Chemische en lichamelijke aspecten van brandrook

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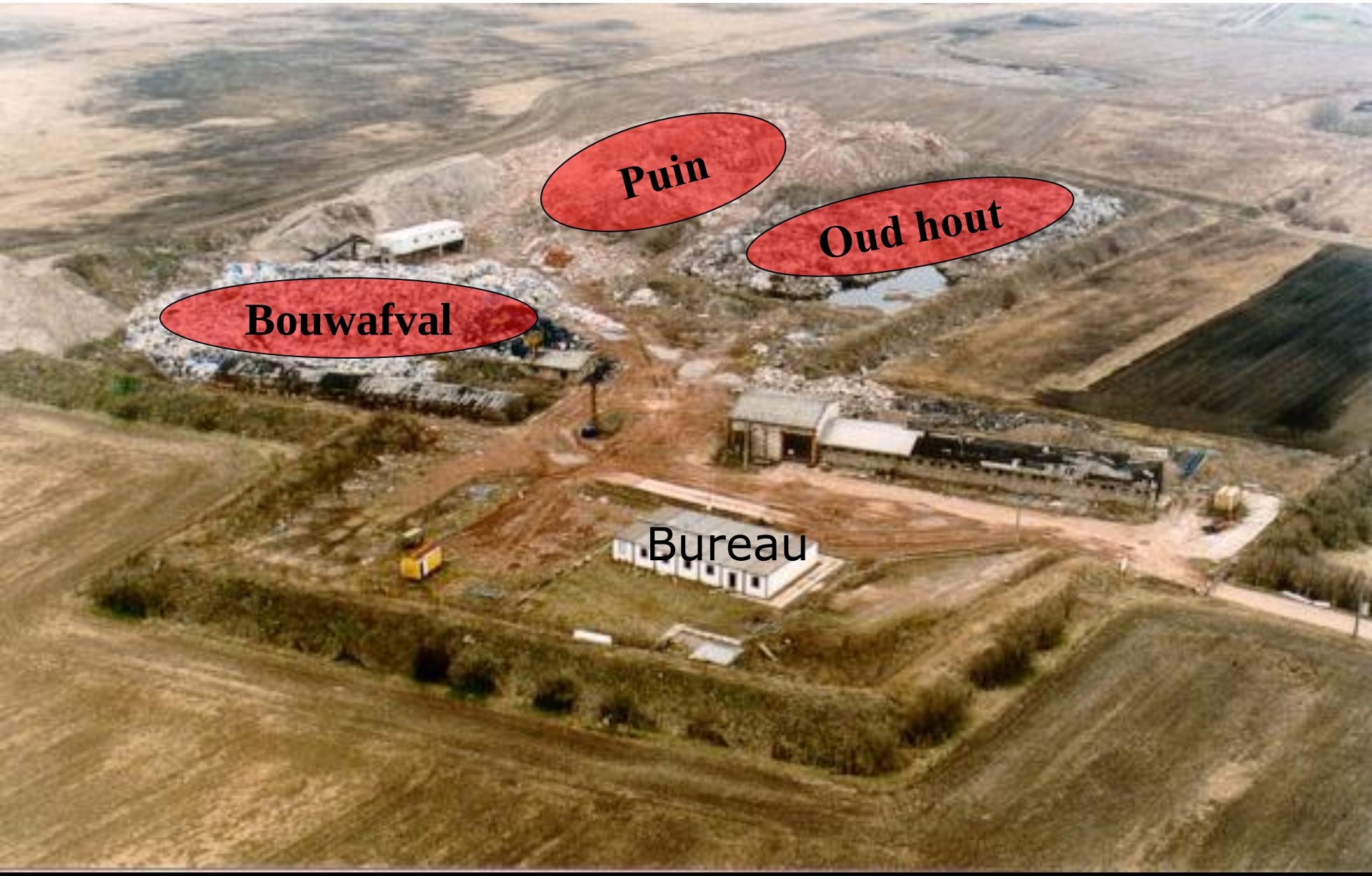
BERGISCHE UNIVERSITÄT WUPPERTAL
FACHBEREICH D
SICHERHEITSTECHNIK
ABWEHRENDEN BRANDSCHUTZ

Sortering van bouwafval



ca. 12.000 ton bouwafval

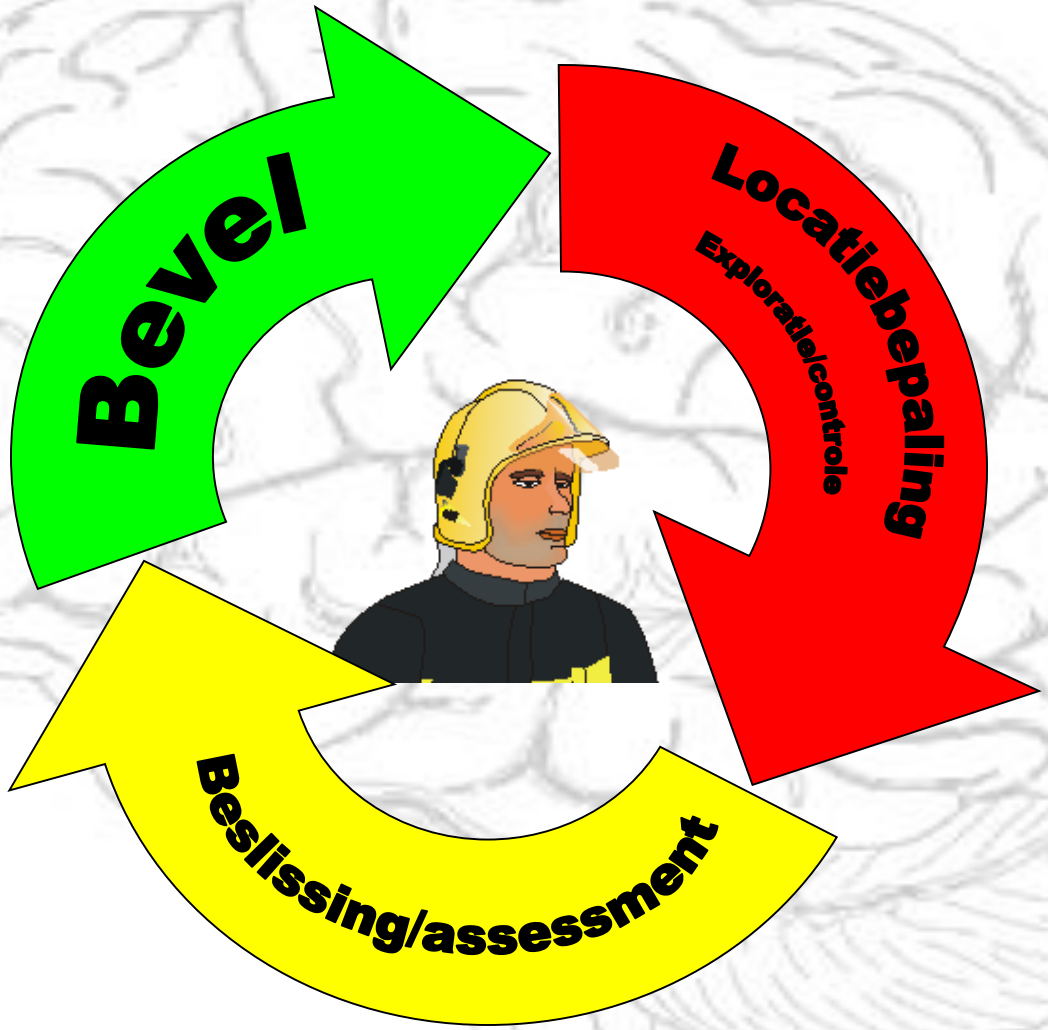
(Kunststof, geringe hoeveelheid mineralen en 3 % hout/textiel)

Brand bouwafval op zondag 30.03.03, 17.30 uur


31 3'03

Exploratie met de helikopter

Gedachten van hoogste leidinggevenden - Het proces van leiderschap



Gedachten van hoogste leidinggevenden -Het proces van leiderschap

Locatiebepaling
Exploratie/controle

Gevaarlocatie:

Aard en oorzaak van schade

Schade-object en omgeving

Omvang schade
mensen, dieren,
milieu en dingen

Gedachten van hoogste leidinggevenden -Het proces van leiderschap

Planning
Beslissing/assessment

Beslissing:

Welke gevaren voor mensen, dieren, milieu en dingen?

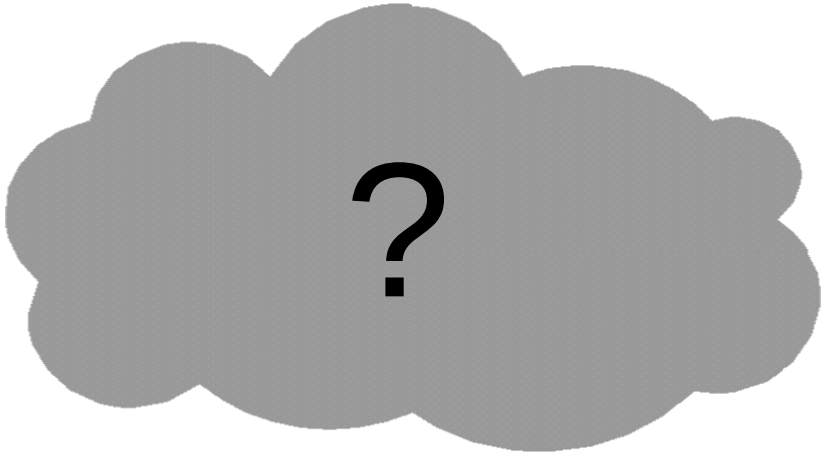
Welk gevaar moet als eerste op welke plek bestreden worden?

Welke mogelijkheden bestaan met welke voor- en nadelen?

Wat is de beste mogelijkheid?


