



Implementing Advanced Concepts for Biological Utilization of Waste

Polish Testing with Food Waste.

Emilia den Boer,
Wroclaw University of Technology

Agnieszka Łukaszewska,
Marshal Office of Lower Silesia



Baltic Sea Region
Programme 2007-2013

Part-financed by the European Union
(European Regional Development Fund
and European Neighbourhood and
Partnership Instrument)

LOCATION: WASTE MANAGEMENT PLANT GAĆ
EXPERIMENTAL PERIOD: MAY-JUNE 2014



SUBSTRATES USED

- Potatoes peels



Moisture – 82%-87%



SUBSTRATES USED

- Kitchen/restaurant residues



PROCESS SETUP

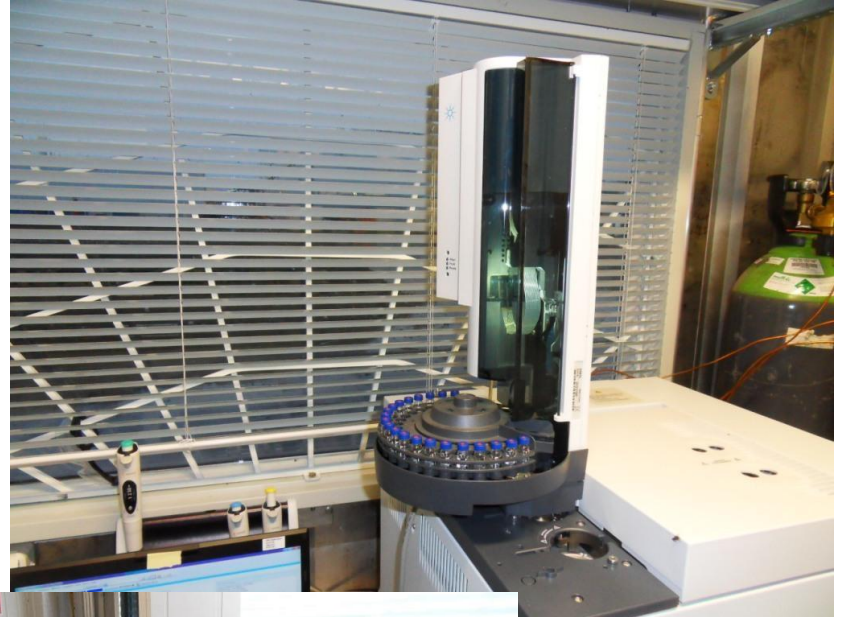
- Test duration app. 4 days of continuous run (24h/d)
- Stages:
 - Feeding (crushing)
 - Hydrolysis with the use of enzymes
 - Feeding the reactor, inoculation
 - Creating optimal conditions for microbes performing butanediol fermentation
 - Process control:
 - Temperature
 - Steering
 - Aeration
 - pH control
 - Glucose concentration control
 - Sampling and analyses with gas chromatography



