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Biobutanol production from high sugar content wastewaters

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BIOBUTANOL PRODUCTION FROM HIGH SUGAR CONTENT WASTEWATERS

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INTRODUCTION

Low Costs

Sustainability

Availability

Substrate



High Sugar Content Beverages

Biomass



(2)Acet

Acet

CO₂

$NADH_2$

(2)Ethanol

Butyrate

ATP

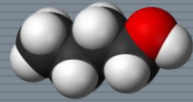
Butyryl-CoA

Food industry waste or illegal seizures of goods

Ethanol

$2NADH_2$

IN THIS WORK



**SYNTHETIC
MEDIUM**

Batch tests using single
representative sugars

Batch tests using a
mixture of the 3
sugars

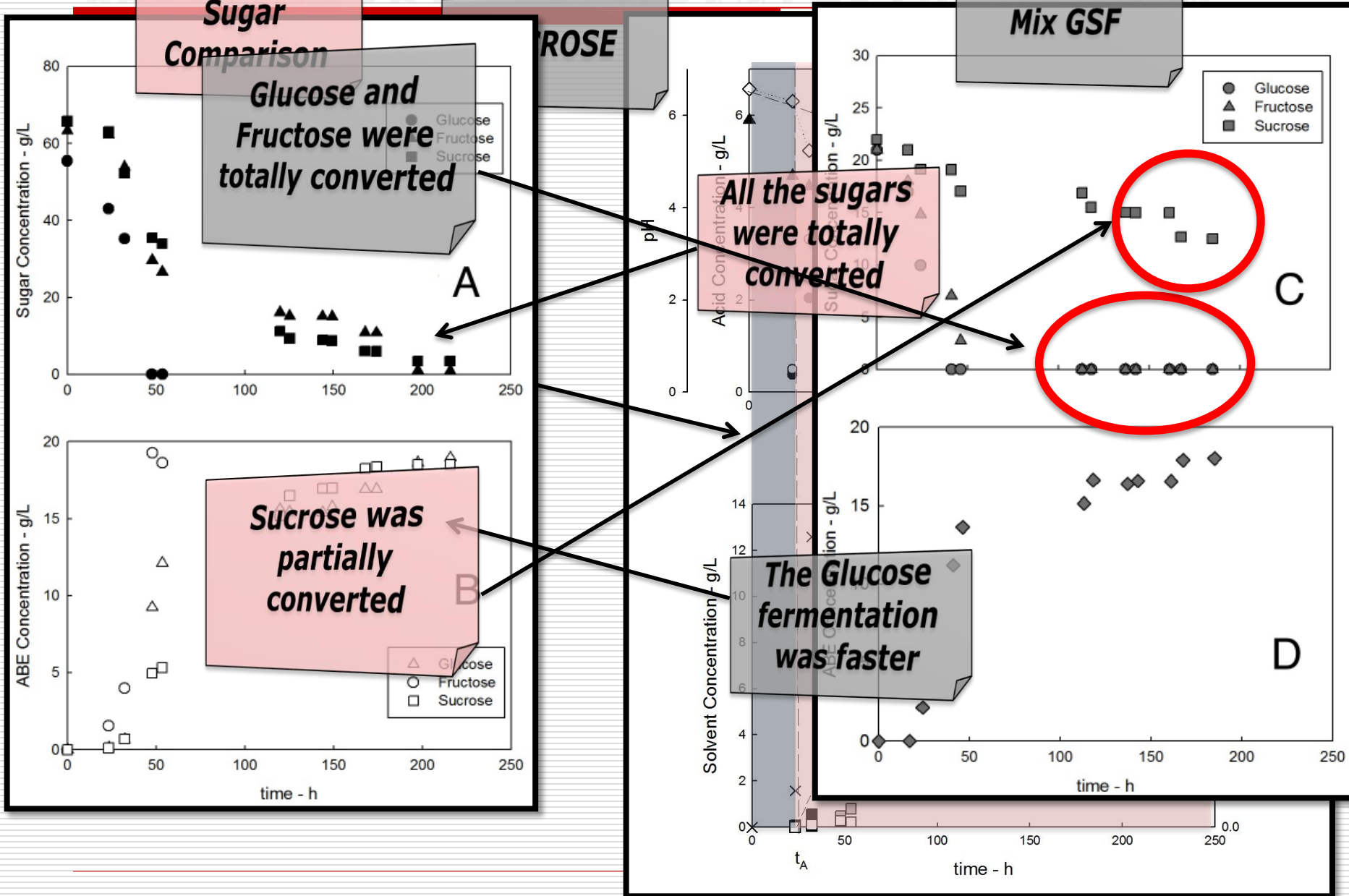
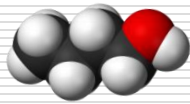
Kinetic characterization