2,5 km

Brandrook-
Bepaling van de rook-ingrediënten



Samenstelling van brandrook

Stem van pers – stemming van bevolking

Vlammen vernietigen verzinkerij

Geen giftige stoffen vrijgekomen

Met de as regende dioxine op de huizen

Na kunststofbrand 900 inwoners geëvacueerd

Dioxine-alarm bij brand op veranda

Politie: Vermoedelijk geen Seveso-gif vrijgekomen

Angst de dag erna: „Nu is alles besmet“

School en kinderdagverblijf gesloten/ tuintjes gesloten

Stem van pers – stemming van bevolking

Vuurzee: Gifgas-alarm hield Hagen in greep

Brand in verzinkerij/ Kinderen niet naar school

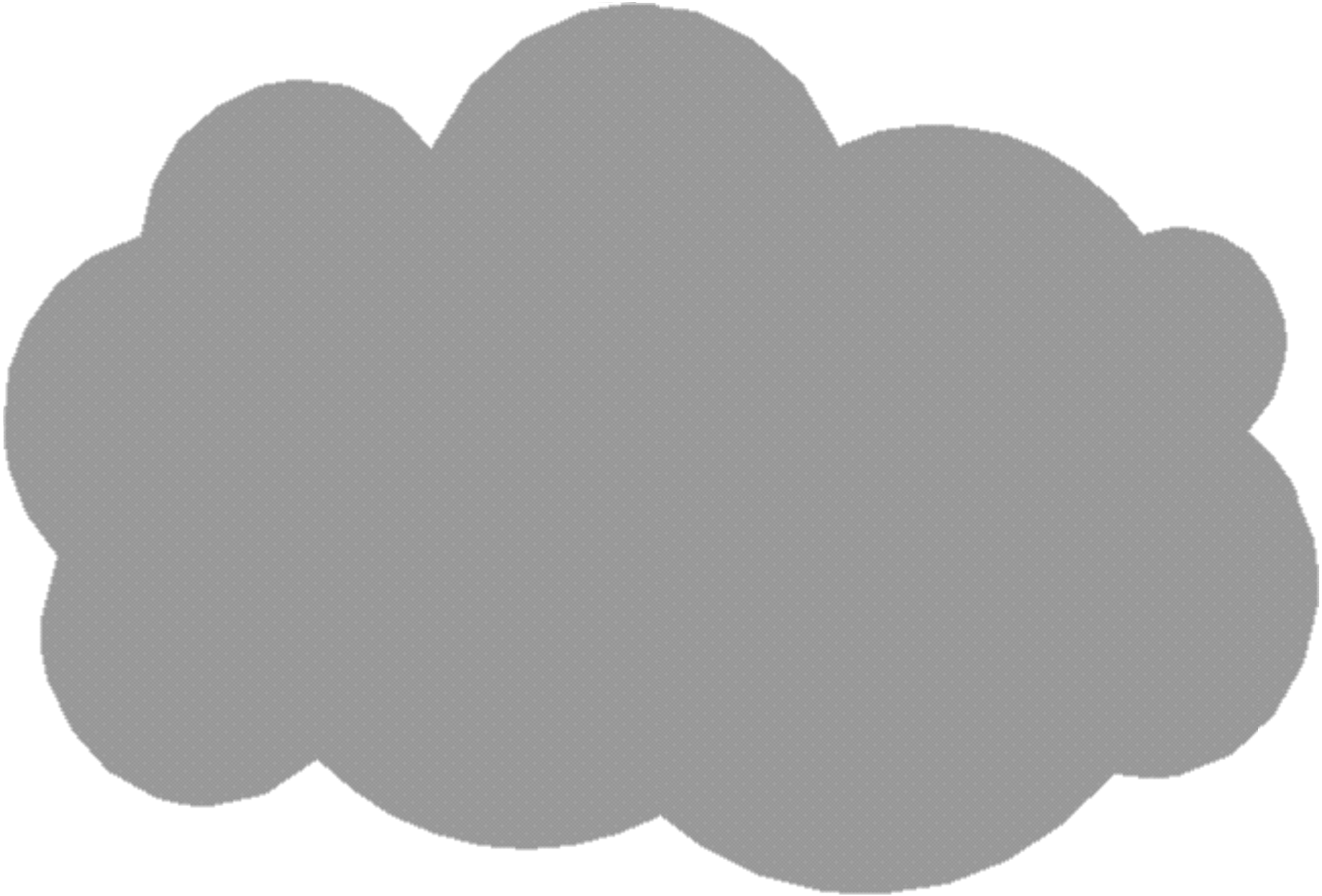
Gifgaswolk bedreigt Schwelm

Vuurzee in magazijn/ chloordampen komen vrij

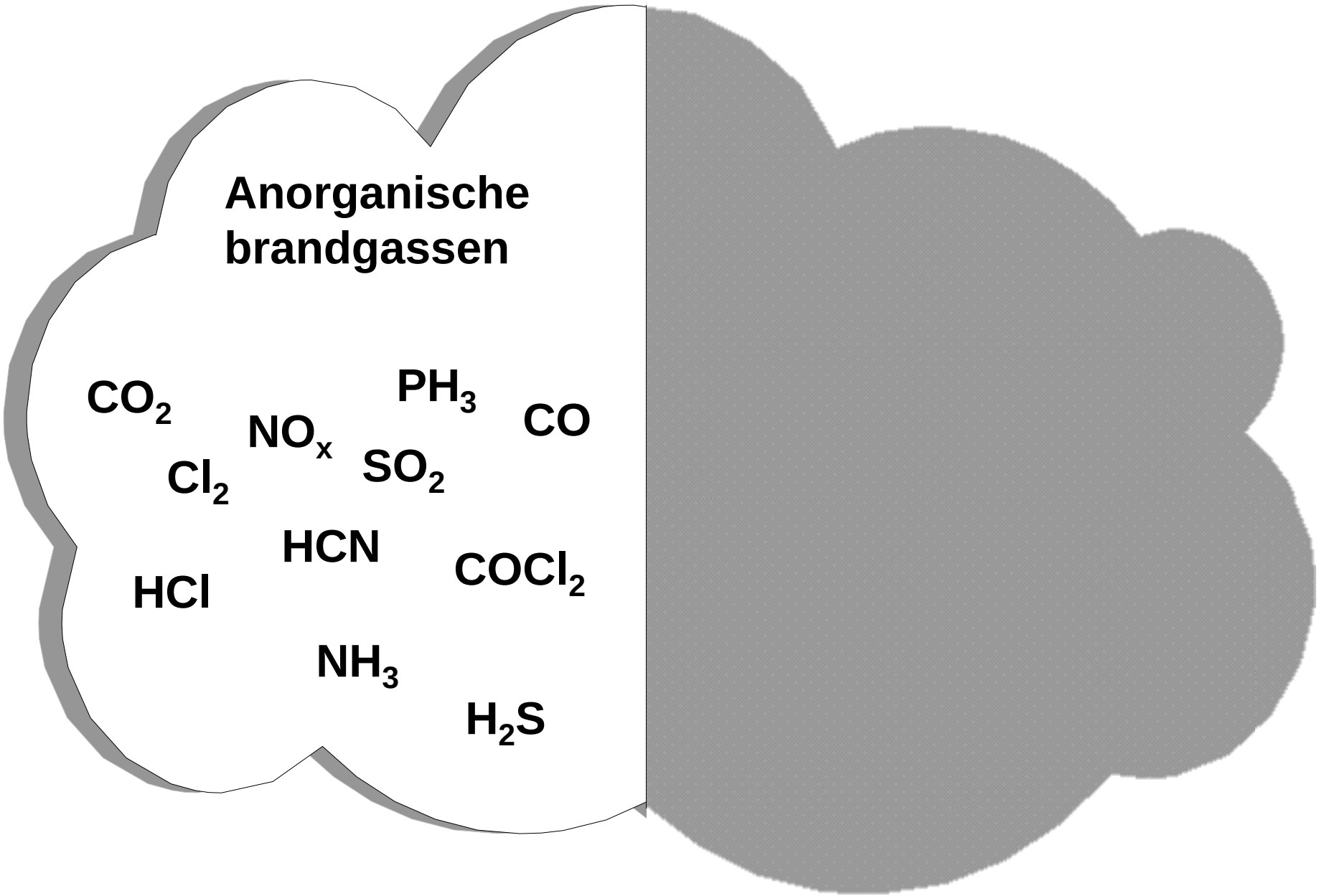
Gifgas-alarm: fruit mag niet geoogst worden

Angst in Schwelm: burgers verlaten stad/ afsluitingen

Algemene samenstelling van brandrook



Algemene samenstelling van brandrook

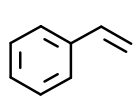


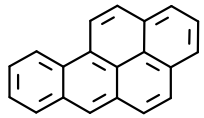
Algemene samenstelling van brandrook

Anorganische brandgassen

CO_2 PH_3 CO NO_x Cl_2 SO_2 HCN $COCl_2$ HCl NH_3 H_2S

Organische brand-ontledingsproducten





Algemene samenstelling van brandrook

Anorganische brandgassen

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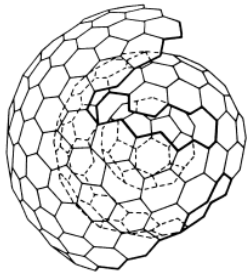
Organische brand-ontledingsproducten

Roet

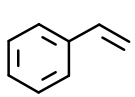


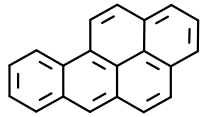
Algemene samenstelling van brandrook

Anorganische brandgassen

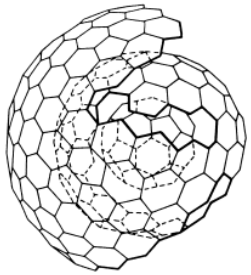
CO_2 PH_3 CO NO_x SO_2 Cl_2 HCN $COCl_2$ HCl NH_3 H_2S

Organische brand-ontledingsproducten



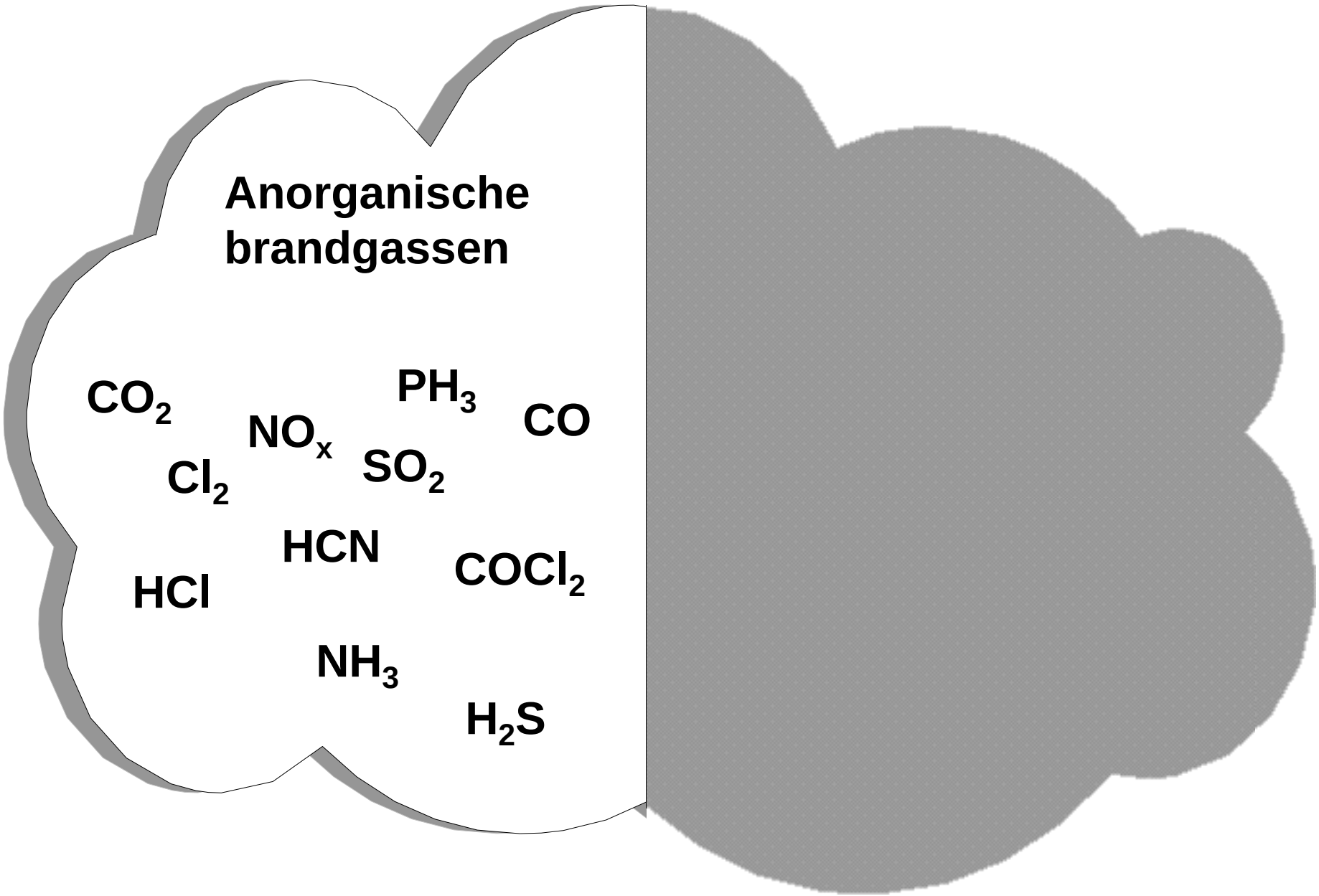


Roet



PCDD/F

Anorganische brandgassen



Brandrook is in hoge concentraties dodelijk!


