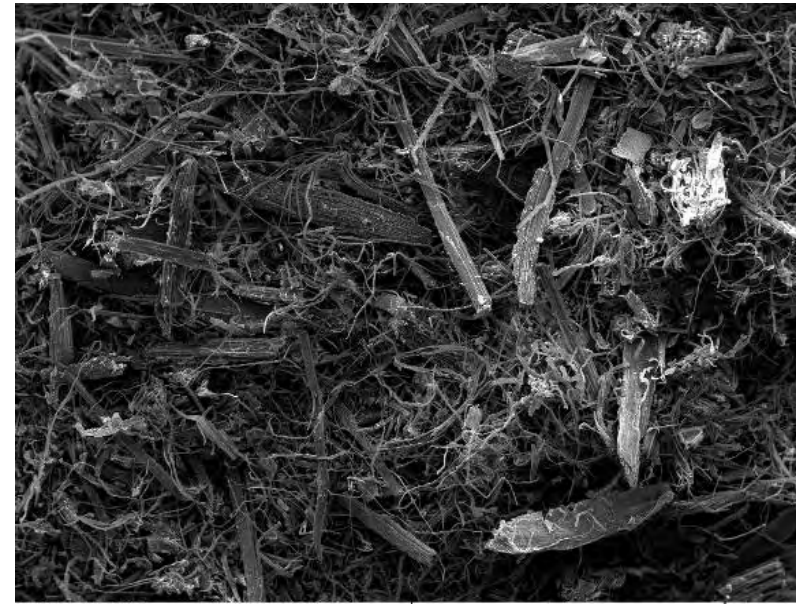
„Basic Process“ Wels



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SEM MAG: 60 x Det: SE Detector
SEM HV: 20.00 kV Date(m/d/y): 03/20/08 2 mm VEGA\\ TESCAN
Vac: HiVac Device: VEGA II LMU fh ooe



SEM MAG: 60 x Det: SE Detector
SEM HV: 20.00 kV Date(m/d/y): 03/20/08 2 mm VEGA\\ TESCAN
Vac: HiVac Device: VEGA II LMU fh ooe

Straw untreated

Straw treated

Yield 95 %
→

200 kg Ethanol/t
2,5 % Vol. Ethanol



Advanced Bioethanol Process



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20 % Straw



414 kg Ethanol / t
5,2 % Vol. Ethanol



Advanced Bioethanol Process



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30 % Straw



621 kg Ethanol / t
7,8 % Vol. Ethanol



Advanced Bioethanol Process



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40 % Straw



828 kg Ethanol / t
10,2 % Vol. Ethanol



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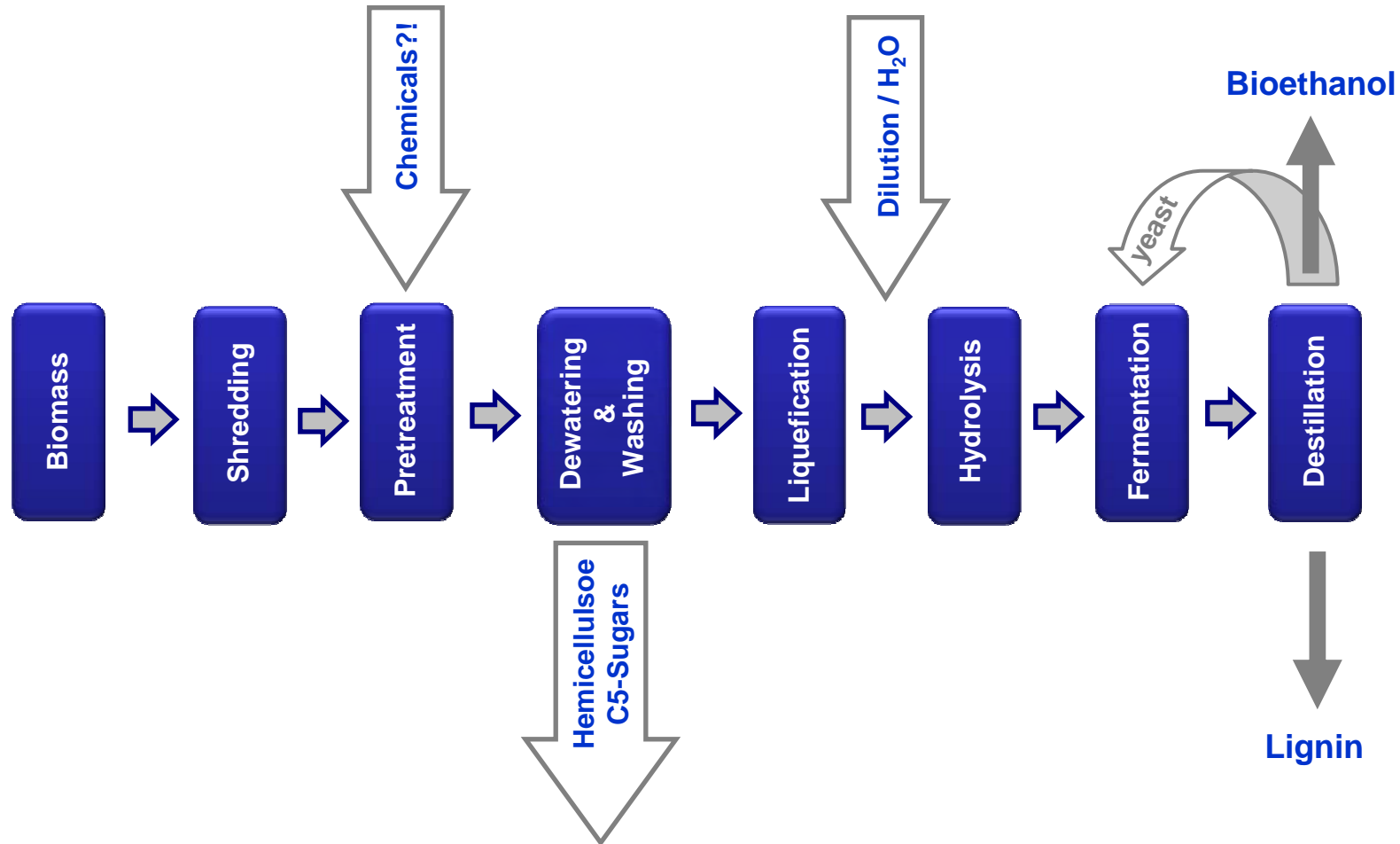
How to dissolve 40 % straw?