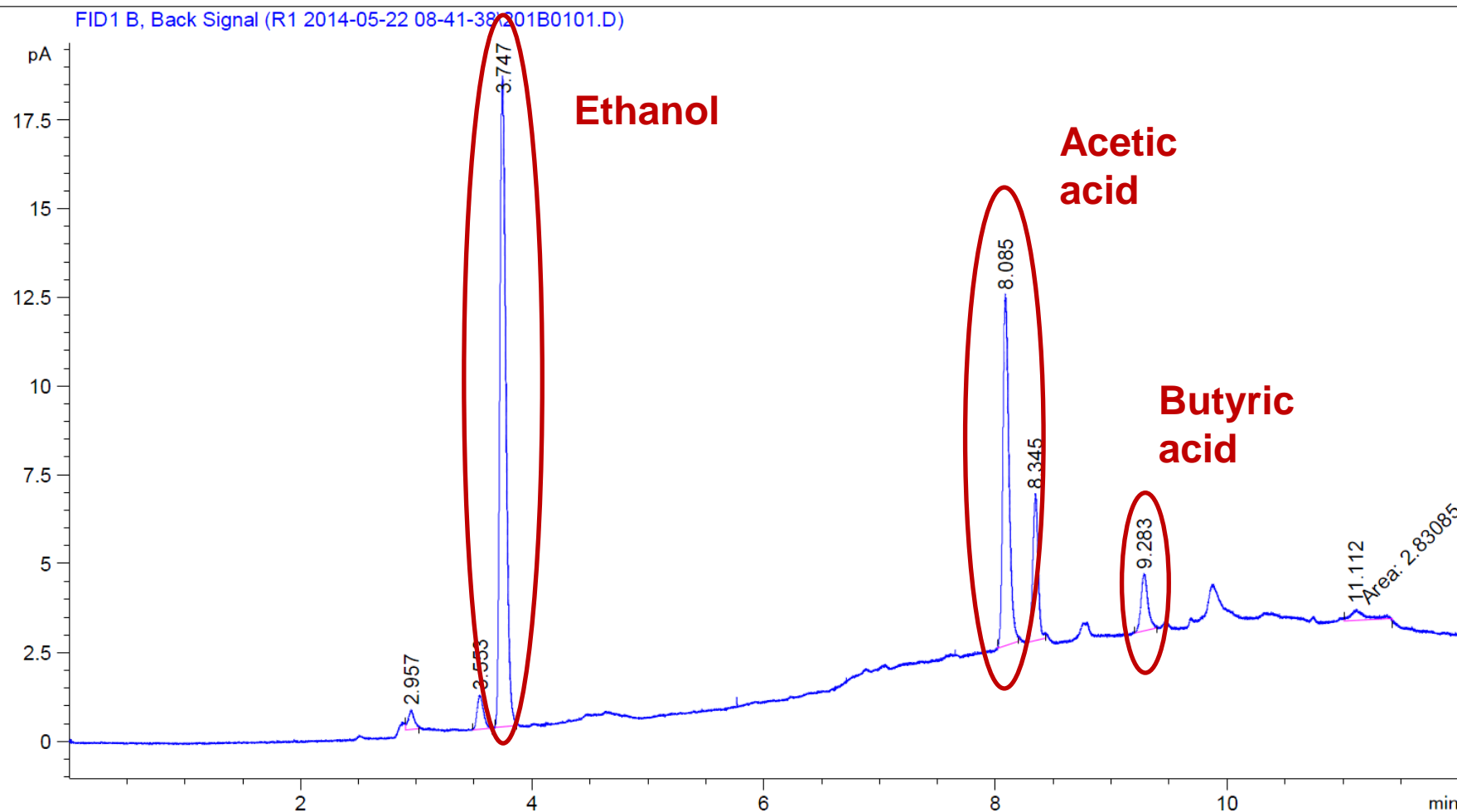
FINAL PRODUCT



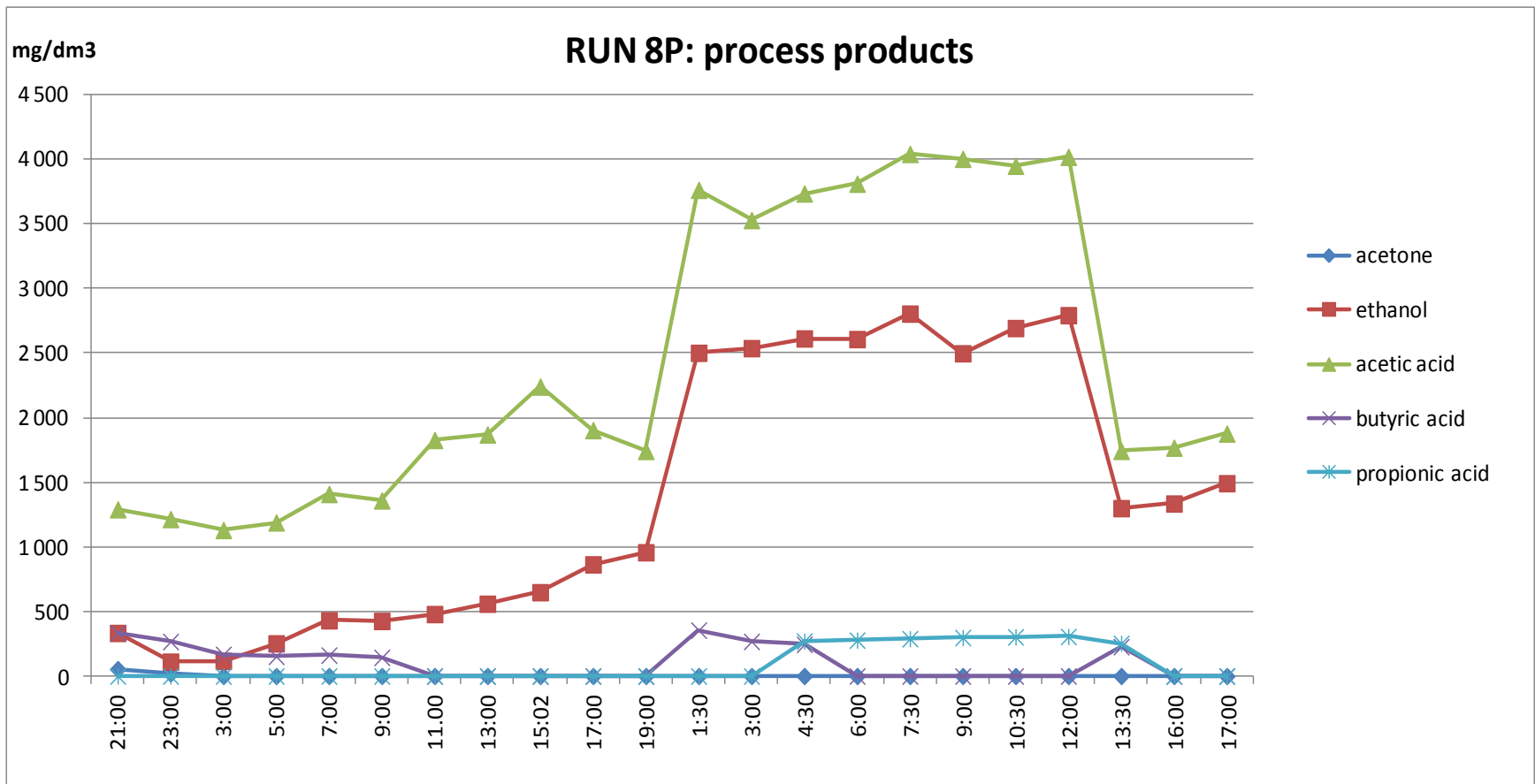
SAMPLES PREPARATION AND ANALYSES WITH GC



RESULTS – EXEMPLARY TRIAL (8P)