Dräger
Dräger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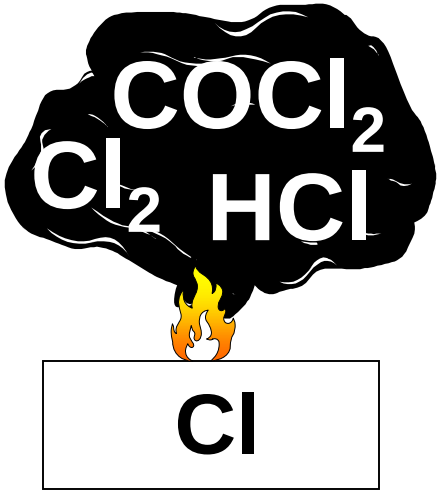
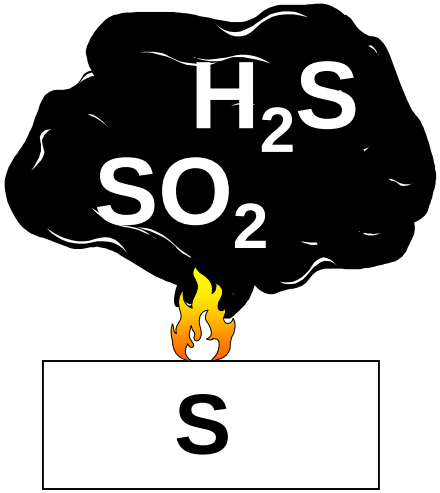
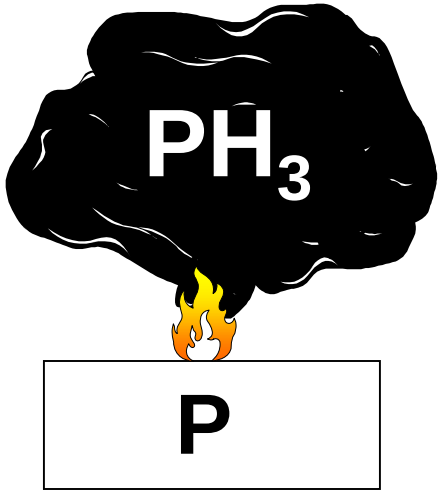
11-12 belangrijke anorganische brandgassen

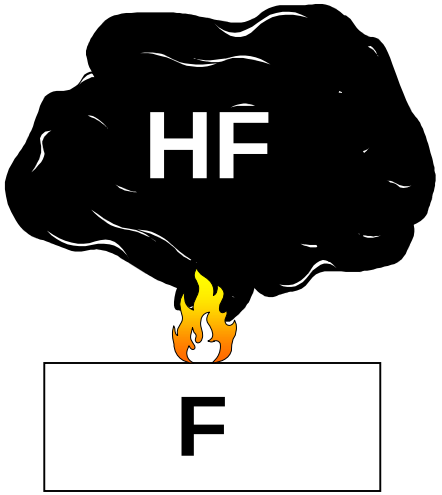
Koolmonoxide:

8.000 ppm	Plotselinge dood
3.000 ppm	Dood na 30 min inhalatie
1.500 ppm	Dood na 1 uur inhalatie
1.000 ppm	Loopstoornissen, dood na 1-2 uur
500 ppm	Hallucinaties na 30-120 min
200 ppm	Hoofdpijn na 2-3 uur
50 ppm	MAK-waarde

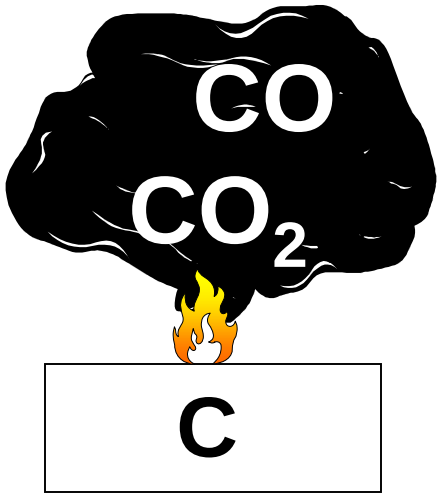


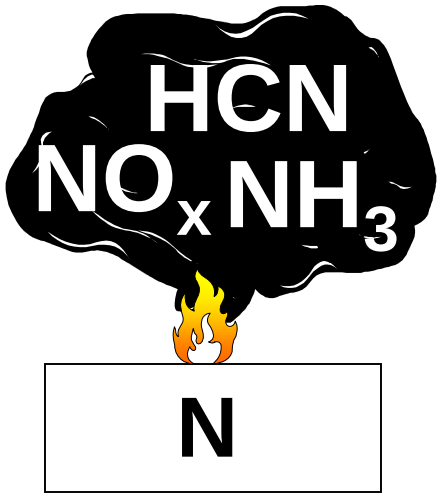


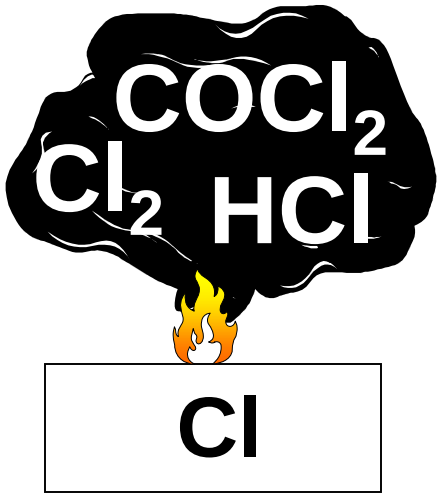


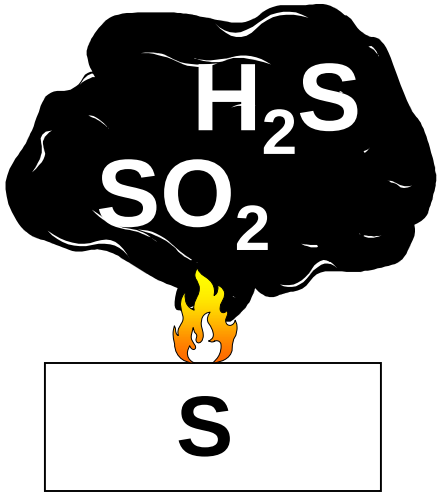


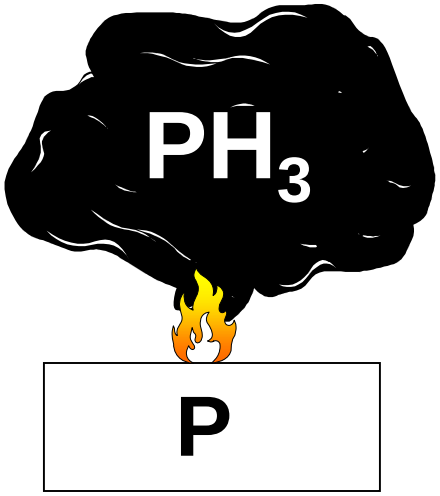
12 belangrijke anorganische brandgassen

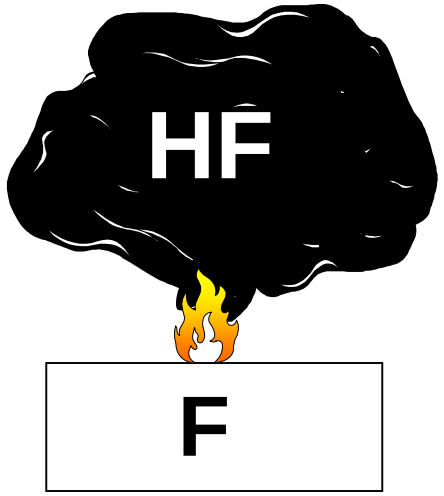












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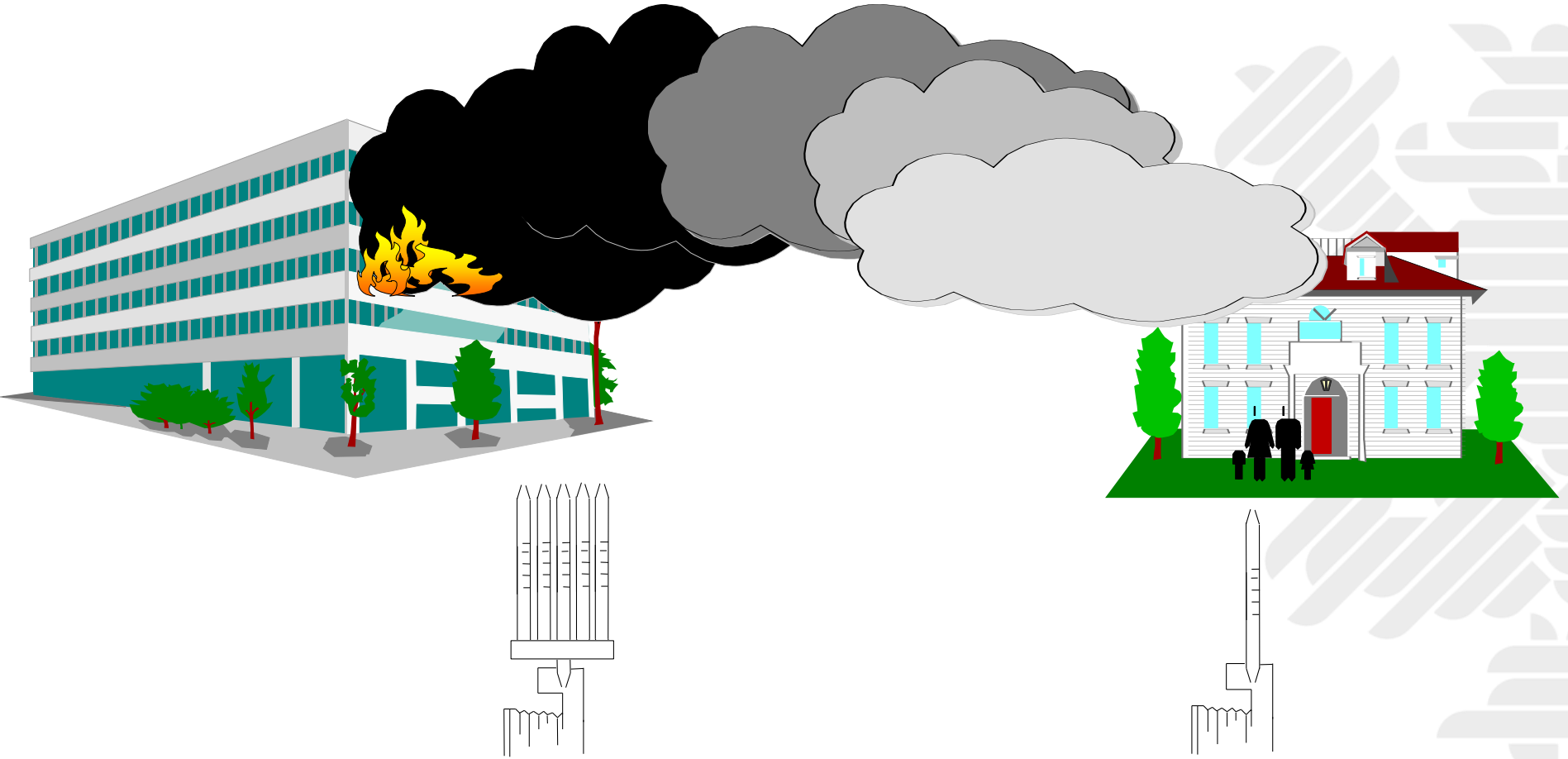
Welke gevaren bestaan

- voor mensen
- dieren
- milieu
- dingen

?