Advanced Bioethanol Process Inbicon Process

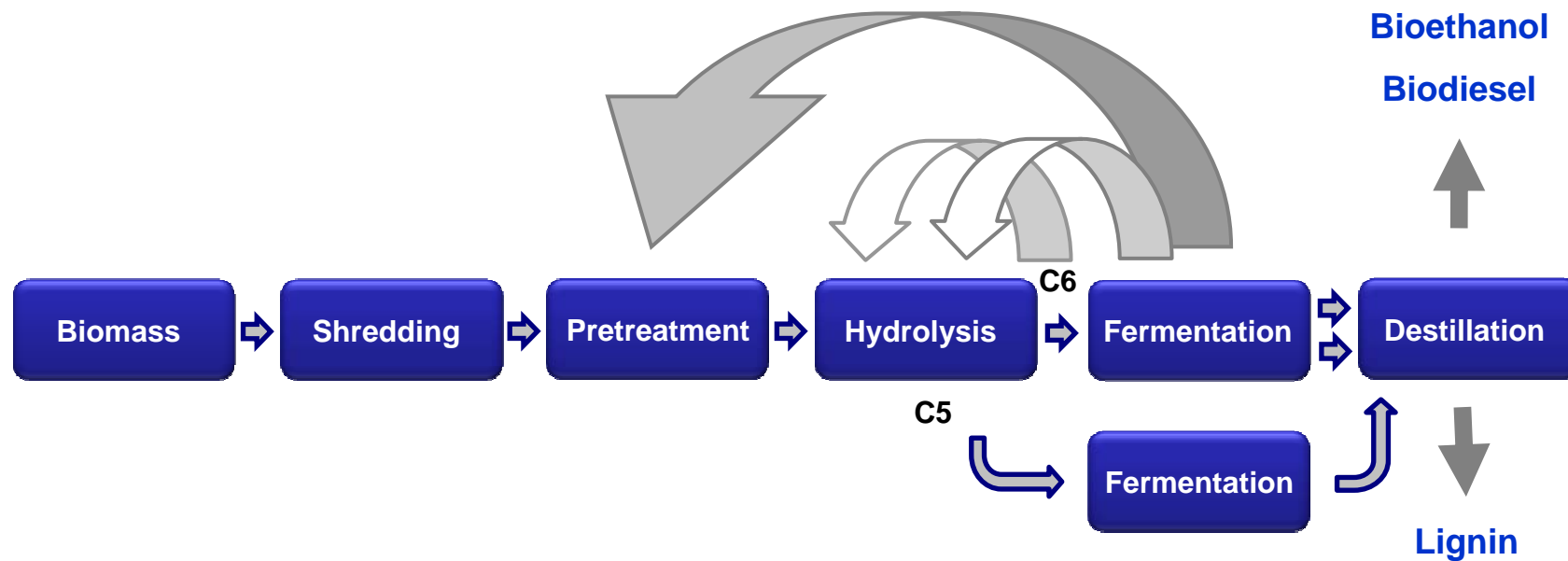


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Advanced Bioethanol Process „Wels Process“