RESULTS –RUN 8P – POTATOES PEELS



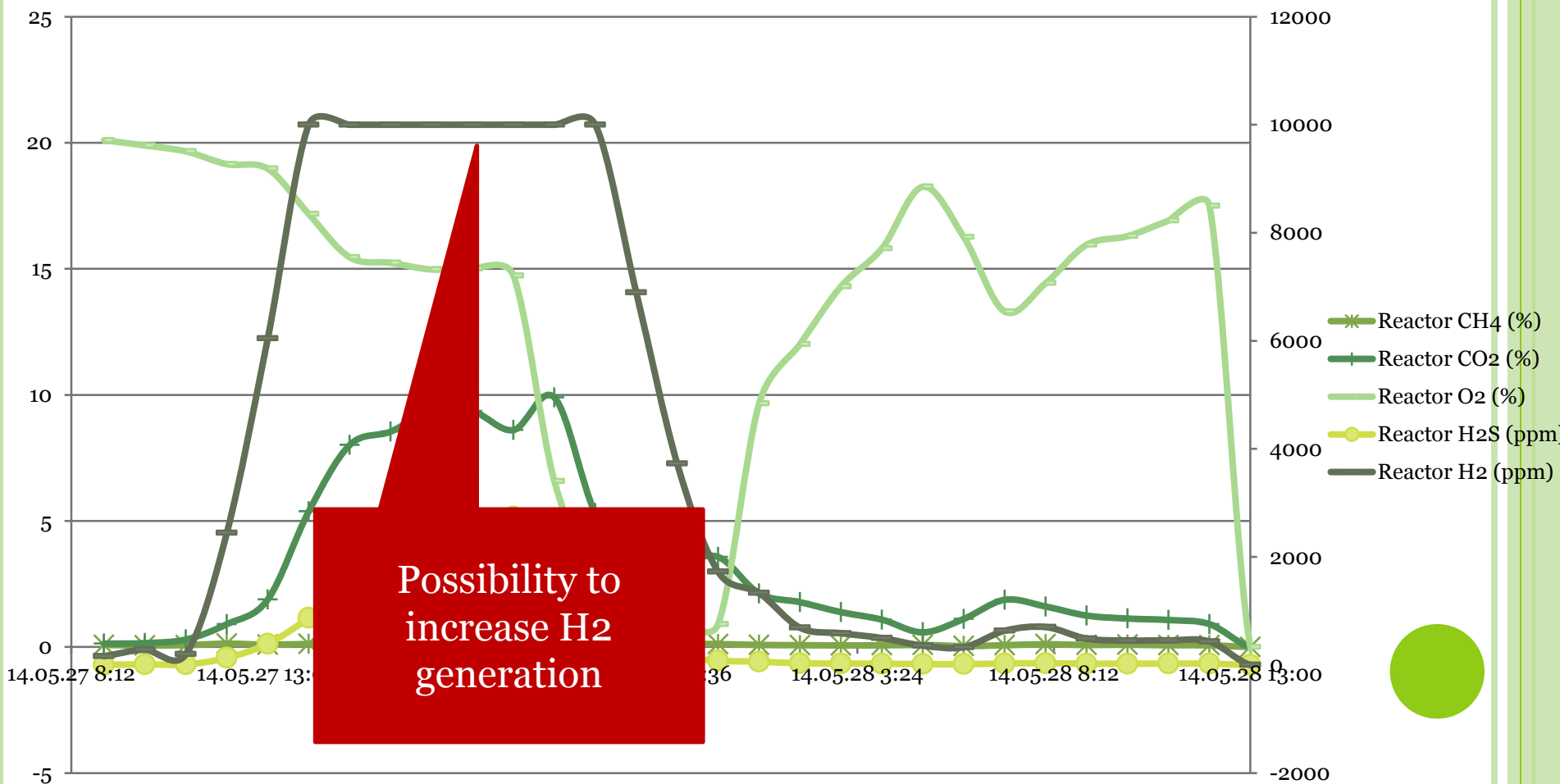
RESULTS OF EXPERIMENTS

- In the first phase of experiments mostly **ethanol production** – at the level of app. 30-36 g/kg dry mass (app. 1 l per reactor (0,08 g/g glucose))
- Additionally possibility to produce other products – e.g. **hydrogen**
- Low concentration of other fermentation products when the potatoes peels were used as single substrate