Meet-tactische (analytische) vraagstelling

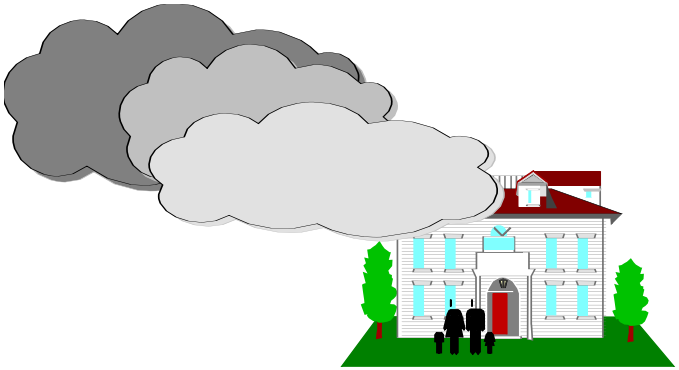
Meet-tactiek anorganische brandgassen

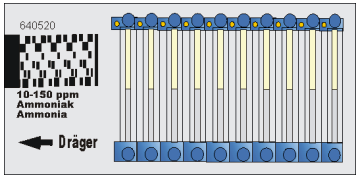


1. Overzicht van de emmissiebron

2. Gevaarbeoordeling van emissie

Meet-tactiek anorganische brandgassen





Organische brandontledingsproducten

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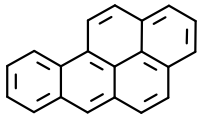
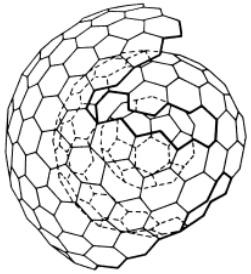
Organische brand-ontledingsproducten

