

Passwords:

Lab computer (potentiostat): ~~Secret~~ Secret 1231

GC computer: Secret 123

BTG computer:

New GC computer software: Secret 1231.

$\eta_{ohm} \rightarrow R$

=
• ECSA

f_0

at high frequency: ohmic resistor

at low frequency = charge transfer res.

Proposed protocol

→ first do ECSA in H_2SO_4

then pur flush the cell w/ electrolyte

→ then bubble

→ then cell test

→ then ECSA in H_2SO_4

Tips

Tim → proactive

→ be more at UT

→ planning → punctual

Top:

→ motivation

→ technical skill

→ communication skill

→ team player.

Timo → punctual & lack of
communication

→ explainable

→

Top: motivation

• technical skills



radical:
oxidation

olution

ic

the
user
exhibit

1M

Prepare 0.3 L of acetic acid-sodium acetate 1M, pH=2.6

Lab

water, NaOAc

Acetic acid adjust pH

240 mL 3.06

25g / 23.83 / 3.67 molar mass 110.5

1.00g/mL

1.00g/mL 0.1M HCl + 0.5M NaOH

BTG

New

1M, pH 4.0

240 7.35g

22.16g / 22.12m / 4.0

1M pH 4.0

240 24.09

11.08g / 10.56m

1M pH 5.8

240 38.30

1.62 / 1.5443m

[Handwritten scribbles]

pH 5.7

p.m.V

V = 91m

observed hydrogen radicals could react with allene radicals. suitable solvent methanol: due to widely indicated oxidation because of carboxylate layer.

"cations" ion react to ester, alcohol in aqueous solution or to oligomers in alcoholic solutions. \rightarrow reaction leading to ethers in ester: higher-mers " " oligomers: run rather

water/acetate



Coarse water on platinum aqueous acid solution. particles on a surface covered by a dipole barrier. The film of CH_3COO^- rejected with appearance of co-adsorbed oxide.

9 mandatory course.

Ind Ornation:

16 weeks | : wk is the preparation time of electrodes of BDD

(16 weeks)
How many BDD: 30/20: but can't tell until i get results of reproducibility

They have cell: 3.14 cm^2 , 16 cm^2 , 4π , 81 cm^2 :
 Note, they wanted to evaluate divided cells

for PEs { 313 cm, 10x10 cm
to begin with
also prepare small electrode sticks for
baker type extra heating

15 pt, BDD elaborate for minutes by

- compound
- conditions.
- pure u_1 molecules...

{ process . . . }
} or use.
{ Friday afternoon captured. }

Program meeting Friday 7th line of program meeting

Private: { } { }

② Standard-

③ gaseous products so what about the side products.
| esters, aldehydes, alcohols

④ fractionation of Kraft lignin

aldehydes in ketone : lignin Kraft



How can you be in 100% possible
able scale in 100%

③ Preparation of biologically

moisture content 15-30% [large]
large organic content 25-40%
| heating value:
→ difficult to handle in stove : functional groups.

→ limit metals.

short chain acids. require more H₂ in (H₂) produce low
value flammable gases

hydrogen compounds:

→ minimum uncombustion (= bonds per gram)

- low oxygen
- high purity
- low oxygen
- alcohol

→ ketone / jet fuel : desired. (isolated to bio oil)
of p¹

lignin. macro molecules.
| stable

E_{we} : $OCV = 604.7 \text{ mV}$

Divided cell:

Na^+ ion membrane: activated

CO2 simulator: 0.0%

light intensity for BTG

Synthetic spectra at 955

Demonstration of Acetic acid oxidation on UHPD

Pyruvate reductase

BTG:

two electrode cell: undivided: galvanostatic cycling

electrode:

BDD

cell setup: integrated with GC and HPLC

extra setup: XRF: used for what? \rightarrow liquid outlet

different from Margot setup

\rightarrow no much oxygen

\rightarrow difference in carrier GC gas: H_2/He

\rightarrow HPLC: synthetic spectra at 955

\rightarrow BDD: same acetic acid C_2 , Na salt:

Product:

CH_3 , O_2 , N_2 , CO_2

\downarrow

minimum

change: formation of CO_2 , but not C_2H_6

little bit formation of C_2H_6

O_2 , N_2 in large quantity

(training: HPLC, XRD, XPS and Photoacoustic Power supply)

How thing will go with guide.