**COMPLEX
MEDIUM**

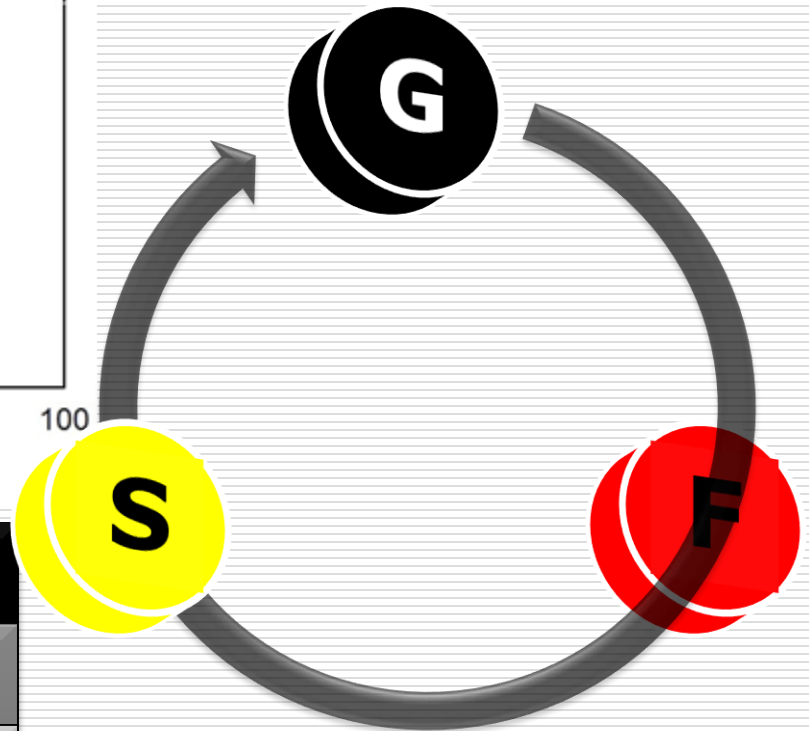
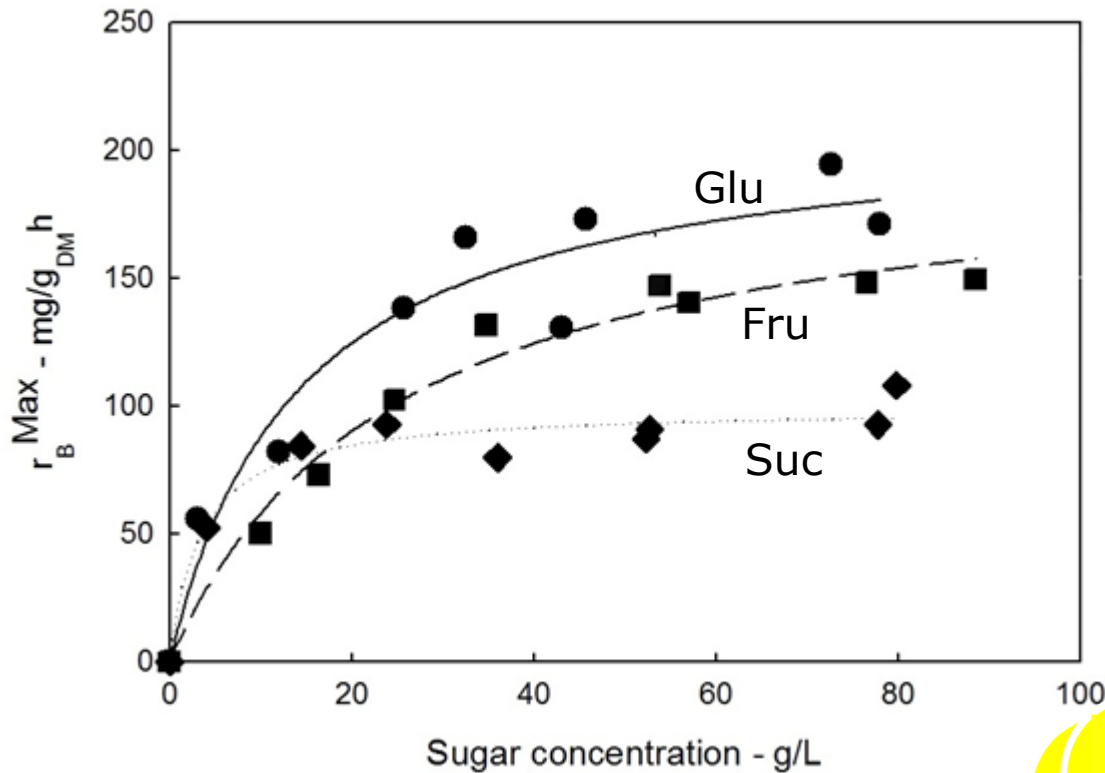
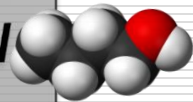
Nutritional Factors	Concentration [g/L]
Sugar	60
YE	5
NH ₄ Cl	2
K ₂ HPO ₄	0.25
KH ₂ PO ₄	0.25
MgSO ₄	0.25
FeSO ₄	0.01
MnSO ₄	0.01
CaCO ₃	5