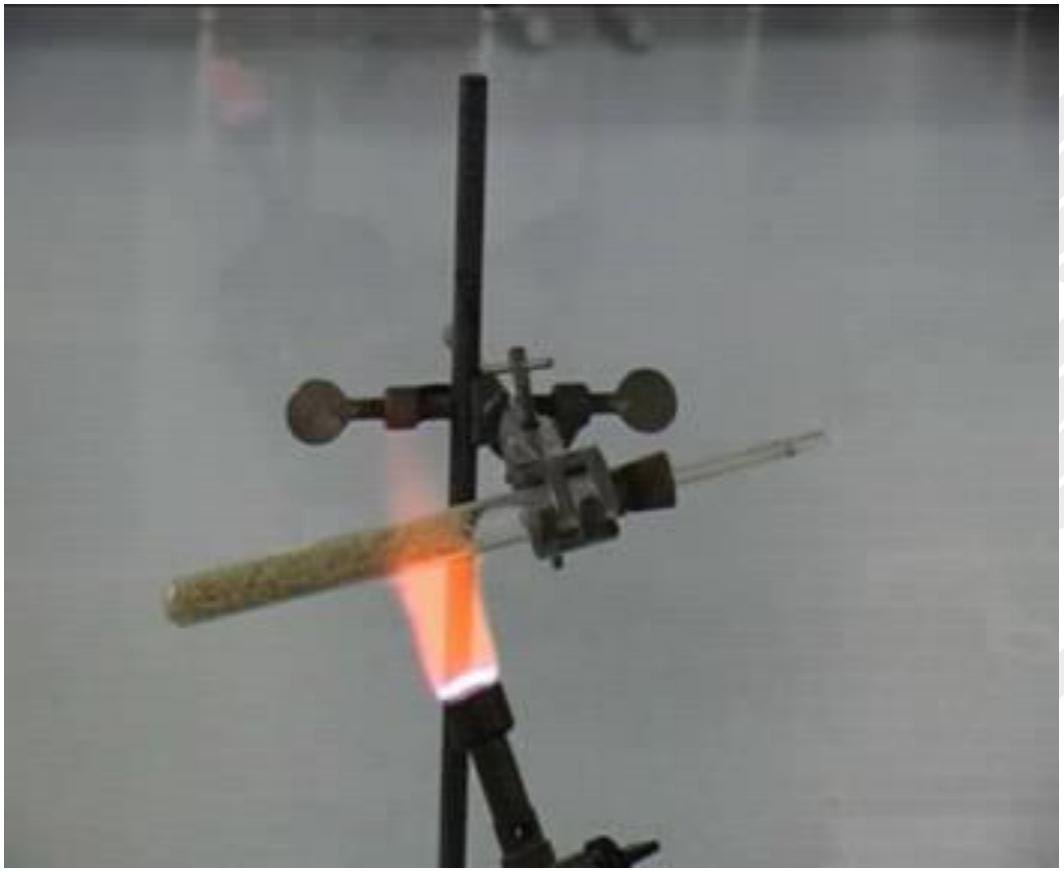


Roet

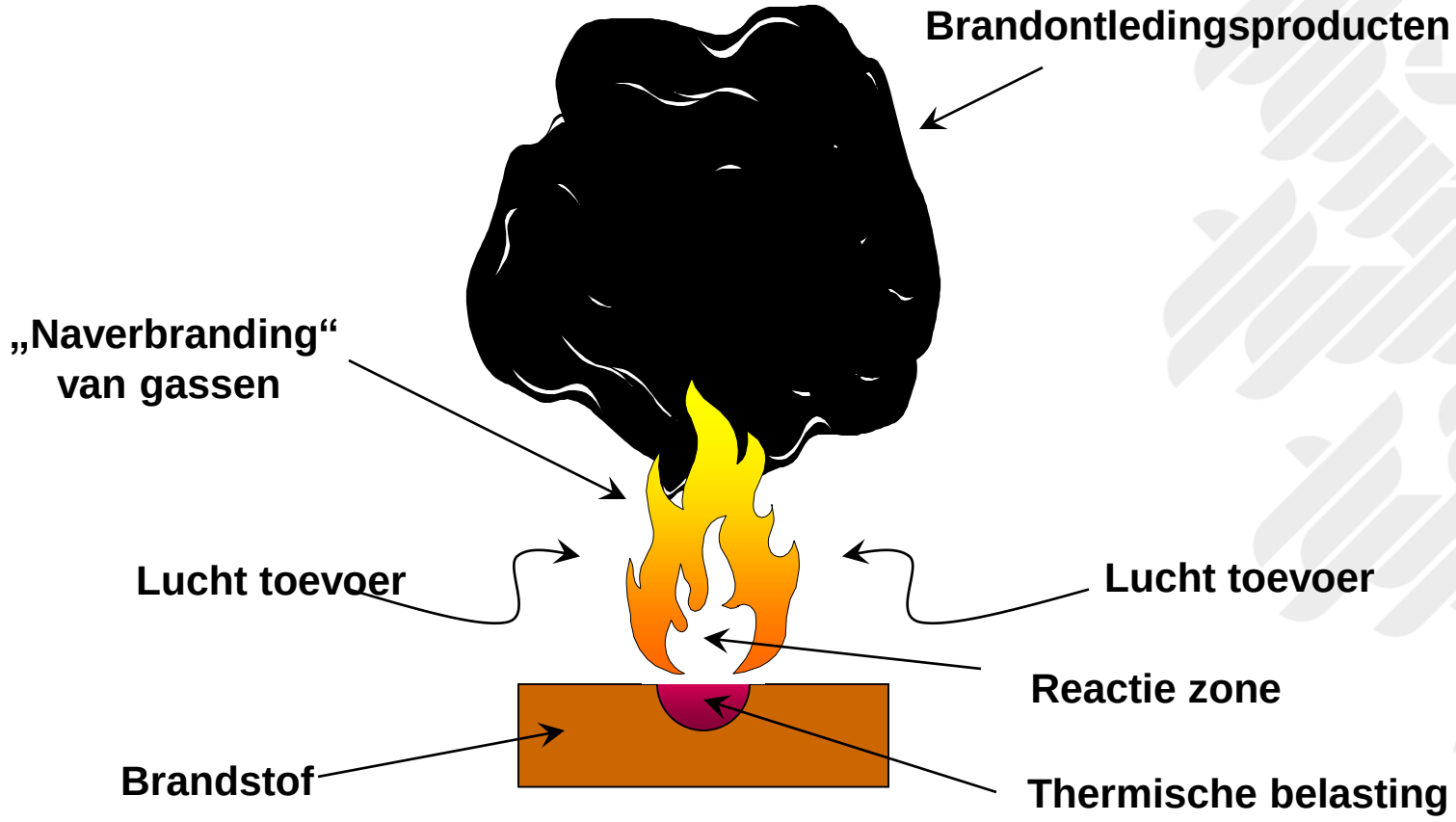


PCDD/F

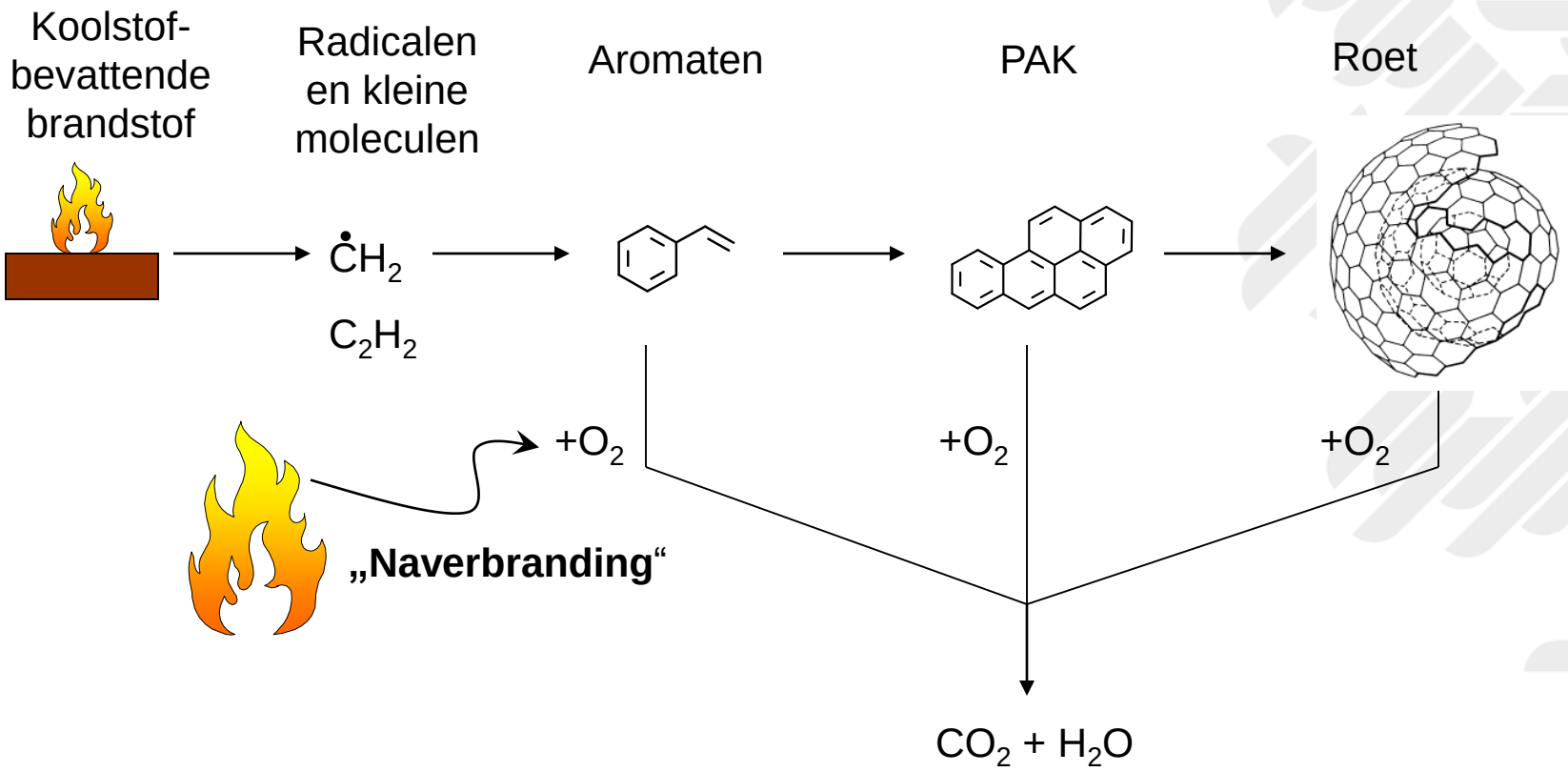
Droge houtdistillatie



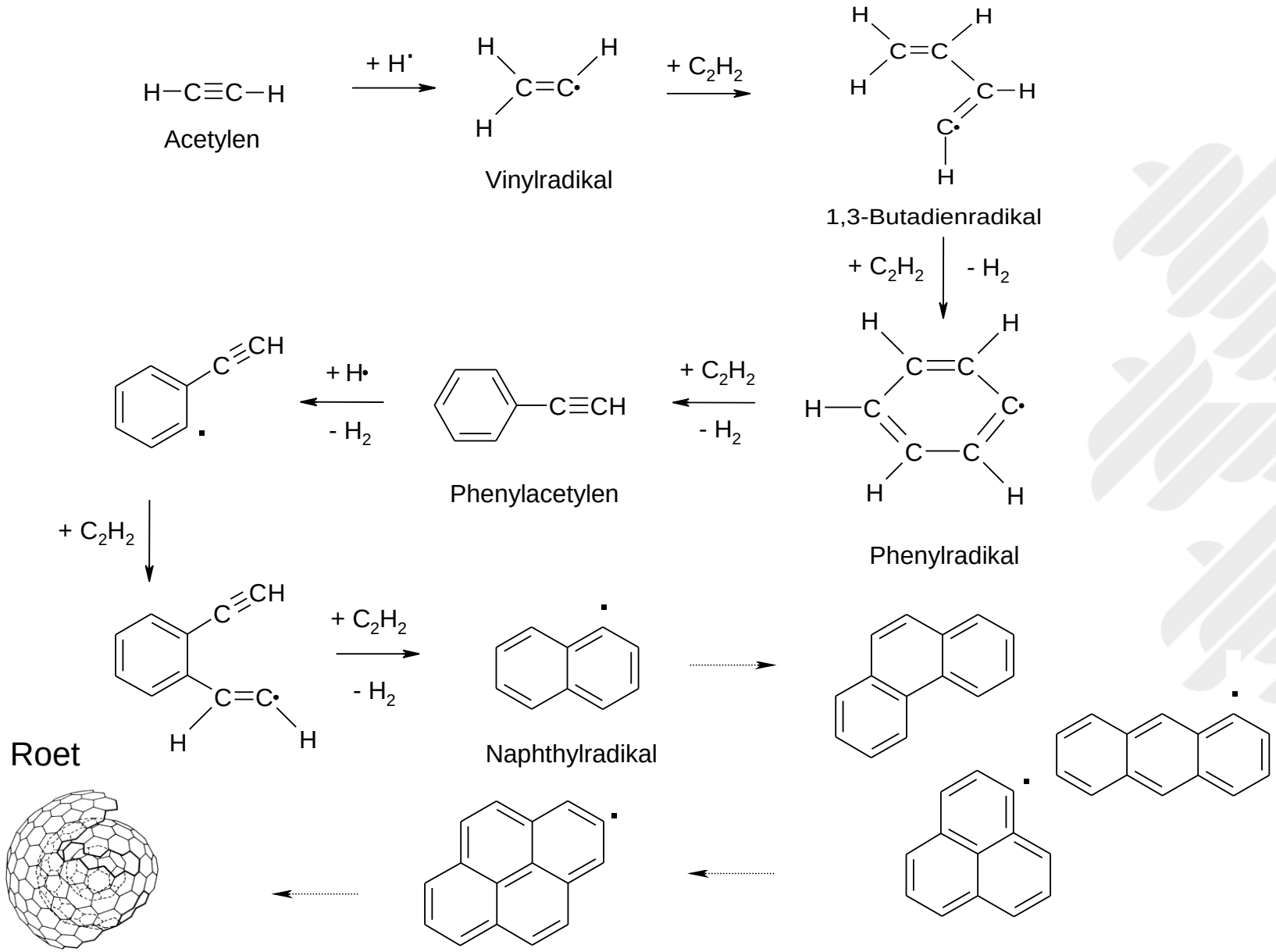
Zones bij de verbranding



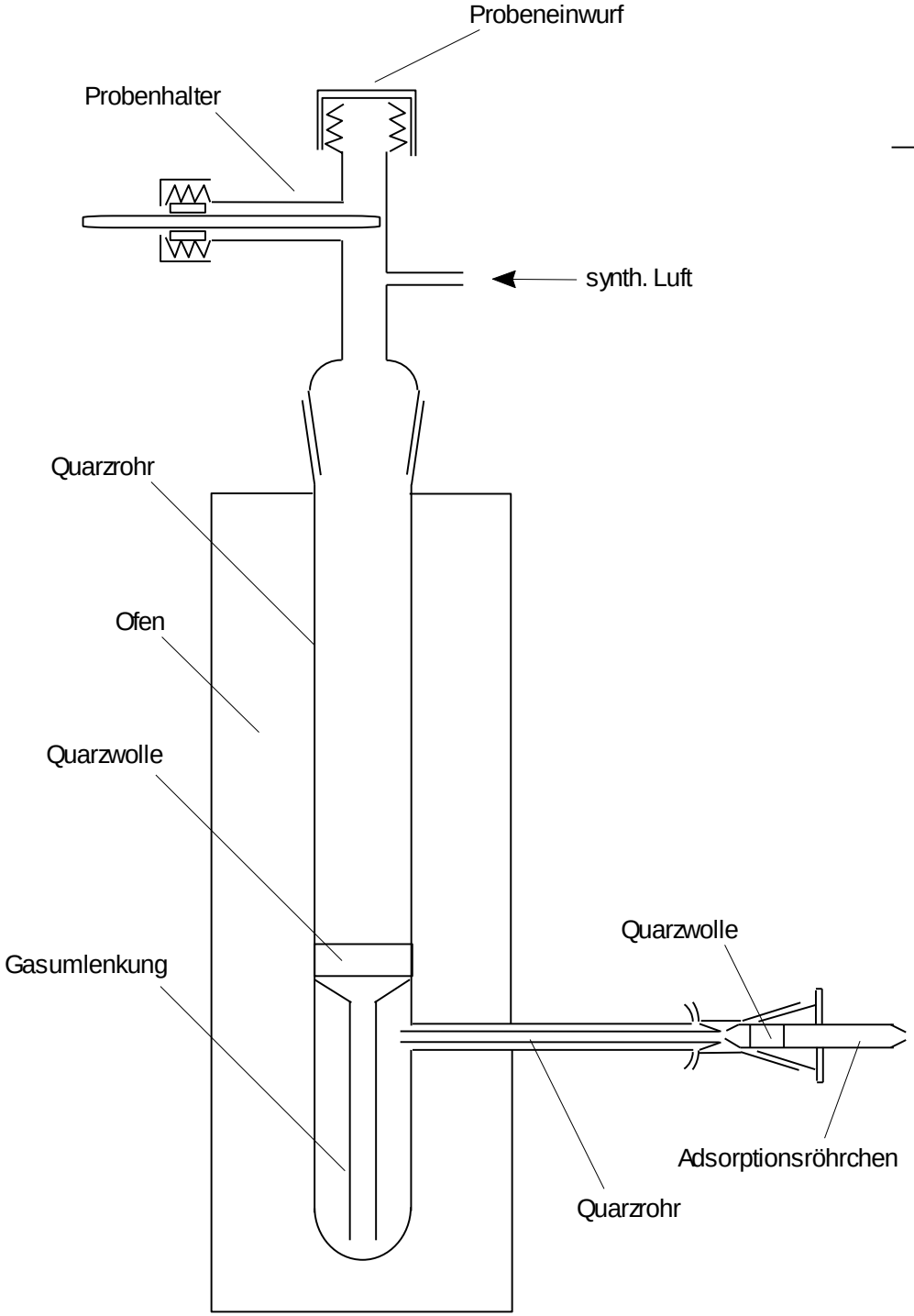
Formatie van aromatische verbindingen en roet



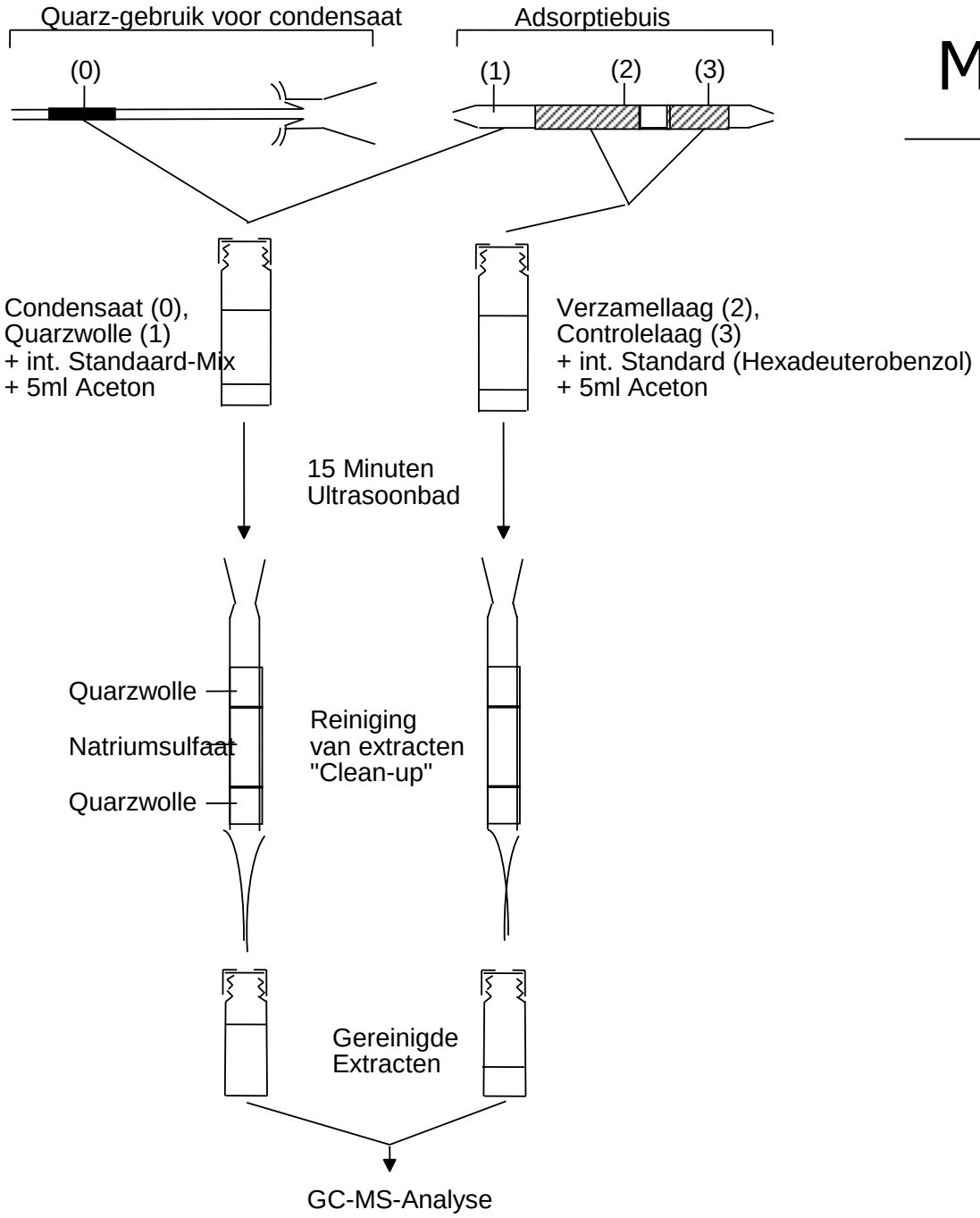
Formatie van aromaten – Reactiemechanismes