Pyrolysis oil - biomass feedstock.

Helium goes in the column, goes the out from out at the column to GC in cell

XRF: elemental analysis
sensitive to chlorine:

quantitative, qualitative analysis / elementally
solid, liquid, slurries and loose powders
from Be to Th

XRF: non destructive test
analysis - can be used for P

No 7

20210309: Experiment 89g-Trap

Pyrolysis oil composition:

1:1 dilution

acid: 18%, oxygenates: 17%

furans: 8%

by sugars: 9%

syngas 6%.

Re treatment after KOLLE

h₂O: 1:1 dilution 1:1 \rightarrow elemental composition

sodium sulphide: conductor \rightarrow XRF: C: 43.902%,

ratio to, H: 7.562%

sodium sulfate anhydrous $\frac{1.479}{4.429}$ / 100 ml: 0.177 wt%

start GC first takes time

BTG: Purved

add helium 10 ml.

distilled water.

from the cell - with one pump

fill the column with water & pump: 20 ml/sd.

21.94 g \rightarrow for 0.10 wt.

for water 150

open length = 2.5 cm, C₁₀H₈ fuel - fuel layer

Contact area = 100 mm²

$V = 5.5 \text{ m}^3$

Open cathode
red. pool

(400 km cathodes have diff out potentials)

(K₁ K₂ K₃)

25 ml : sample

carrier fluid. H₂O, 0.005 M. : 25 ml.

sample:

0.7 ml of sample + (25 ml of H₂O)

0.2 mm PET film + wiring

5 acetic acid, methanol, formic acid & etc

Methyl Methacrylate 20 8918

GC = Spectroscopic TCD GC959

C₂: CH₄

CO₂

C₂H₆

C₂H₄

C₁: H₂

O₂

N₂

CH₄

CO

GC 985-4503 - separate via graph.

XRF - emission monitors

Progress meeting
Ebio project at university

(0.88V)

- sodium sulfate + soda
- sodium acetate
- Phosphate at electrode surface → bacteria
- limited by the layer
- electrode
- differential local pH → at high anodic density
- reproduce
- digested:
- can't in anion
- some anions do not have influence
- many main: b/w acetic acid in sodium acetate
- important: rotation in non rotation
- electrode 40V
- GC calibration

XFL → luxury to around

[]

UT = molar comp
ATC: 1.4 molar in ponds

AT: 1.4

AN = 0.9 g/L/g

by 10 l

all are big

low water resources

GPC → chromatography

Prepave sample

Bit-oil = 100 ml (dilution 1:1)

sodium sulphate = 0.1M solution 1.42g/100 ml

MW, 142g/mol
wt% = 0.1
142 = 0.1
14200%

with DI: no conductivity so no flow.

The current shouldn't be above 1500mA
that will destroy stainless cylinder.

The current with water drops at outlet
if it could damage the column, then we have to clean the column.



Pure supply 71: PL302 pure supply.

Two columns go in GC:

from data file, you can always get the neat data

Conducts BDD:

silicon, tentatum, Neobium, glassy carbon, graphite

	Products with acetic acid	Product with pyridine
CO ₂	0.06	1.41
H ₂	4.51	2.63
O ₂	5.57	2.05
N ₂	0.33	0.31
CH ₄	1.35	1.41
C ₂ H ₆	0.05	0.05
C ₃ H ₈	0.01	0.01
C ₄ H ₁₀	0.15	0.15
C ₅ H ₁₂	0.07	0.07
C ₆ H ₁₄	0.01	0.01
C ₇ H ₁₆	0.01	0.01
C ₈ H ₁₈	0.01	0.01
C ₉ H ₂₀	0.01	0.01
C ₁₀ H ₂₂	0.01	0.01
C ₁₁ H ₂₄	0.01	0.01
C ₁₂ H ₂₆	0.01	0.01
C ₁₃ H ₂₈	0.01	0.01
C ₁₄ H ₃₀	0.01	0.01
C ₁₅ H ₃₂	0.01	0.01
C ₁₆ H ₃₄	0.01	0.01
C ₁₇ H ₃₆	0.01	0.01
C ₁₈ H ₃₈	0.01	0.01
C ₁₉ H ₄₀	0.01	0.01
C ₂₀ H ₄₂	0.01	0.01
C ₂₁ H ₄₄	0.01	0.01
C ₂₂ H ₄₆	0.01	0.01
C ₂₃ H ₄₈	0.01	0.01
C ₂₄ H ₅₀	0.01	0.01
C ₂₅ H ₅₂	0.01	0.01
C ₂₆ H ₅₄	0.01	0.01
C ₂₇ H ₅₆	0.01	0.01
C ₂₈ H ₅₈	0.01	0.01
C ₂₉ H ₆₀	0.01	0.01
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C ₆₀ H ₁₂₂	0.01	0.01
C ₆₁ H ₁₂₄	0.01	0.01
C ₆₂ H ₁₂₆	0.01	0.01
C ₆₃ H ₁₂₈	0.01	0.01
C ₆₄ H ₁₃₀	0.01	0.01
C ₆₅ H ₁₃₂	0.01	0.01
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C ₇₀ H ₁₄₂	0.01	0.01
C ₇₁ H ₁₄₄	0.01	0.01
C ₇₂ H ₁₄₆	0.01	0.01
C ₇₃ H ₁₄₈	0.01	0.01
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C ₇₅ H ₁₅₂	0.01	0.01
C ₇₆ H ₁₅₄	0.01	0.01
C ₇₇ H ₁₅₆	0.01	0.01
C ₇₈ H ₁₅₈	0.01	0.01
C ₇₉ H ₁₆₀	0.01	0.01
C ₈₀ H ₁₆₂	0.01	0.01
C ₈₁ H ₁₆₄	0.01	0.01
C ₈₂ H ₁₆₆	0.01	0.01
C ₈₃ H ₁₆₈	0.01	0.01
C ₈₄ H ₁₇₀	0.01	0.01
C ₈₅ H ₁₇₂	0.01	0.01
C ₈₆ H ₁₇₄	0.01	0.01
C ₈₇ H ₁₇₆	0.01	0.01
C ₈₈ H ₁₇₈	0.01	0.01
C ₈₉ H ₁₈₀	0.01	0.01
C ₉₀ H ₁₈₂	0.01	0.01
C ₉₁ H ₁₈₄	0.01	0.01
C ₉₂ H ₁₈₆	0.01	0.01
C ₉₃ H ₁₈₈	0.01	0.01
C ₉₄ H ₁₉₀	0.01	0.01
C ₉₅ H ₁₉₂	0.01	0.01
C ₉₆ H ₁₉₄	0.01	0.01
C ₉₇ H ₁₉₆	0.01	0.01
C ₉₈ H ₁₉₈	0.01	0.01
C ₉₉ H ₂₀₀	0.01	0.01
C ₁₀₀ H ₂₀₂	0.01	0.01

Peter represents - from -> input to
eval.

Have finite intake
PhD plans 3 months after joining the program

- research plan
- educational plan
- drafted with promoter & checked by TGS director

Qualifier: 6-9 months: official evaluation

- ↳ no rules: ask supervisor: (usually report + presentation)
- Annual interview

30 ECTS: required for degree
generic courses: course/index

first year:

TGS academic publicity, presentation, data management, scientific information

2 1/4 year:

- research support (2 ECTS)
- language course (5 ECTS)
- financial develop - (IEC: build your intellectual muscle)
- Teaching course (2 EC: taste of teaching)
- Career & employability

→ Go abroad for courses & some data (Tudelft, WUR, TU/e)
TGS website has links

field courses: OIRIS

Block	Sep	1 Nov	Feb	2 April
	A	B	A	B

M code: master: participation code

Koyal data academy of sciences → courses

Teaching 4u, supervisor: 10 ECTS

Indicative

Required electron: 1 molecule O_2 , 4 $F_{96405C/mol}$

- 1 molecule C_2H_6 , 2
- 1 molecule CO , 6
- 1 molecule H_2 , 2
- 1 molecule CH_4 , 1
- 1 molecule CO_2 , 1
- 1 molecule H_2 , 2

conc ppm
product flow = $\frac{\text{conc ppm of individual ppm}}{\text{gas flow velocity (ml/s)}}$

Required electrons = $\frac{\text{product flow (mol/s)}}{\text{Required electron per react component}}$

Faradaic efficiency = $\frac{\text{required } e^-}{\text{total } e^- \text{ flow} = \frac{\text{Faradaic am}}{\text{current applied}}}$

(conc in ppm) = $\left(\frac{\text{peak area - individual avg}}{\text{a - efficient from calibration}} \right)$

1 mol/l = 10,000 ppm

$$\eta = \frac{P}{RT}$$

Excel sheet flow

Pyrolysis oil + ethanol.