PRELIMINARY TESTS: SYNTHETIC MEDIUM



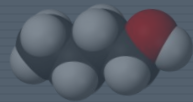
PRELIMINARY TESTS: KINETICS

Max specific Butanol production rate



	Glu	Fru	Suc
$r_B^0 - \text{mg/g}_{\text{DM}}\text{h}$	226	201	99
$k_d^0 - \text{g/L}$	18	24	3

IN THIS WORK



SUNTHETIC MEDIUM

Batch tests using single representative sugars

Batch tests using a mixture of the 3 sugars

Kinetic characterization



Nutritional Factors	Concentration [g/L]
Sugar	60
YE	5
NH ₄ Cl	2
K ₂ HPO ₄	0.25
KH ₂ PO ₄	0.25
MgSO ₄	0.2
FeSO ₄	0.01
MnSO ₄	0.01
CaCO ₃	5

COMPLEX MEDIUM

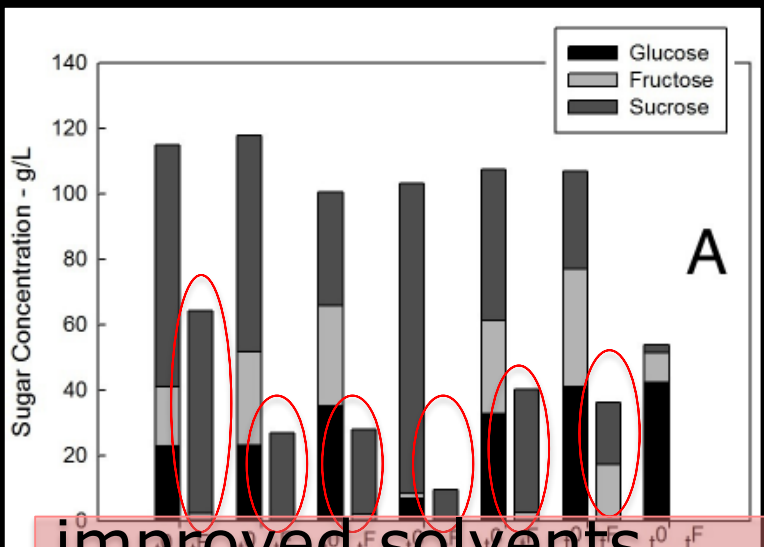
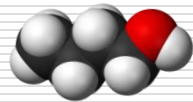
Fruit juices:
Pineapple & Pear

Syrups:
Lemon & Almond

Soft drinks:
Coca cola & Sprite

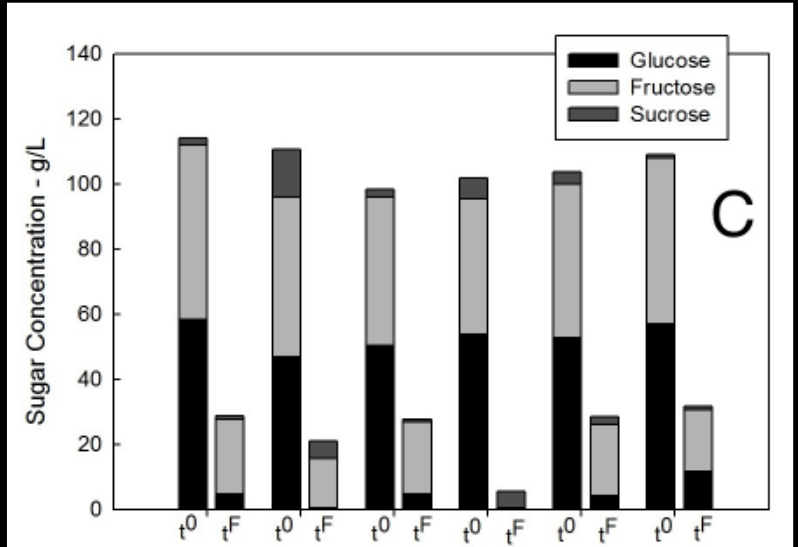
Sport drinks:
Powerade

COMPLEX MEDIUM



Supplement
medium (HSC)