VCI-Verbrandings-apparatuur

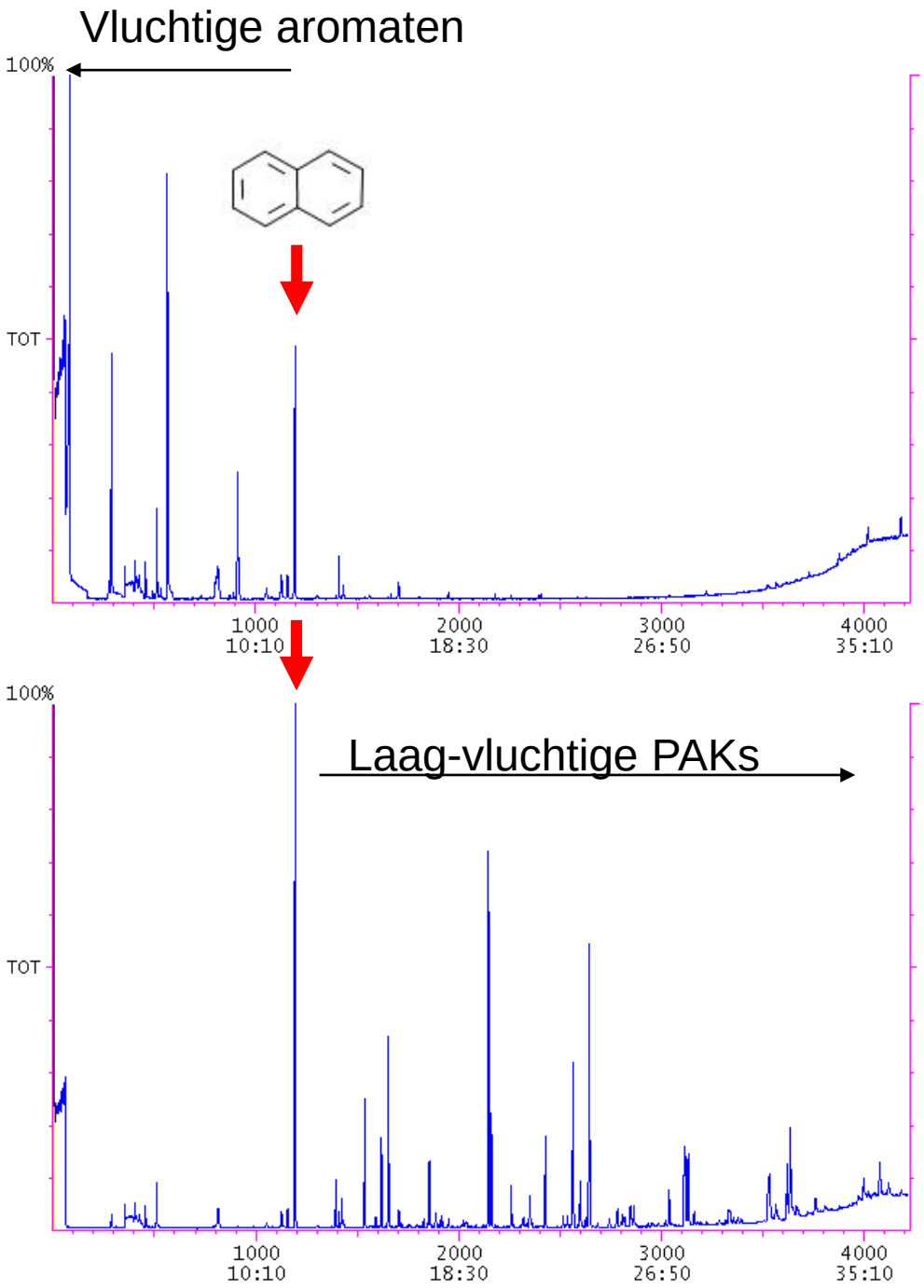


Monstervoorbereiding



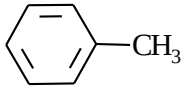
In de lucht

Roet

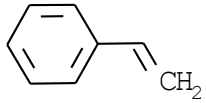


Brandrook-typische organische brandontledingsproducten

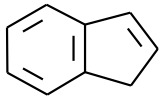
Benzol



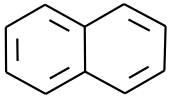
Toluol



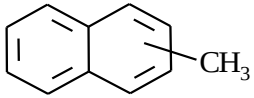
Styrol



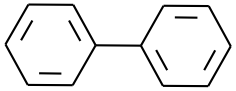
Inden



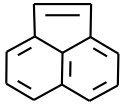
Naphthalin



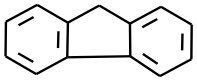
Methylnaphthalin



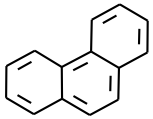
Biphenyl



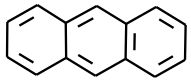
Acenaphthylen



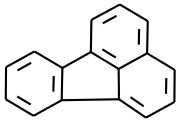
Fluoren



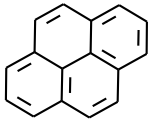
Phenanthren



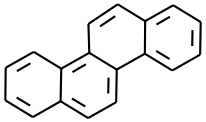
Anthracen



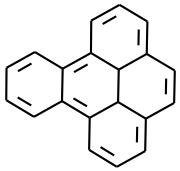
Fluoranthen



Pyren

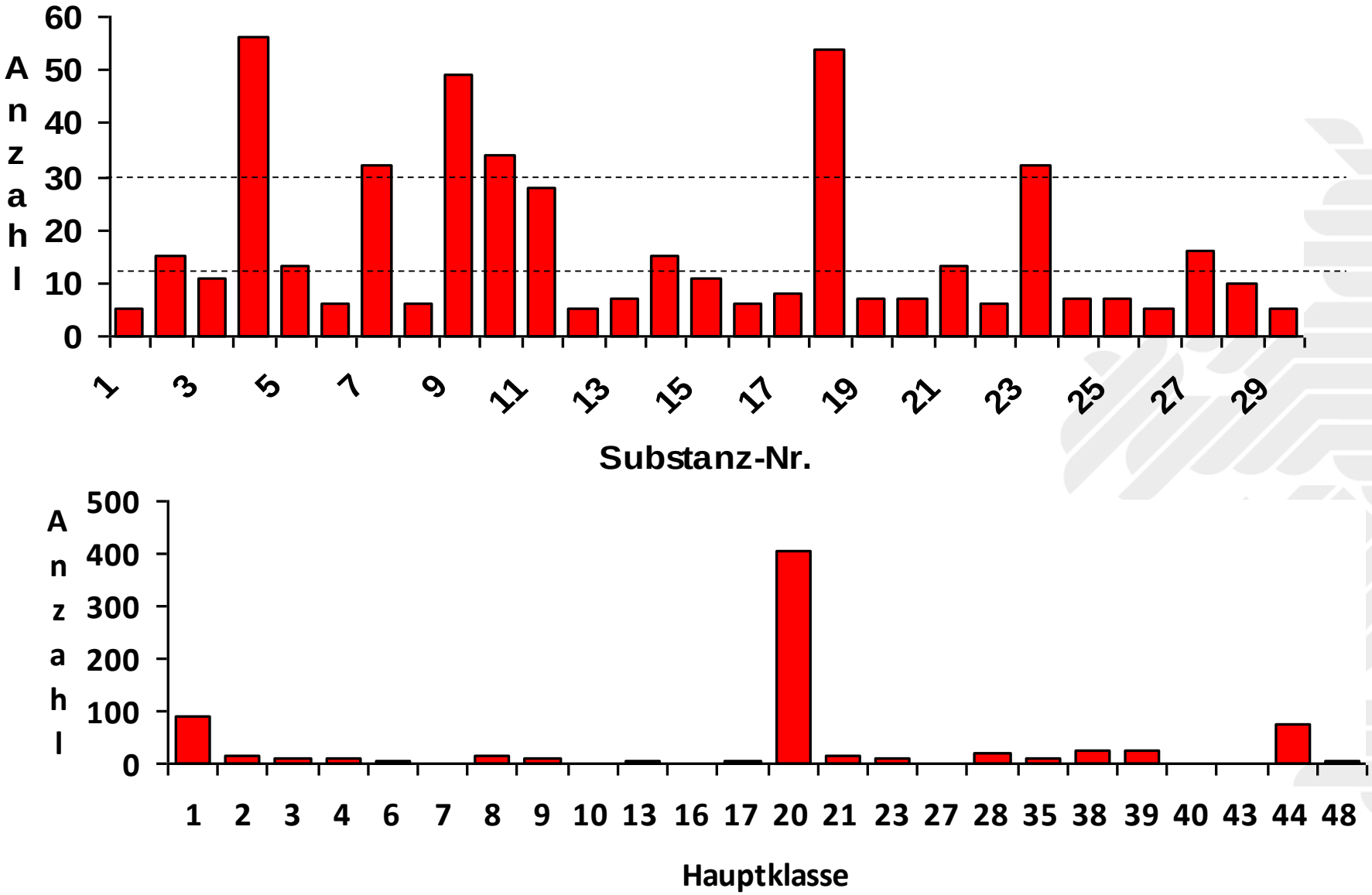


Chrysen



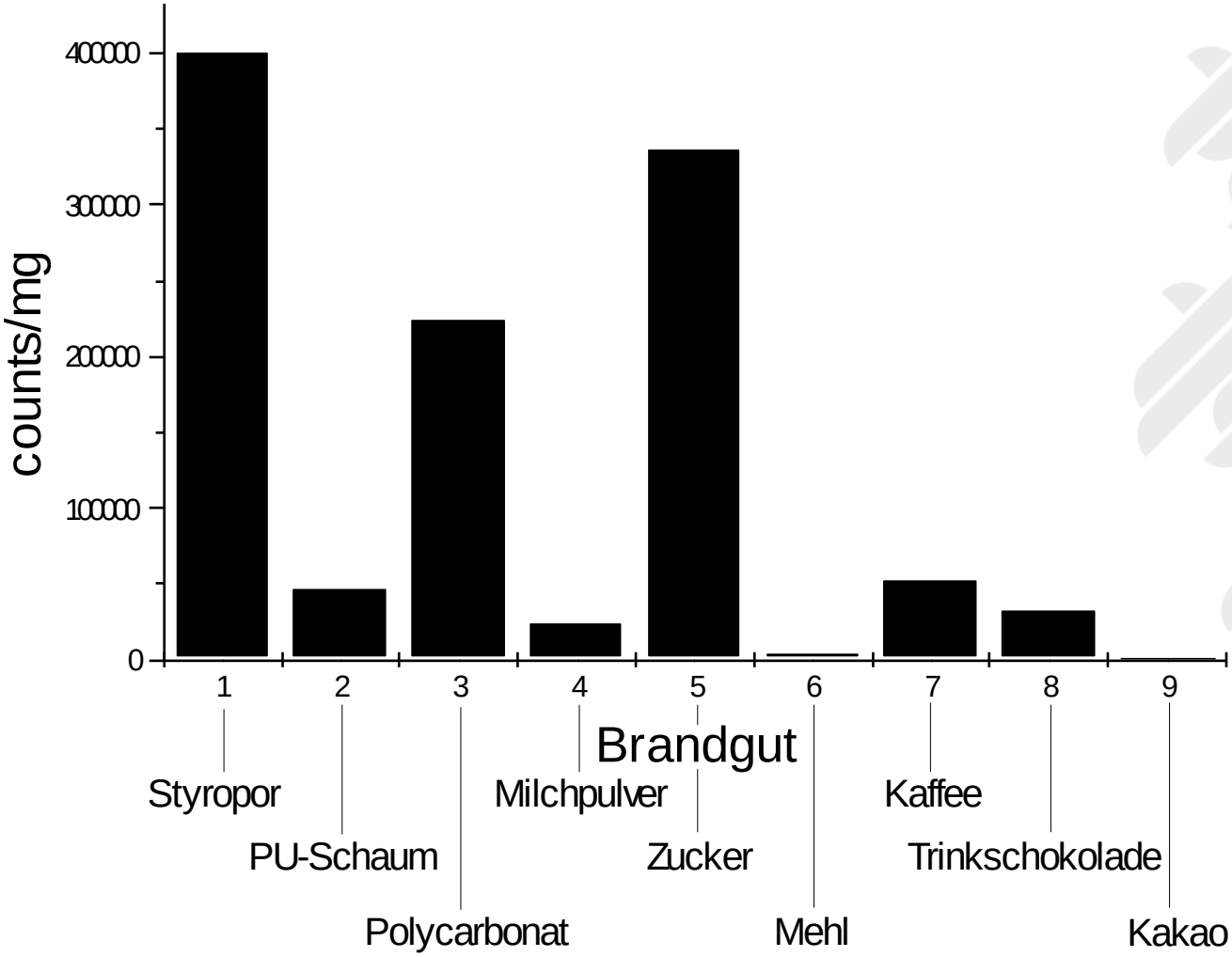
Benzpyren

Frequentie van stoffen – Evaluatie

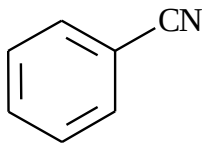


Aandeel medium-vluchtige stoffen

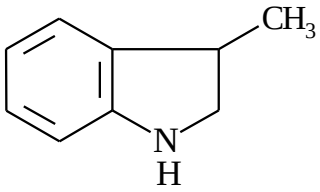
(Benzol, Toluol, Styrol, Inden Naphthalin)



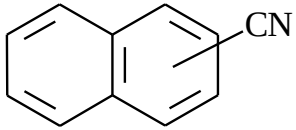
Typische organische brandontledings-producten van PU-schuim