+ Na_2SO_4 141g =

2108g empty bottle

$\left\{ \begin{array}{l} 14.31\% + 50.71\% \\ \text{did with H}_2\text{SO}_4 \text{ not work} \\ 14.91\% \rightarrow \text{D-46-mH} \\ \text{(no gross products)} \\ \text{too little b.t.} \end{array} \right\}$

alcohol in water

ethanol + acid \rightarrow

ionic \rightarrow leaping \rightarrow

addition of electron \rightarrow sort of

\rightarrow same as Na_2CO_3 (kettle)

\rightarrow Na_2CO_3

\rightarrow $\left\{ \begin{array}{l} \text{Na}^+ \\ \text{CO}_3^{2-} \end{array} \right\}$

$\left\{ \begin{array}{l} \text{Na}^+ \\ \text{CO}_3^{2-} \end{array} \right\}$

\rightarrow before electrode a.

\rightarrow before electrode: further to one it is

\rightarrow $\left\{ \begin{array}{l} \text{Na}^+ \\ \text{CO}_3^{2-} \end{array} \right\}$

Pt.

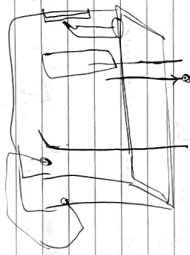
Measure

one part is PbO_2 (

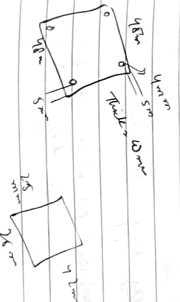
\rightarrow $\left\{ \begin{array}{l} \text{kg of water (2000)} \end{array} \right\}$

\rightarrow $\left\{ \begin{array}{l} \text{small reference electrodes 113} \end{array} \right\}$

\rightarrow $\left\{ \begin{array}{l} \text{M61283} \end{array} \right\}$



service date at half



10cm

first oxidation is not dominated by direct e^- transfer but mediated by hydroxyl radicals

methyl radical combine with addition OH radical at BDD, large conc of OH radical

Results in methanol: reaching plateau to form formic acid CO_2

→ running electrode for a while. dark surface → corrosion of diamond

Formic acid oxidized to CO_2

Kobayashi found formic acid peak in HPLC (no trace just

OH^+ hydroxyl ^{radical} don't affect BDD p^+ conversion, is at BDD surface

→ Now: we use aq solution of organic compounds.

OH⁺ radical oxidizing acids to form allyl radicals

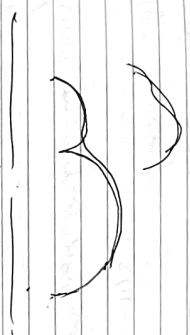
inducing graphitization of sp^2 bonded to sp^3 which etch easily by high potential.

O_2 evolution can be dominated at high current density, low currents there is O_2 ^{partial} oxidation

methyl acetate $\text{C}_3\text{H}_8\text{O}_2$
 CH_3COOH = methanol.

C_2H_4 = ethylene

C_2H_6 : Ethane.



Acidic number
sugar, phenol,
halide oxidized
reaction of sugar: acid

Master product

paired electrolysis

aldehyde reduction / oxidation
+ H^+
photogenerated HCl

aldehyde reduction:
aldehyde must (but not of)

partial oxidation, presence of aldehyde in and

water.

sugar, acid.

neutral CO_2

to the acid

distillative
 CO_2 aldehydes.

nitrogen-f

sulphur, chlorine

photogenerated HCl

contamination

Program meeting

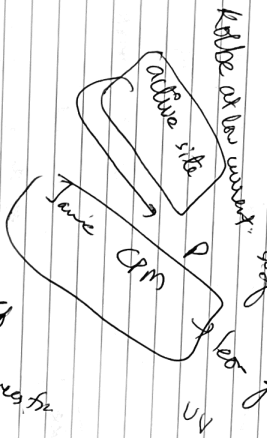
2 questions: 1st, second half

known quantities and signs for
for value

1st half

2nd half

1st half
2nd half
3rd half
4th half
5th half
6th half
7th half
8th half
9th half
10th half



1st half

2nd half

calibration starts with the column change, we do the drying of column by heat treatment.