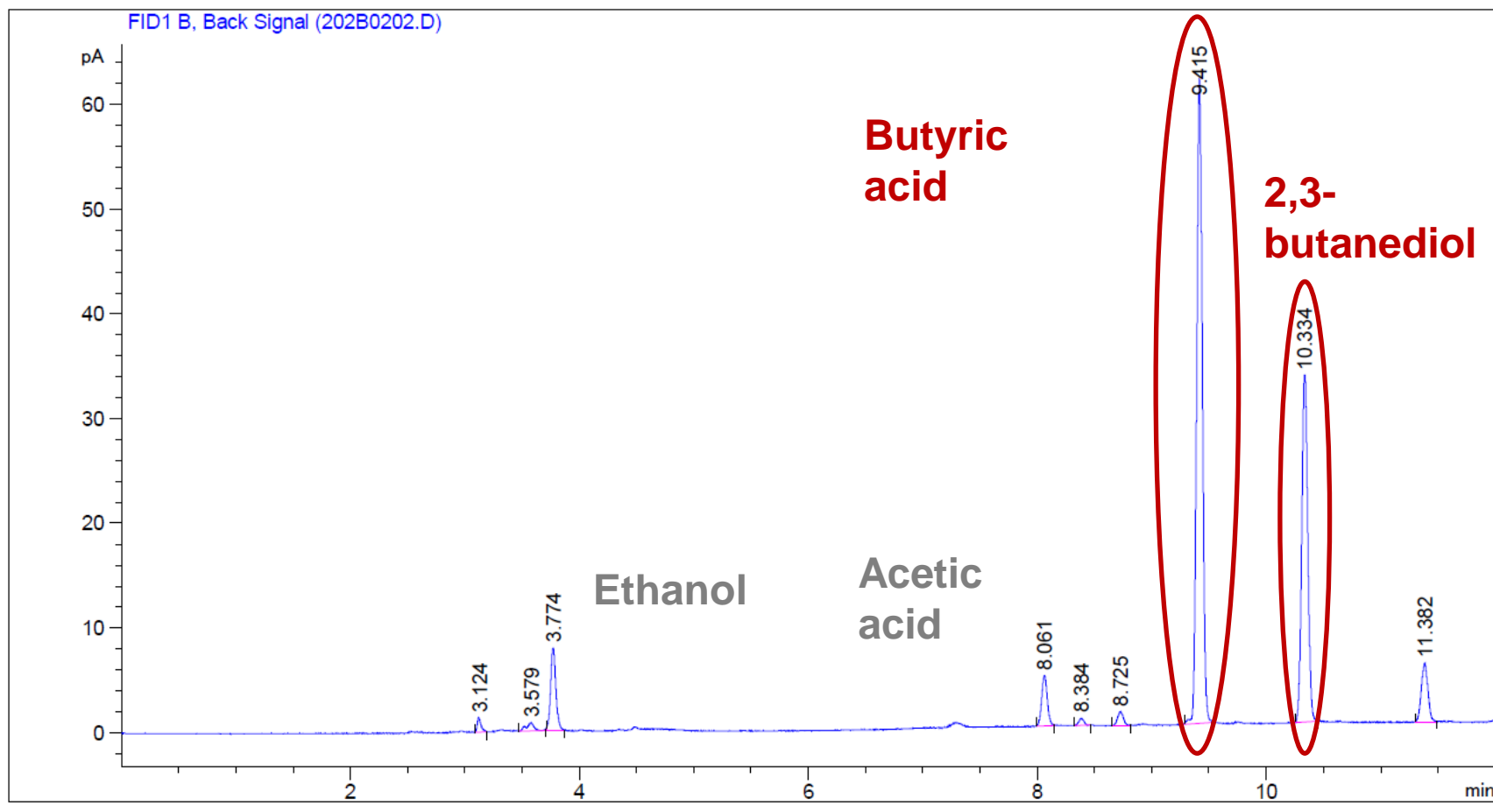


COMPOSITION OF GASES GENERATED IN THE PROCESS

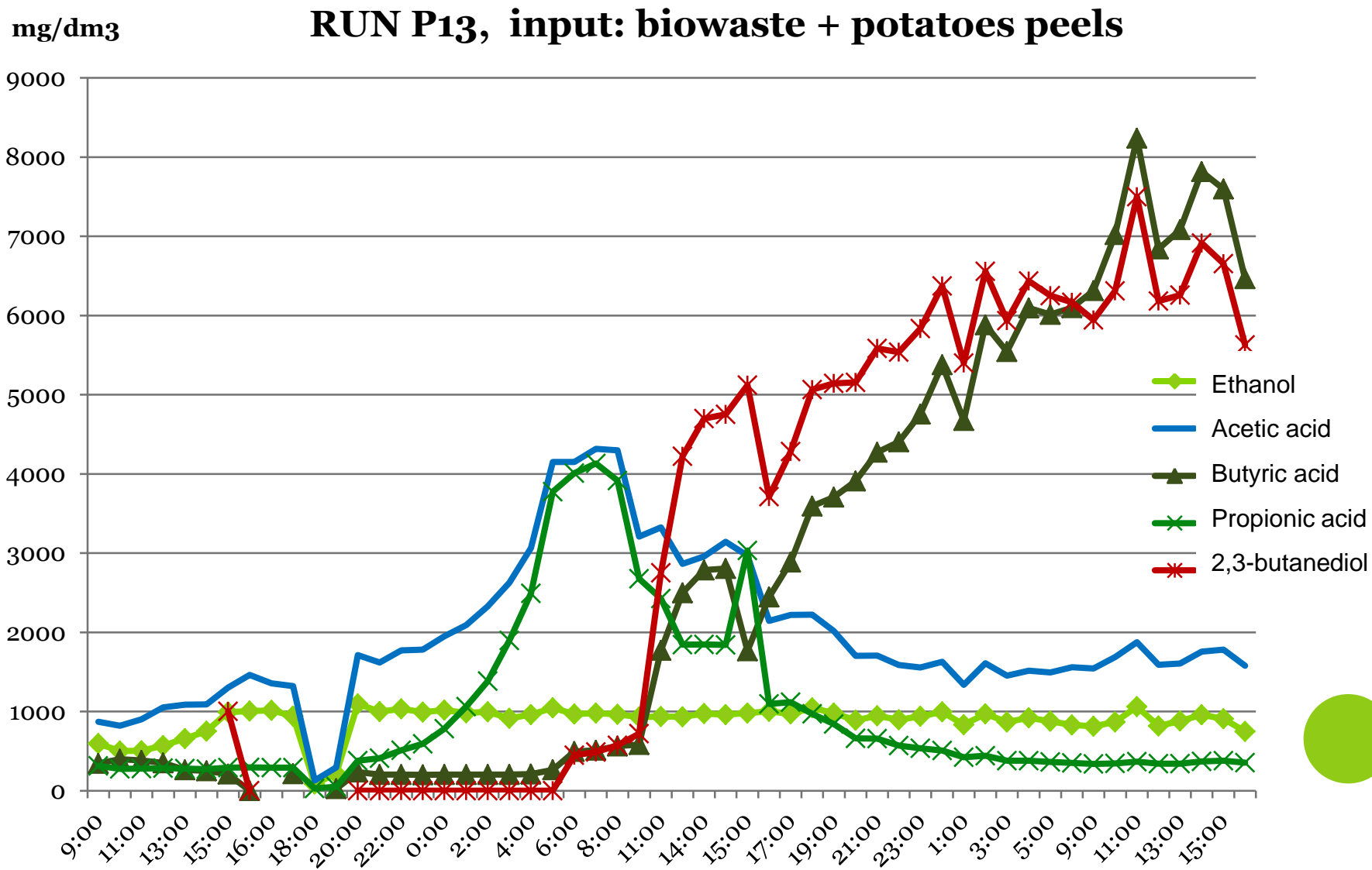
RUN P9 – gas composition



RUN P13, INPUT: BIOWASTE + POTATOES PEELS



GENERATION OF 2,3-BUTANEDIOL AND OTHER PRODUCTS: BUTYRIC ACID, PROPIONIC ACID

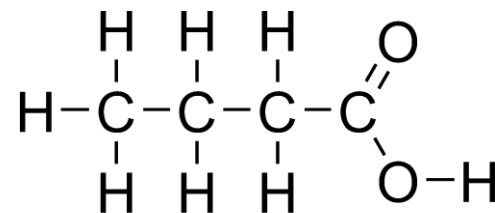


RESULTS OF EXPERIMENTS WITH THE USE OF BIOWASTE AND POTATOES PEELS

significant products

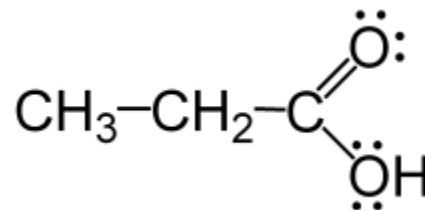
- **Butyric acid**

used in aromas production, paints
and medicines



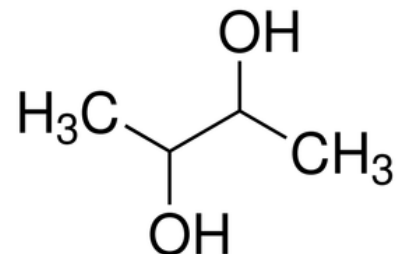