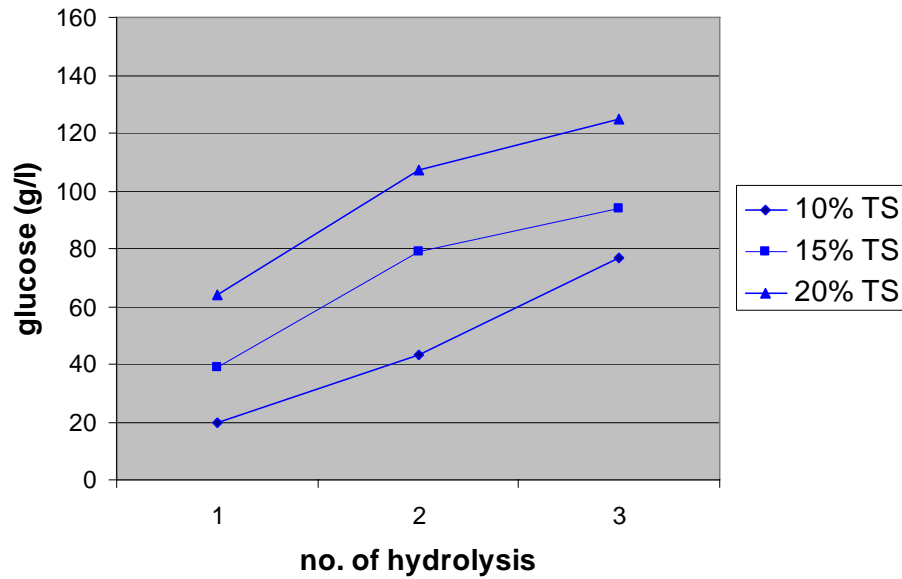




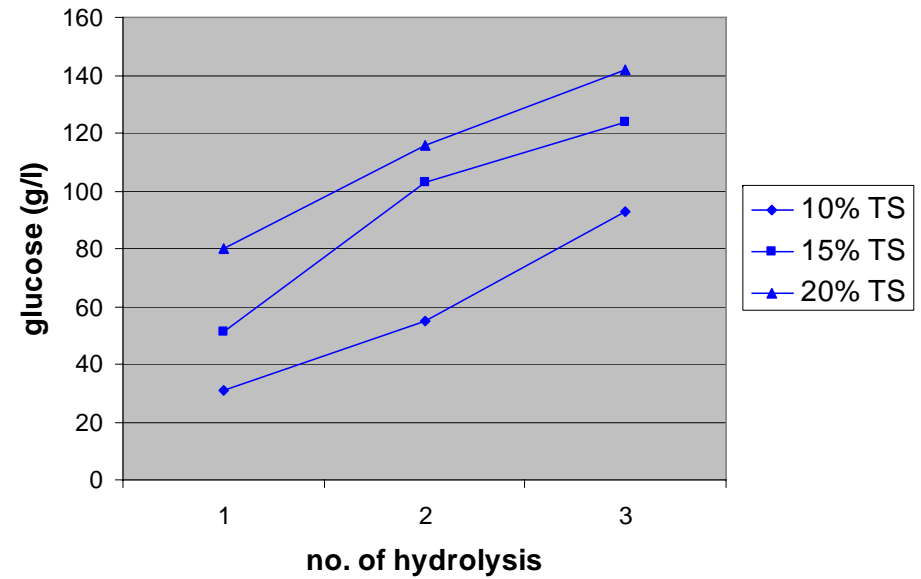
Results „Wels process“



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Standard assay



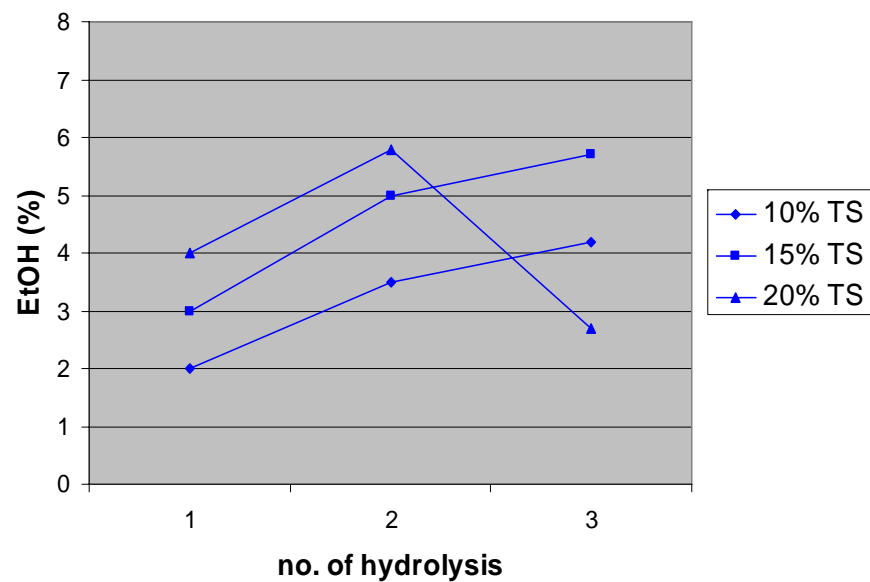
Inhibitor control



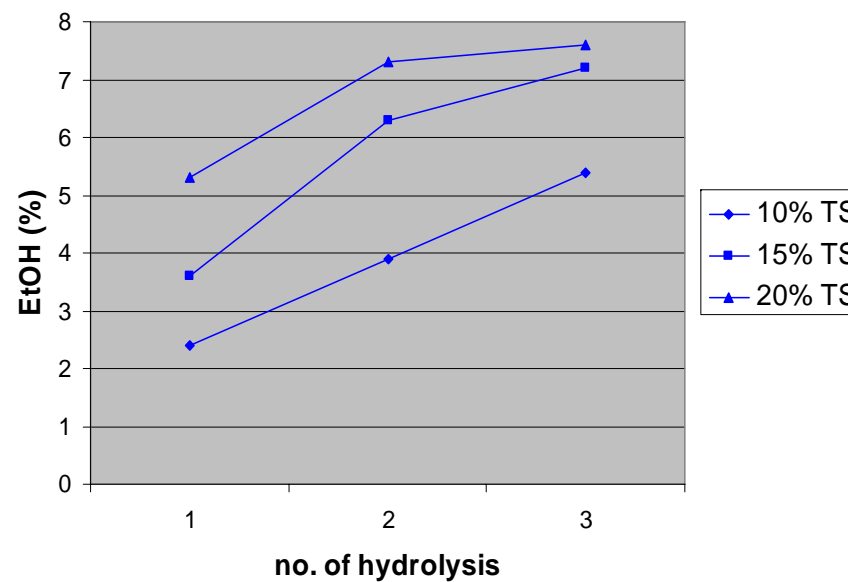
Results „Wels process“



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Standard assay



Inhibitor control



Bioethanol Potential Austria

Residual Materials incl. Wood



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	Straw	Recycled paper	Wood unused	Total
Quantity tons pa available	2.000.000	800.000	6.000.000	
Usage rate	50%	50%	25%	
Tons pa	1.000.000	400.000	1.500.000	
Cellulose content	40%	80%	40%	
Yield sacharification	90%	90%	18%	
Yield fermentation	95%	95%	65%	
l Bioethanol / ton	342	684	47	
m3 Bioethanol pa	342.000	273.600	70.200	685.800
Total Mileage(6 l/100 km)	5.700.000.000	4.560.000.000	1.170.000.000	11.430.000.000
Average mileage Km	15.000	15.000	15.000	
No of cars	380.000	304.000	78.000	762.000



Scenario: Complete replacement of fuel by means of Bioethanol in Austria



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Agricultural area		1.375.822
Usage rate bioethanol production	33%	454.021
Extensive greenland / wasteland	ha	900.980
Usage rate	33%	297.323
Intensive grassland	ha	909.407
Usage rate	33%	300.104
Total	ha	1.051.449
Ethanol Yield Crops	m³ p.a.	4.894.495
Ethanol Yield Straw	m³ p.a.	2.796.855
Total	m³ p.a.	7.691.349
Rate of substitution	%	100



Scenario: Complete replacement of fuel by means of Bioethanol in Europe



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Agricultural area		180 Mio ha
Replacement by 1st generation EtOH	100 %	- 60 Mio ha
Replacement by 1st and 2nd generation EtOH	100%	- 40 Mio ha
Replacement by 1st and 2nd generation EtOH incl. C6 and C5	100 %	- 30 Mio ha
Increase productivity agriculture	10 %	+ 18 Mio ha
Intermediate crops	10 %	+ 18 Mio ha
Replacement of soy beans etc.	10 %	> 20 Mio ha
Saldo		++++



Research on bioethanol 2 G must be interdisciplinary



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Thanks to our research group



Thanks for your attention