The calibration box in labview is built designed by Robert needs to be checked called online method. calibration box consists of controller.

collaborator has

behavior: variable
in the select gases.

first O_2 in Helium

laboratory → collaboration
select
6 variables

He flow = 49 ml/min
 O_2 1 ml/min

first decade while in use

first flat baseline
just purge pure helium

after

first start with TCD columns

O_2 peak as low as possible

xy → 5'

Detect 1 TCD

1/2 year
6 weeks

Column configuration: Bedde act: Column oven $\approx 170^\circ C$

First detector FID, TCD, back

→ flow at

O_2 as low as possible

TCD: is temperature

O_2 flow needed: at source

$$\frac{O_2 \text{ flow}}{\text{needed}} = \frac{\text{conc (ppm)}}{100,000} \times \text{flow parallel}$$

$$\frac{2500}{100000} \times 400 = 1 \text{ ml/min } O_2$$

$$400 - 1 = 399 \text{ ml/min of the } O_2$$

→ for O_2 : start with 2500 ppm, 5000 ppm.
the 20000, 5

20 injection

RT: 4 sec needed; head detector needed

O_2 change time 4 sec. Waiting for gas
for sample, O_2 10 sec, 150 sec and O_2 again
to 7 minutes, in cycle to generate

Create new sequence for every conc.

Peak tailing

error: cause diff
interpret of results

If one gas is slowing then try it with other
gas just to see the impact.

also use the flow column out of other problems.

CO₂ calibration time: → up to very large to very low
2500 ppm, conc & value this is the product of
QC

15 inject: (1 ~~inject~~ ^{min inject})

→ 5.6 - 5.9 minutes, peaks

76000 ppm

93500 ppm

for 5000 ppm

He → 398

O₂ → 2

FID is not responsive
to air, water,
CO₂, NH₃, H₂S,
SO₂, etc. GC carrier
gas

interpret
data

O₂: 5000, 1000, 10000, (complete bottle, 18)

For 1000 ppm O₂

O₂, 4

He: 398

Helium purge

GC procedure (Helium purge: 15 cycles/min)

Etane 2500, 5000, 10000, 20000 40000 (15 min)

for etane, the mass flow controller is different (so
attach the kind of controller and it
things software "break multi-flow configuration".

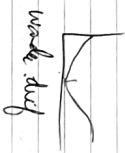
The software for flow control is "Lab view << calibration"
in flow controller

Detector 1: C₂H₆ FID detector.

"FID cannot be autoreg"

it is possible to
do calibration
of components with
different concentrations

Drifting issue at TCD
for etane



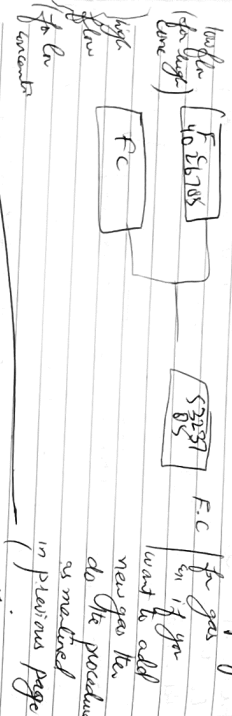
so it means
that we etane
is obviously
and the TCD
column

no flow
change
instrument
setting

→ for low conc of gases, we need high flow of carrier helium
and the controller is different for high flow of helium

→ (the operation was performed at FID but the drifting
not at calibration)
No - result

The calibration box



being out is not always the solution of the cleaning, for small ~~amounts~~ ^{amounts} of gas, a ^{little} ^{more} ^{than} ^{the} ^{software} ^{can} ^{handle} ^a ^{selected} ^{gas} ^{concentration} ^{can} ^{be} ^{used} ⁱⁿ ^{the} ^{software}.

Drifting problem with ethylene C₂H₄ at

low, same problem with ethane

The flameability of ethane could be a problem.

10/18 issue.

11/22 2:46

Data processing calibration

if auto-integ not good then go to manual, select point, add to method, add to data.