- **Propionic acid**

Used in food industry
food preservatives E-280,
used for bread

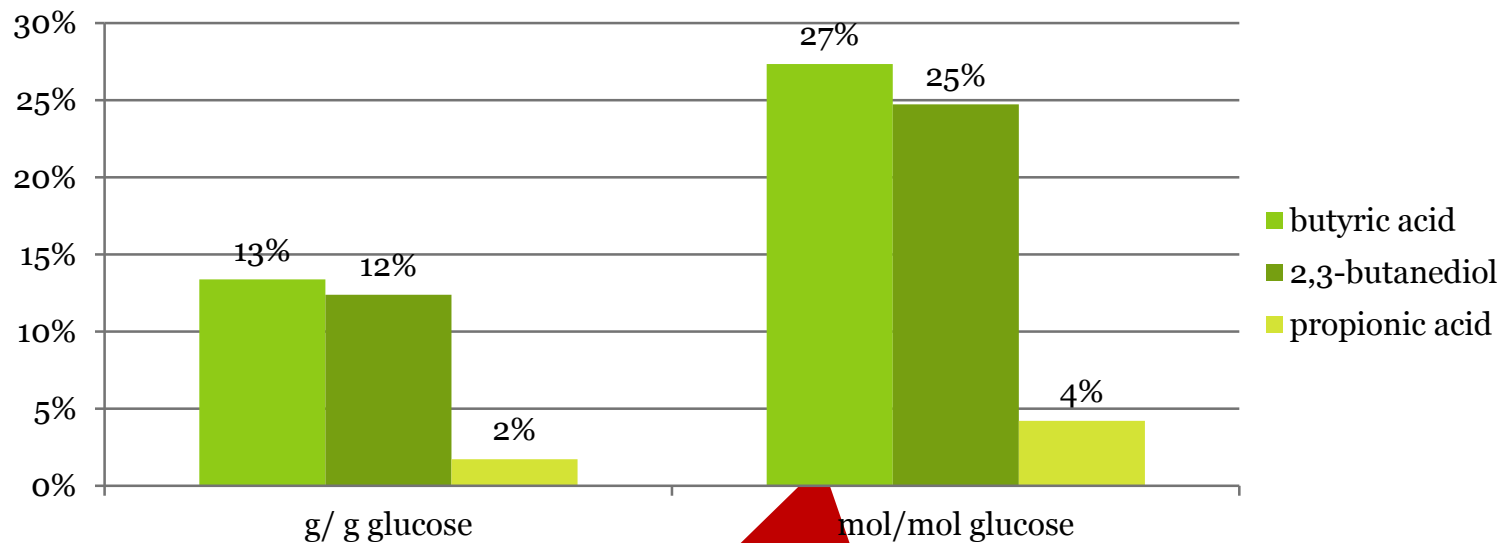


- **2,3-butanediol**

valuable substrate in the production of pesticides ,
pharmaceuticals , plasticizers ,
rubber, fragrance and many others



CONVERSION EFFICIENCY



Very promising results.
In the literature, even above 80%
mole 2,3-BD / mole glucose.
Need for further research



CONCLUSIONS

- Interesting results after a short time trial operation
- Pilot plants allow for verification of the results of the laboratory in semi-industrial scale
- Biorefining technology - an innovative solution for industry
 - Biowaste treatment plants
 - Food industry
 - Wastewater treatment plants
- The possibility of using biowaste - high potential of Lower Silesia
- There is a need for continuous optimization in order to improve the economics of the processes



abowe

Implementing Advanced Concepts for Biological Utilization of Waste



Baltic Sea Region
Programme 2007-2013

Part-financed by the European Union
(European Regional Development Fund
and European Neighbourhood and
Partnership Instrument)

More information:

www.abowe.eu