

Biomass Based Chemicals for the Oil and Gas Industry

Gas Sweetening using Sugars

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Green chemistry's 12 principles – our focus areas

1. Prevent waste.

4. Design safer chemicals and products.

7. Use renewable feedstocks.

10. Design chemicals and products to degrade after use.

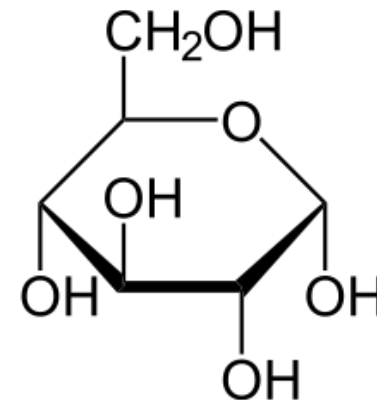
The ideal biomass for production chemicals

Requirements

- Cheap and abundant
- Biodegradable
- Safe and easy to handle
- Renewable

Candidate: Carbohydrates

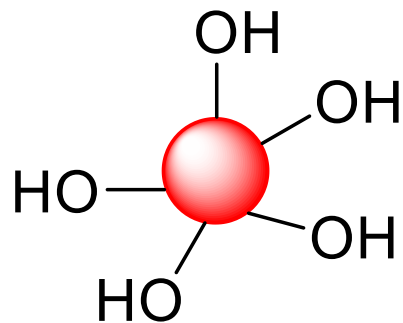
- Glucose the most abundant molecule in the biosphere.
- A multi-functional platform
- Commodity chemical
- Yearly production >185 mio tons
- Price ~ 0.4 \$/kg



Our Approach

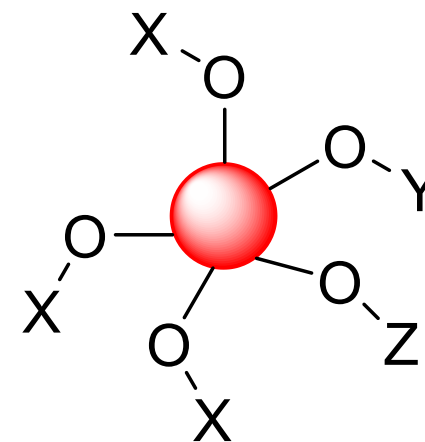


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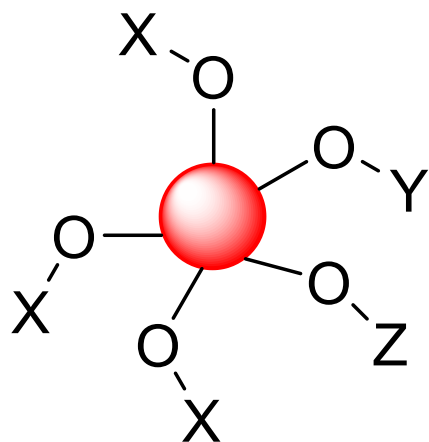