CO₂ (m) > analyze

concln 1500 5000 85000 (value) vs conc

1
2
3 (the calibration was good, no problem with peak intensity)
4
5 (of gas, as we had problem with drift)
6
7
8
9
10

Bio oil component

Typical properties:

moisture content	15-30 (wt %)
pH	2.5
specific gravity	1.2 (gm/ml)
Elemental composition	wt %
Carbon	54-58
Hydrogen	5.5-7.0
Oxygen	35-40
Nitrogen	0-0.2
ash (wt %)	0-0.2
HHV (MJ/kg)	16-19
Viscosity (cP) at 50°C	40-100
solid (wt %)	0.2-1.0
Distillation residue	upto 56

→ Stability varies in various solvent
Bio oil completely miscible in : methanol, iso propanol
and acetone

: water solubility of various bio-oils : 60-80 wt%
etc. solubility : 40-60 wt%.

Upgrading bio-oil without any solvent is preferable

• water is inert for hydrogenation

(Solvent variation could be interesting; i.e. 14% of the oil was
found to be soluble in toluene, which is a gasoline like
solvent)

GC cells

Compact GC 4.0

FID: C_1-C_6 . All

TCD: H_2 (O_2+N_2 , CO , CO_2 , Cl)

Carrier gas pressure 500 kPa; for detector gases 300 kPa
for FID flame gas, hydrogen and air are required

Gas flow required
Carrier gas: 2-50 ml/min: depending on pressure and split flow

Role of split: short and dilute
split is used when analyzing neat and concentrated gases
split provides dilution causing less stress on the column
but also shortens the time that sensitive compounds
have to interact with GC inlet liner surface
Split injection provides small portion of sample to GC columns
(mainly) to avoid overloaded peaks that corrupts the
separation efficiency of column

First go to C64 - either software
then go to status:
when it turns "ready" then
go to chromatogram
(not sure what method
is already there)
(use injector)

it already calibrated for

methane, ethylene, ethane, propylene, propane, butane } FID

H_2 , He , CO , CH_4 , CO_2 } TCD

10000 ppm	3625 ppm
0.1782	0.0046

keep section in mind so they find information
 writing quickly
 - build up evidence
 - look of clarity for (ex)

info @ biocondi.org (exercise 4 part)

EL^{1,1,1,1} R for coming
 Pump: coming
 EL^{1,1,1,1} coming
 No. of: coming, meaning what construction, C₁-C₂

1/2 page strategy of from synthesis or it is not up with discussion

then proposed

write report to problem, solve
 (one week before publication)
 strong leader, managing NMR (keep up)

C₅

LC-MS. () : m/z

Prob

(Rate) xRDE ()

NCC → (m/z)
 compare

OS agree has 2022 IEE ()

Can CHAINS (conference).

Elucidation write up industrial perspective
 create in (continued of synthesis)

catalytic cycle ... (in answer). How's
 do make things.

External catalyst

CATA

→ November (year)
 Projects (budget)

WORK

{ $\left\{ \begin{array}{l} \text{Small sample conc} \\ \text{Mass loss} \end{array} \right\}$ }
 { $\left\{ \begin{array}{l} \text{ECM conc} \\ \text{Mass} \end{array} \right\}$ }
 { chromatography }

carboxylic acids	18.91
Alkydols	0.98
Aliphatic ketones	12.49
Hydroxy ketones	5.23
Cyclic ketones	3.17
Aromatic ketones	0.09
Furans	1.88
Hydroxylic aromatics	0.11
Allyl-terpenes	0.87
Alkyl phenol	0.47
Monoterpene phenol	0.79
Benzofuran	0.56
Other chemicals	18.95
Heavy components	39.72

Approx. by (calculated based on C content)
 of various layers

literature (cannot work to analyze)
 (specific)

made for LC-MS

Take 15 μ l, it as the standard

① literature source \rightarrow right column, suitable phase

② method
 make mixture of with injected

③ HPLC method

④ GC-MS method

⑤ GC-MS method

sub

Pulse electrode: bubble removed and replacement of ions.