NO GROW



initial pH

2.5-3

2.5-3*

2.5-3#

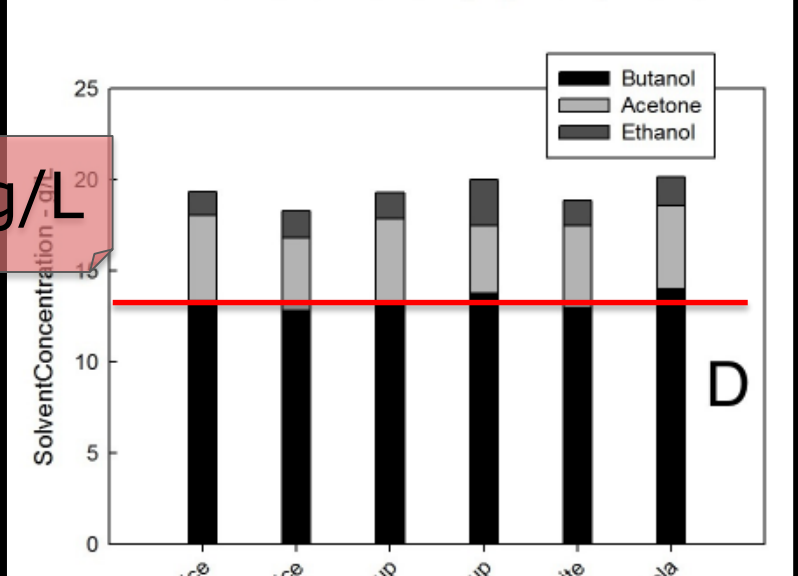
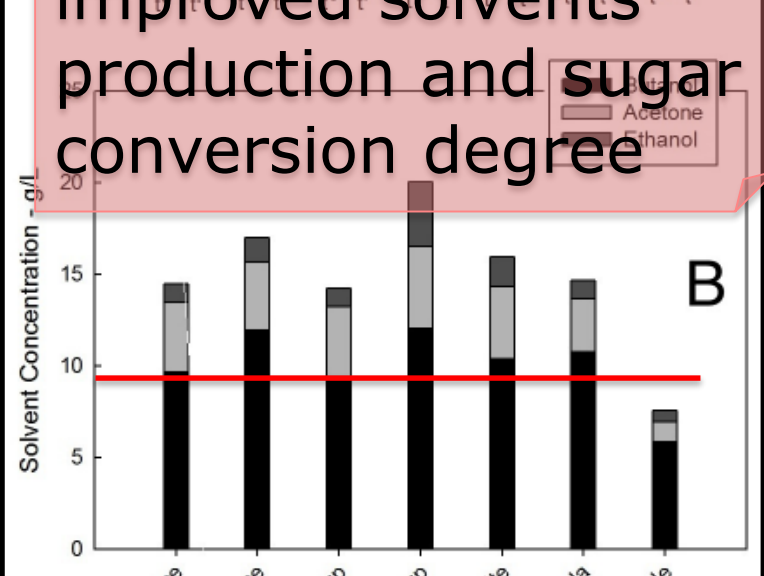
2.5-6#

2.5-3

2.5-3

2.5-3

improved solvents
production and sugar
conversion degree



13 g/L

a test

(HHSC)

disp

nutrient

fermenta

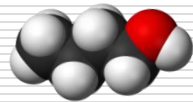
*before dilution

**after dilution (1:10 for the syrups and 2:3 for the pear juice)

Pineapple Juice
Pear Juice
Lemon Syrup
Almond Syrup
Sprite
Coca Cola
Powerade

Pineapple Juice
Pear Juice
Lemon Syrup
Almond Syrup
Sprite
Coca Cola

FINAL REMARKS



Synthetic Medium

*Single Sugar
(Glucose,
Fructose, Sucrose)
Batch Tests*

Sugars
Preferences
(CCF) Batch
Test
 $G > F > S$

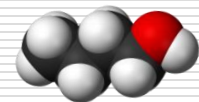
Kinetic
Characterization

Complex Medium

Fruit juices
Syrups
Soft drinks
Sport drinks

HHSCB+
gave the best
results

HHSCB+



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