3-6 Handles

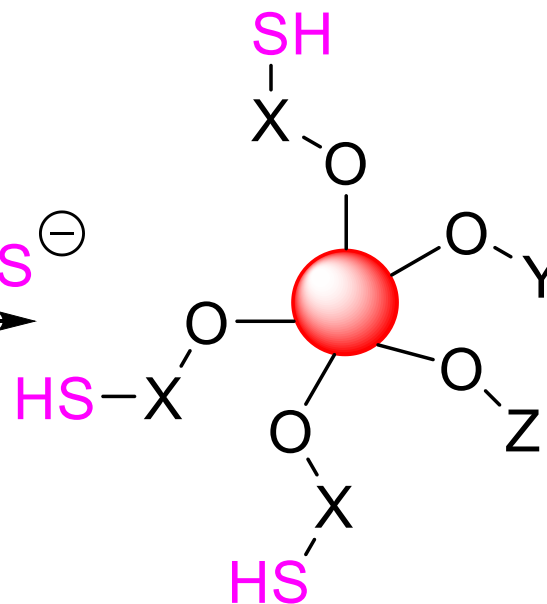
Organic
Synthesis



More functions in
one molecule



H_2S or HS^-

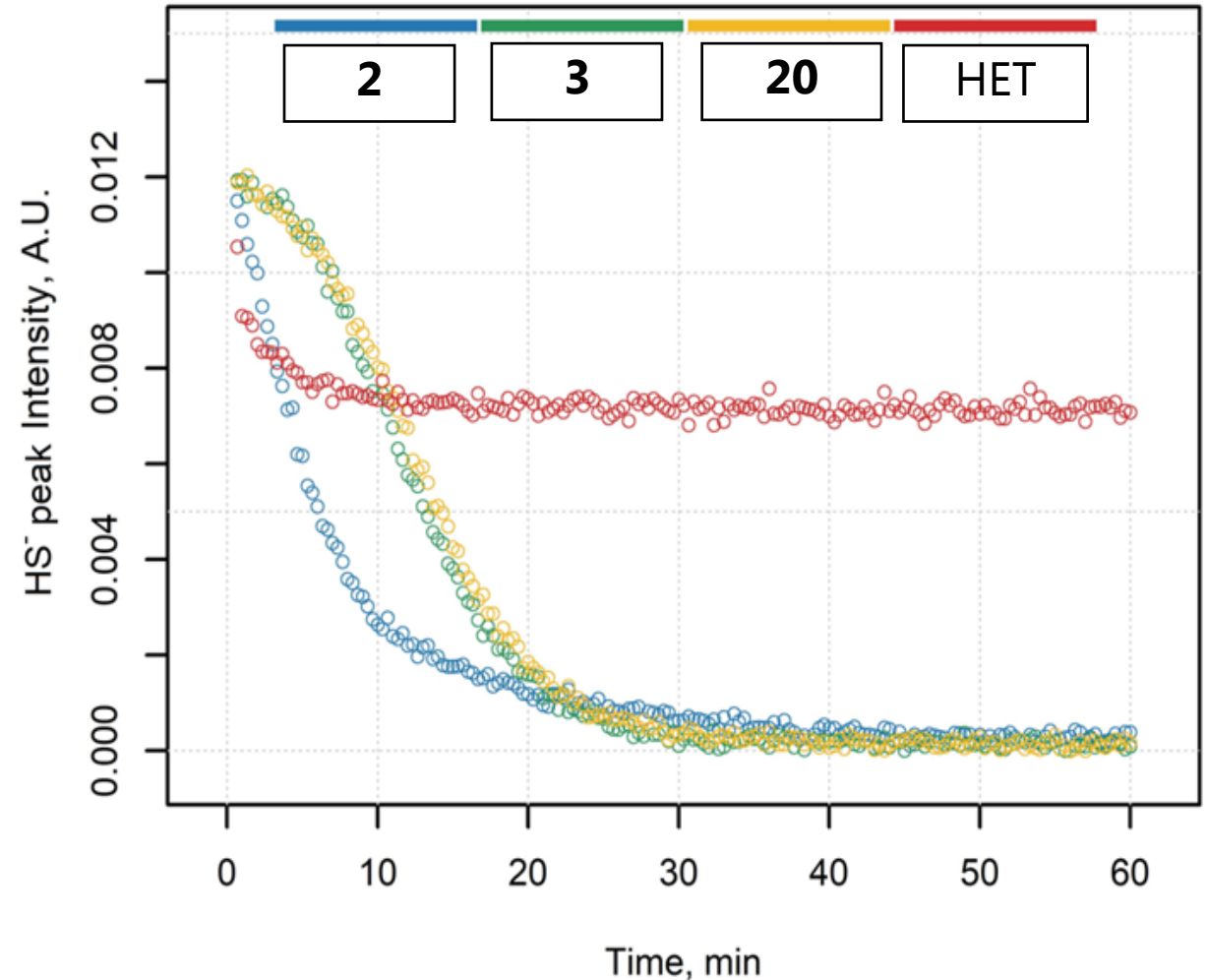
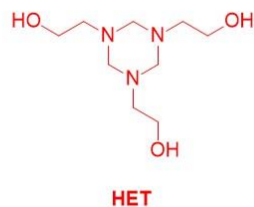
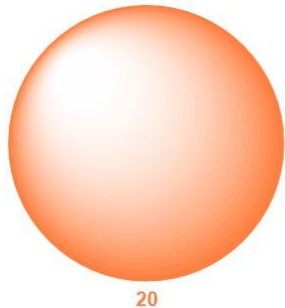
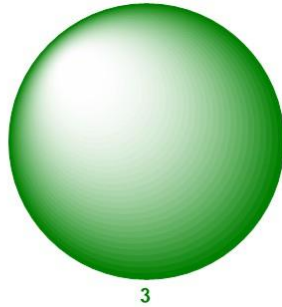
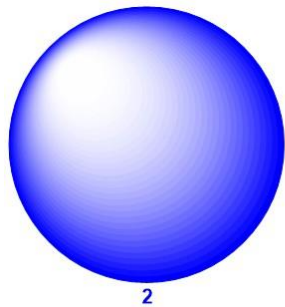