→ voltage pulse
→ current pulse

Esch

OPA & undivided

③ Divided - cardiac

analysis: appears → pure.

longer can } important.

pure 3rd. } 9:15
 } E610:

Open alluvial young channel

Width

- 0.5 m wide and 0.5 m deep
- 0.5 m wide and 0.5 m deep

- 0.5 m wide

- 0.5 m deep and 0.5 m wide
- 0.5 m deep and 0.5 m wide

- 0.5 m deep

- 0.5 m deep and 0.5 m wide

Width

- 0.5 m

- 0.5 m

- 0.5 m
- 0.5 m

- 0.5 m
- 0.5 m

- 0.5 m

- 0.5 m

Robinson 4th, Penna. 1898

red

0 8716

20

3

10

9

9

1

10

1

10

06

For

68.1-8.0

0.8

1

1

J

1

1

和

1

1

Range, Calibration, gas position

H₂ . 0.64 to 0.71

Air . 0.85 to 0.95

CH₄ = 0.49 to 0.51 FID

C₂H₄ = 0.53 to 0.55

N₂

CH₄ : TCD : 1.8

CO₂ : TCD : 4.52 -- 4.9

20210608
Calibration of GC

30ml/min

Methane

Pressure in bottle : 200 bar

Reducer : 200 bar - 2.5 bar. (picture :)

flow rate :

Conc: 2500 , 5000 , 10000 , 20000 , 40000 , 50000

GC goes to shut down mode : error

Solution: first go to the GC editor and correct and get method, press configure method, check parameter (last time the problem was the low flow of H₂, it's this causes shuffling in FID, as it require H₂ oxidation to start the ignition

to inject: 1-15: Methane 2500ppm

17-26: Methane 5000ppm

10000 ppm

25000 ppm

20000 ppm

30000 ppm 45000 ppm

5000 ppm

20210609
Calibration of GC

Ethylene: The problem is that the methane still in the

1500 , 10000 ppm

H₂ : 1500 , 5000 , 15000 , 3000

for hydrogen, it's not working

as in TCD, the conductivity of the H₂ is similar

so ~~the~~ the only bulge can be seen starting from 10000 ppm

by 2000 ppm

Nitrogen

600, ppm

45000 ppm

2021 06 14

Calibration CO₂

3500 ppm

system water 15

0.0000 0.0000 0.0000 0.0000 0.0000

0.0000 0.0000 0.0000 0.0000 0.0000

0.0000 0.0000 0.0000 0.0000 0.0000

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0.0000 0.0000 0.0000 0.0000 0.0000

CO₂

L1: 3500

L2: 7500

L3: 20000 ppm

L4: 50000 ppm

L1

L2: 10000

L3: 20000

L4: 40000

L1

L2: 20000

L3: 40000

L4: 45000

Respiration content

→ Direct test Undisturbed cell R₂

→ Indirect Undisturbed cell R₂O₂

Page for presentation

1. Glucose acid to sporic acid production from *Aspergillus* and *Trichoderma*

→ Conversion of D-glucose into glucose by the oxidation of four enzymes (NADPH oxidase, aldehyde oxidase, aldehyde dehydrogenase, and NADPH reductase).

0.5M H_2SO_4 :

1M of H_2SO_4 = 98 g/mol

0.5M = 98/2 = 49 g per litre

0.5M = 49 g

1L

1L = $\frac{49}{0.5}$

1000ml = $\frac{49}{0.5}$

1ml = $\frac{49}{0.5 \times 1000}$ g

250ml = 0.0989 x 250

= 24.5g H_2SO_4

pH of 0.5M sulfuric acid = 0.301

0.5M H_2SO_4

20.1.07.13.

0.1g tungsten + 100mg

PE: working electrode

PE/L: counter electrode must

1L 85: 41mg/L

CV scans: 10mV/sec

from 0.05 to 1.00V

CV scans range: 10mV/sec 0.5M H_2SO_4 from 0.05 to 1.8V

CV scans

with tungsten:

100mg + 0.5M H_2SO_4 same scan rate from -0.05V to 1.8V at 10mV/sec.

CV scans

CV scans: 10mV/sec

same with tungsten but potential sweep from -0.05 to 2.5V

100mV

2.1K

= R_{int} 5.600 Ω

R_{ext} 4.760 Ω

at 100 kHz

GC: undecan cell but with Pt

undecane: SV : 0.8 A

start time 13:26 End:

first some clearing cycles.

when i am trying to do 2.5V, Pt current doesn't flow.