Raman study collaboration

Carried out by Assoc. prof. Marco Maschietti and Ph.D student Fernando Revelo from Aalborg university

Scavenger + HS⁻

- Initial conc.: Equimolar - 100 mM
- Temperature: 80 °C
- Initial pH: around 10
- Experiment time: 1 hour
- Raman online acquisition every 30 sec



Low eco-toxicity

Material	Microtox EC ₃₀ min, 50 (A. fischeri) [mg/L]	Marine algae EC _{72h} , 50 (S. Costatum) [mg/L]	Freshwater algae EC _{72h} , 50 (R. subcapitata) [mg/L]	Freshwater crustacean LC _{48h} , 50 (D. magna) [mg/L]
A2	1344 [1191-1499]	>100	>100	>100
A2_C	>2000	>100	>100	>100
A3	1425 [1105-1746]	>100	>100	>100
A50	1053 [814-1291]	>100	>100	>100

Participants

UCPH – CHEM: Synthesis and Analysis

PI: Christian Marcus Pedersen

PhD student Asger Koue (from 15/12-2020)

AAU – Esbjerg: Raman spectroscopy - Kinetic studies

Assoc. Prof. Marco Maschietti (AAU Esbjerg)

Assoc. Prof. Sergey Kucheryavskiy (AAU Esbjerg)

PhD student Fernando Raul Montero Revelo (from 15/11-2020)

DTU – KT: Computational modelling

Assoc. Prof. Martin Andersson (DTU)



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Jørgen Rentler Næumann; Yanina Ivanova; Charlotte Lassen

Phase behaviour:

Simon Ivar Andersen (DTU Offshore); Liridon Aliti (DTU Offshore)

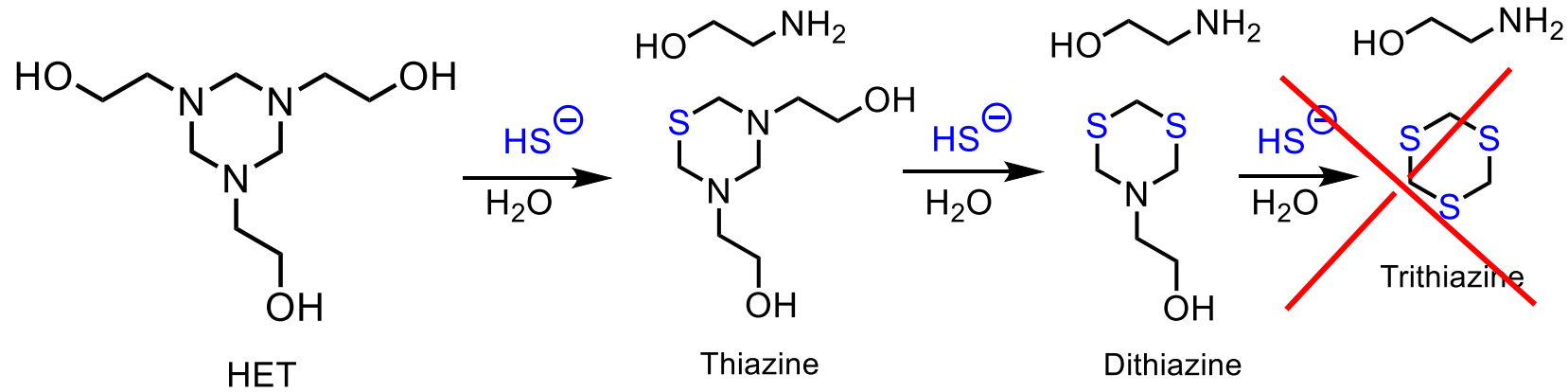
Ecotoxicology, biodegradability and risk assessment

Anders Baun, Philipp Mayer and co. (DTU Sustain)



H₂S Gas sweetening – current technology

Triazine derivatives



Formaldehyde releasers