CV scan Na acetate buffer

from 0 to 2.5 V $n_e = 15$ cycles at 100 mV/sec

CE: Pt, RE: AgCl / working electrode: Pt

Zn²⁺ CuSO₄ 0.01 M

1.02452 V

2.014 V

5.000 V

0.04 V

File name: 20407113-acetate : Pt electrode cycling

2040713 acetate: BPD

experiment on BPD cycling

CV: 5.5V at 0.6 - 0.7 A

start time 16:31

B76: electrolyte 2.0

100 mM, constant current

V=2.53:

Pt: working electrode, GC: Counter electrode

bubbles formation at the electrode

cycles start at H electrode, while ending at GC

100 mM substrate.

Electrode cycling?

five 5 minutes

BDD for anode
for cathode: non PGM overpotential metals (Zn, Pb, Cu-based alloys) as film films supported on carbon materials

→ To facilitate high metal diffusion combined with good access of electrocatalyst "sacrificial support" will be employed.

→ Necessary conditions for LDB in aqueous solution are created by layers of oxides and discharged carbon supports.

→ Certain conditions will build up on Pt electrode layers LDB reaction

→ formation of surface oxide rather than a film of adsorbed H_2 acetylene radicals was considered to be the prerequisite of ethane formation from acetate
→ Only a potential below 0.9V vs RHE was fine Pt sites available, in this region a complete non specific oxidation of acetate ion to carbon dioxide takes place.

→ One can not escape the conclusion that the free radicals are formed during LDB reaction but in aqueous phase.

→ Radical ions have lifetime of couple of seconds or more,

→ Rate of coupling reaction is essentially diffusion controlled

For development of method / GC
layer the amount of split ratio, lower the volume of sample in column and hence better peaks

e.g. split ratio 100:1 : 1 part goes to column, 100 parts of sample exit out

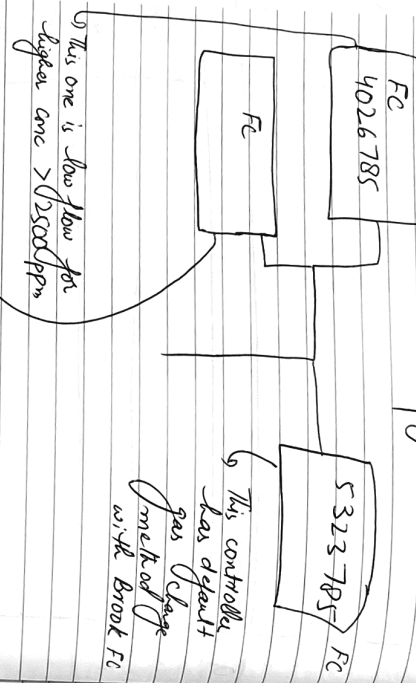
in splitless: sample remains in liner before entering the column due to low flow rate : allows time for analyte to maximize vaporization.

split inject: for higher concentration: analyte can afford dilution
→ higher flow rate leads to sharp narrow peaks with reducing the time for adsorbate interaction

splitless injections: concentrations are very low, if successful at trace analysis, slow flow rate can impact by destruction of analyte by laboratory air breakdown, it also leads to smearing of difficult by band broadening
→ more volatile analyte resulting in wider peaks.

Calibration 2022
important point

Two controllers for carrier/purge gas
1 controller for desired gas



This one is low flow for higher one $> 125000\text{ppm}$
This one is high flow & low con. $< 12500\text{ppm}$

New method: low split low flow

if you see peak decreasing when calibrating with gas bottled, check the pressure of the gas bottle.

fluoridation
 $\text{m}^3 \cdot \text{m}^3$

	$0.6 \text{ m}^3/\text{low}$	water	Total
10 m^3	0.6 m^3	2.4	3 m^3
20 m^3	1.2	$8.8 \text{ m}^3 \times 10 \text{ m}^3 \cdot \text{V}$	
30 m^3	1.8	1.2	$10.5 \text{ m}^3 = \text{V}$
40 m^3	2.4	0.6	
50 m^3	3 m^3	0	

$$M_1 V_1 = 20 \text{ m}^3 V_2$$

$$25 \text{ m}^3 \times 50 \text{ m}^3/\text{M} = 10 \text{ m}^3 \times 30 \text{ m}^3 V_2$$

$$V_2 = \frac{36 \times 50}{10}$$

$$V_2 = 125 \text{ m}^3$$