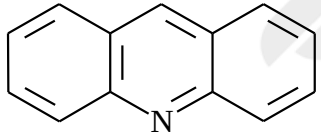
Benzonitril



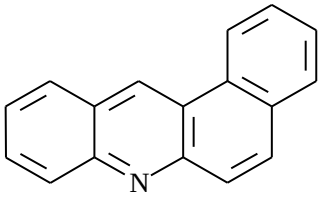
Methylindolin



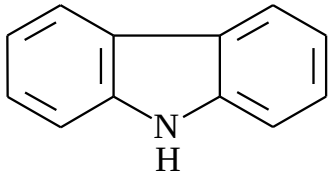
Naphthalincarbonitril



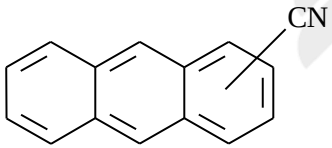
Acridin



Benz(A)acridin

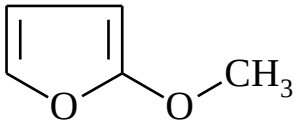


Carbazol

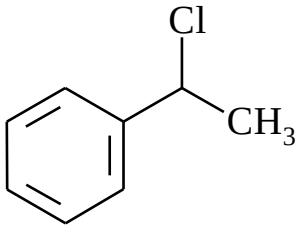


Anthracencarbonitril

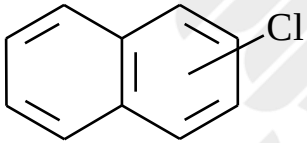
Typische organische brandontledings-producten van PVC



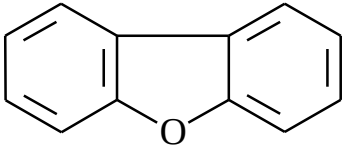
2-Methoxyfuran



1-Chlorethylbenzol

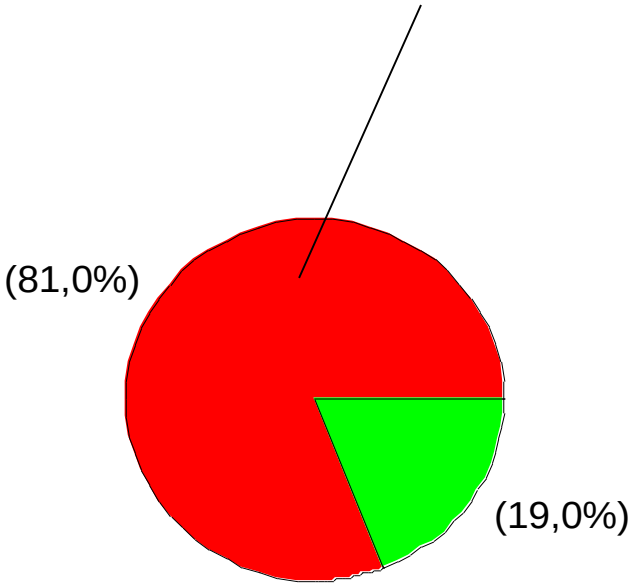


Chlornaphthalin

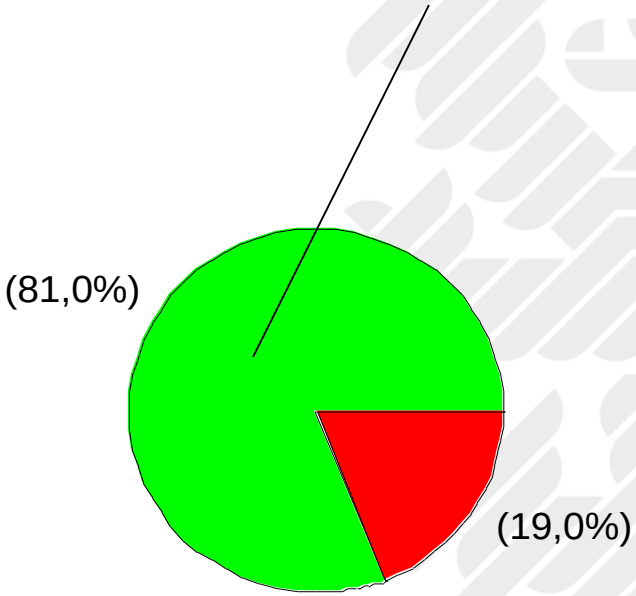


Dibenzofuran

Aandeel stikstofhoudende ontledingsproducten bij de verbranding van polyurethaan

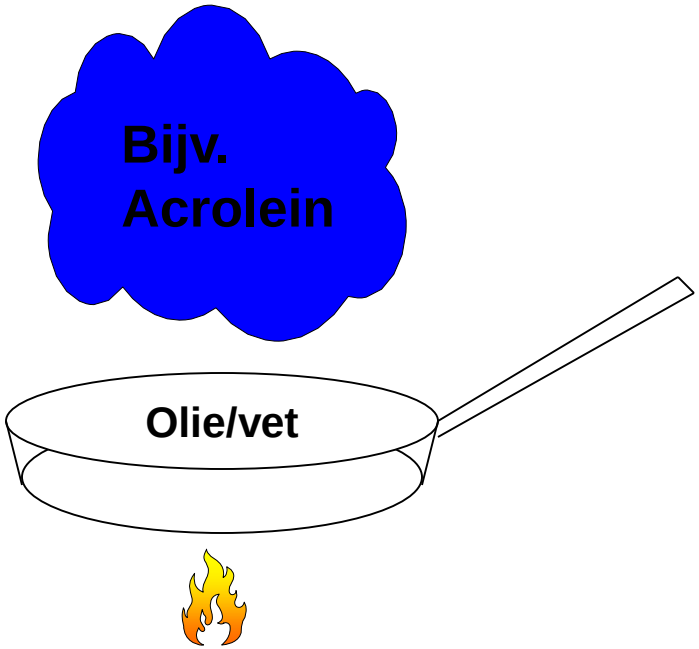


Aandeel chloorhoudende ontledingsproducten bij de verbranding van polyvinylchloride



Aldehyde

kan schade veroorzaken

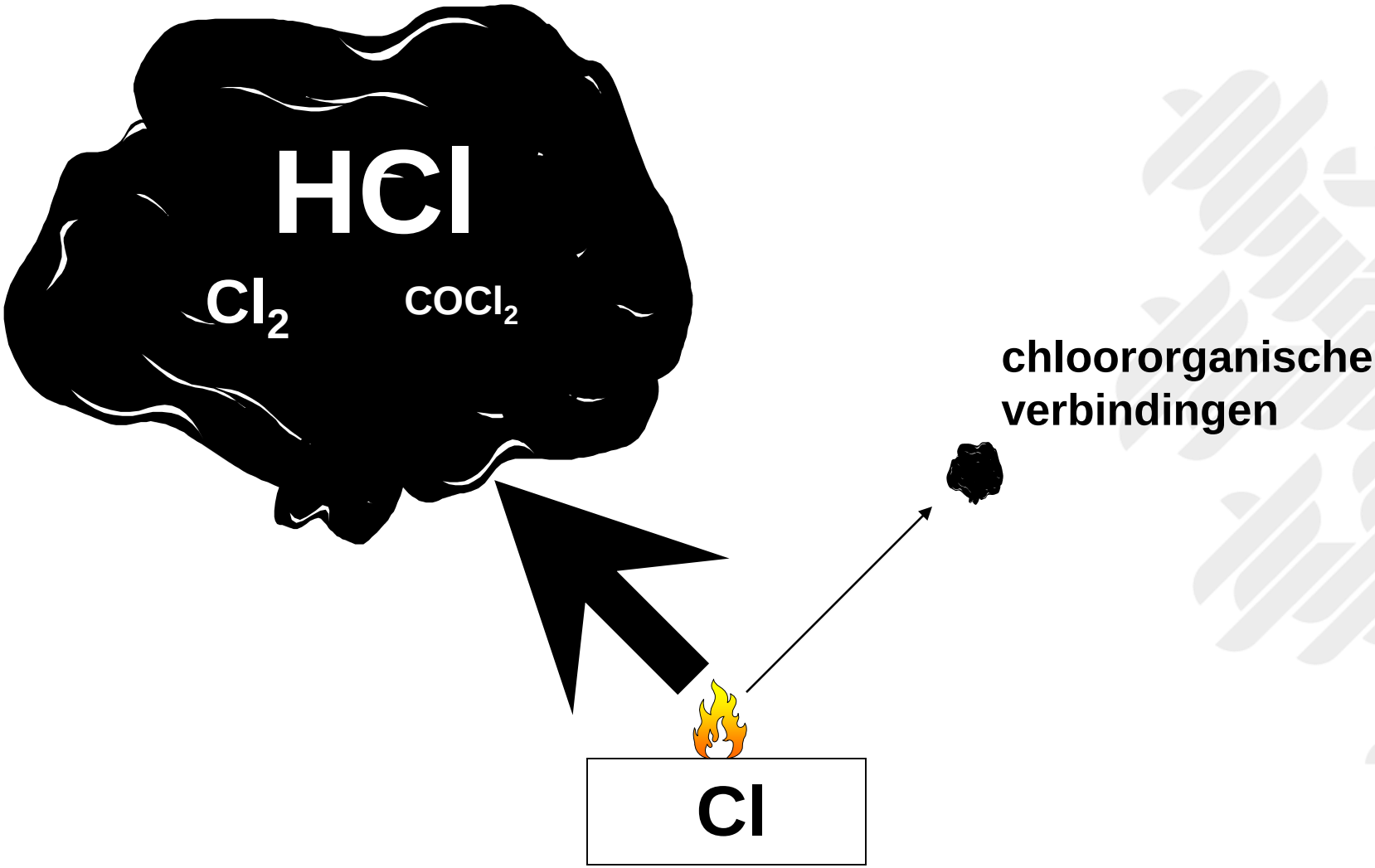


- Lage geurdrempelwaarde
- Prikkelbaarheid van ogen/slijmvlies
- In grote hoeveelheiden waarneembaar

Ook: psychische schade van bevolking

Chloorhoudende brandstoffen

leiden tot zoutzuur



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Gunstige factoren voor de formatie relevante hoeveelheden PCDD/F

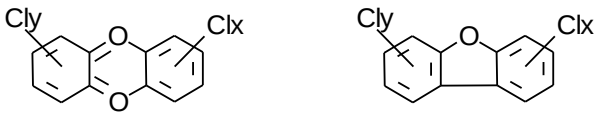
Lage temperatuur

Koper

Voorlopersubstanties (bijv. PCB)

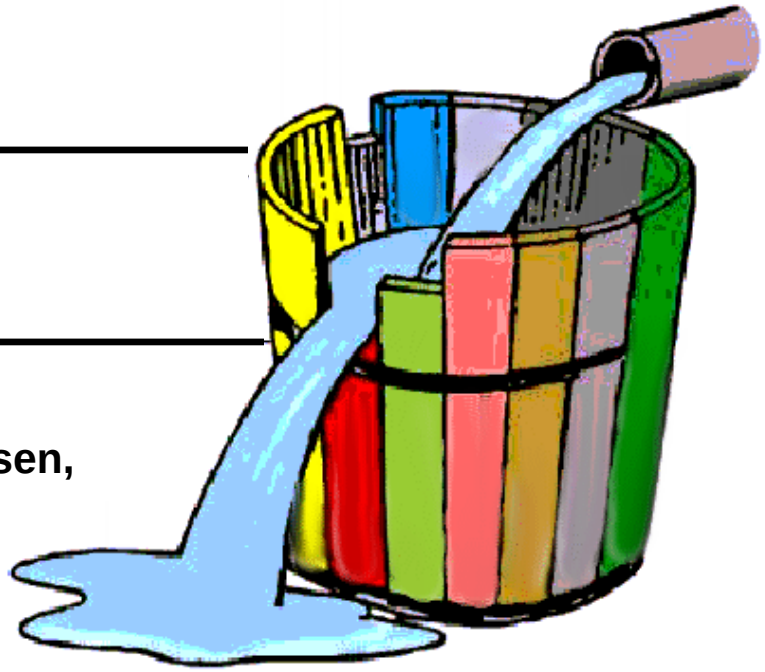
Grote hoeveelheden chloorhoudende brandstof

Relevante hoeveelheden PCDD/F



De noodmaatregelen worden door

- anorganische brandgassen,
- aromaten en
- PAKs bepaald:



Dioxine/Furane
Chlooraromaten

anorganische gassen,
aromaten en PAK

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Gevaarbeoordeling brandrook

Anorganische Brandgassen

1. Anorganische brandgassen bepalen de <u>acute</u> toxiciteit!

Organische brandontledingsproducten

2. Aromatische verbindingen (Benzol etc. en PAK) met kankerverwekkend potentiaal zijn <u>altijd</u> aanwezig

3. Warme brandhaarden: uit de roet gaan kankerverwekkende substanties in de omgevingslucht op
→ adembescherming

Samenvatting:

Gevaarbeoordeling brandrook

4. **Roet bevat laag-vluchtige schadelijke stoffen met lange-termijn effecten**
→ Huidcontact en opname vermijden

5. **Chlororganische verbindingen en PCDD/F zijn alleen onder bijzondere omstandigheden relevant**

VOORUITBLIK

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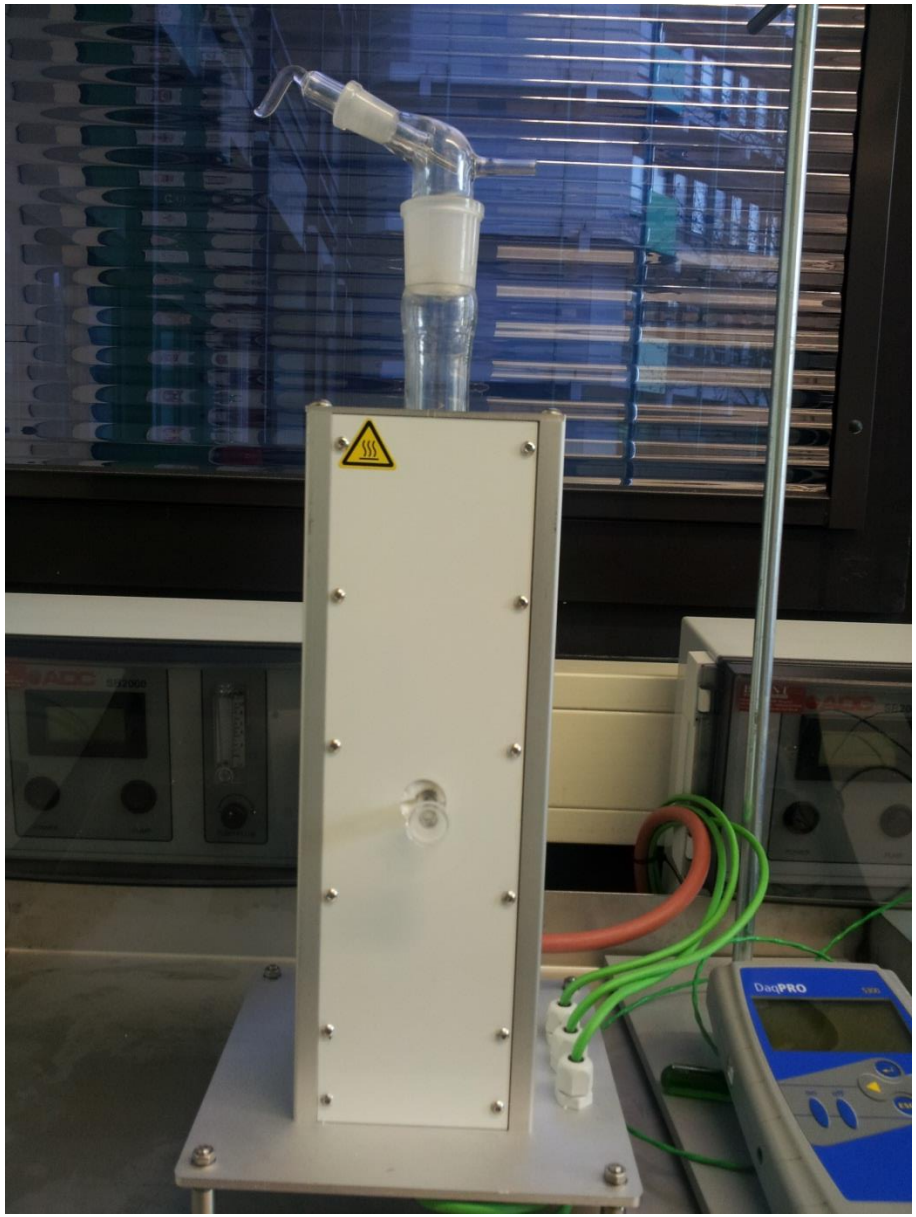

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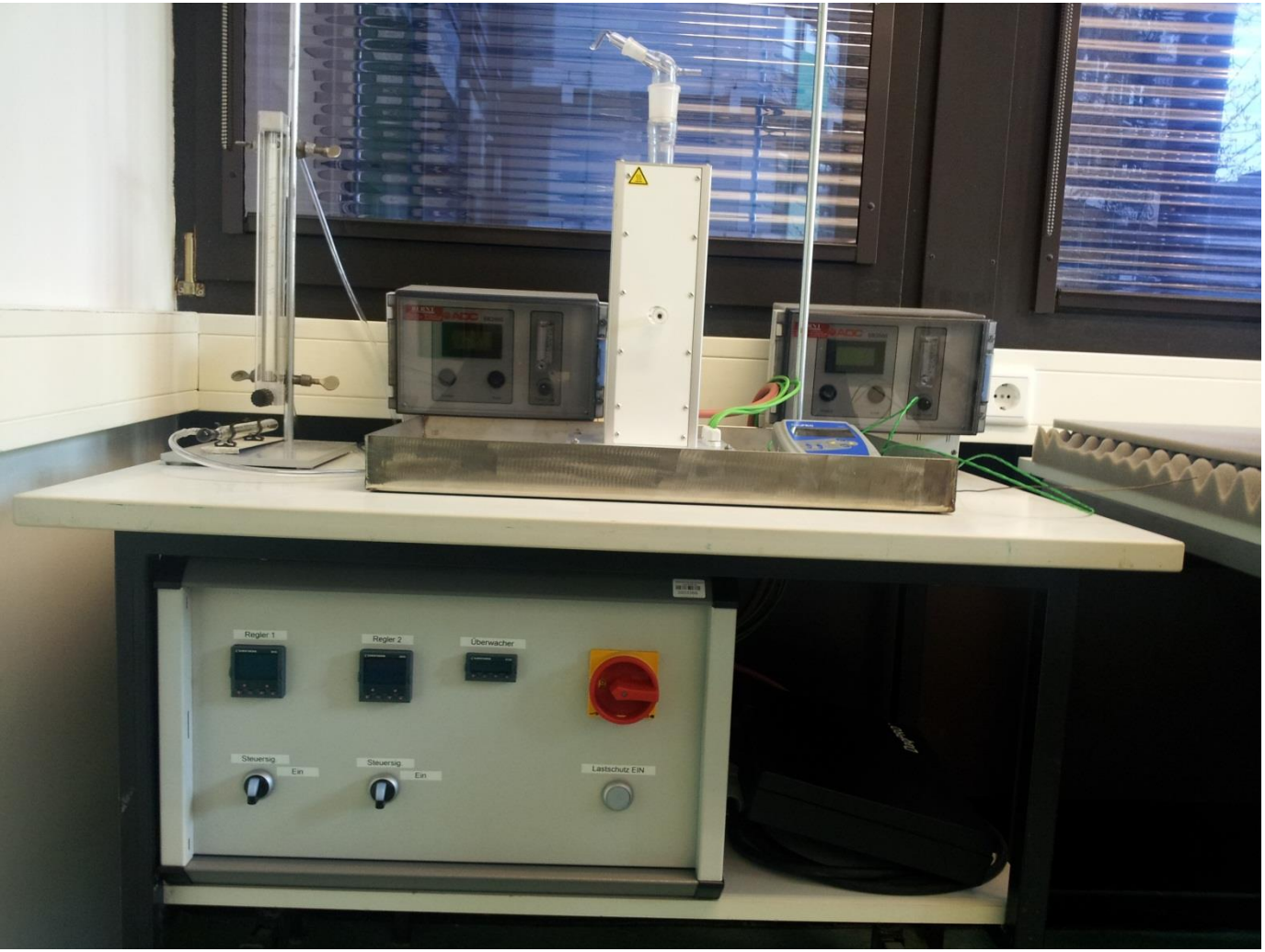
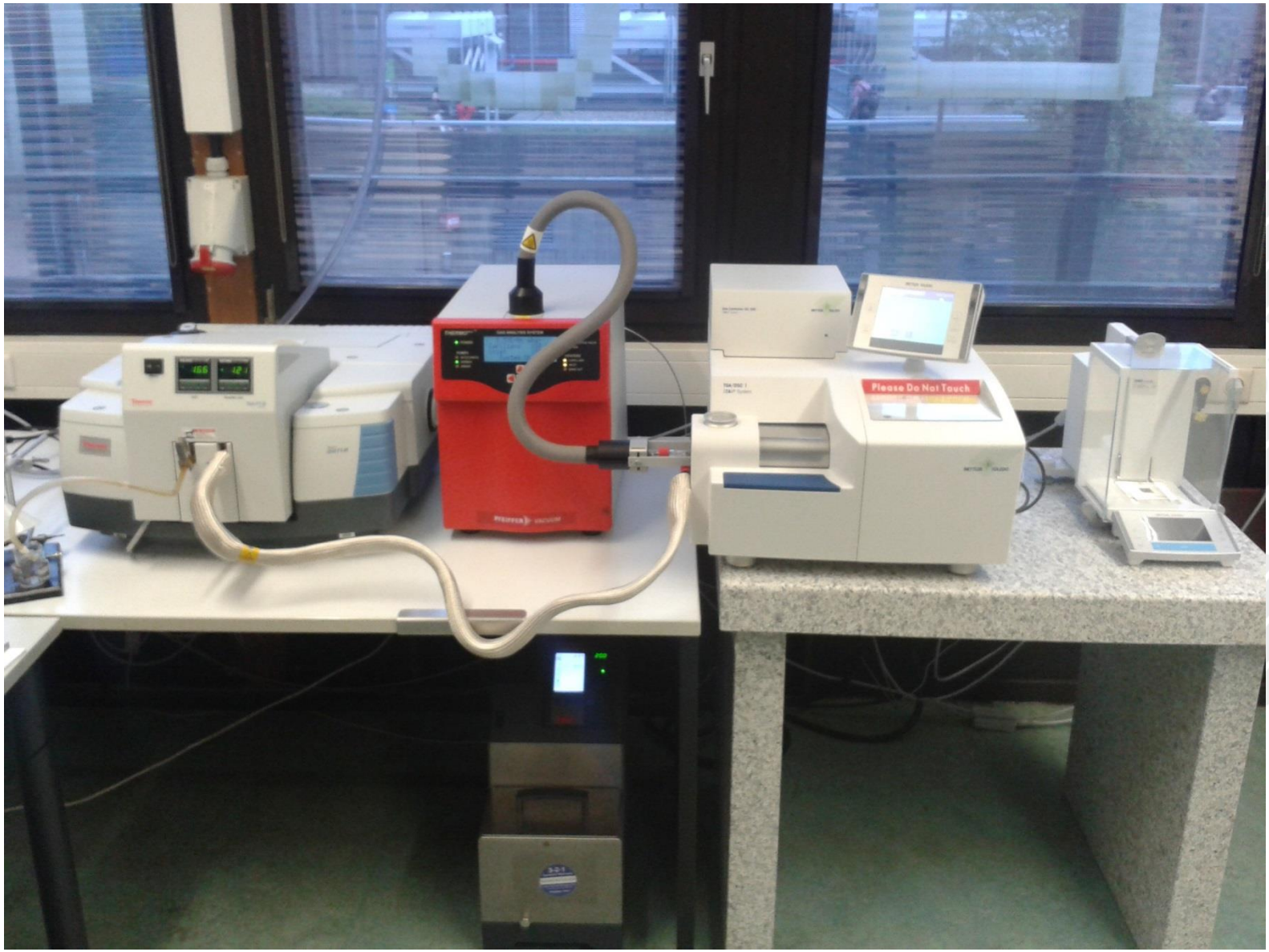


Laboratorium apparatuur



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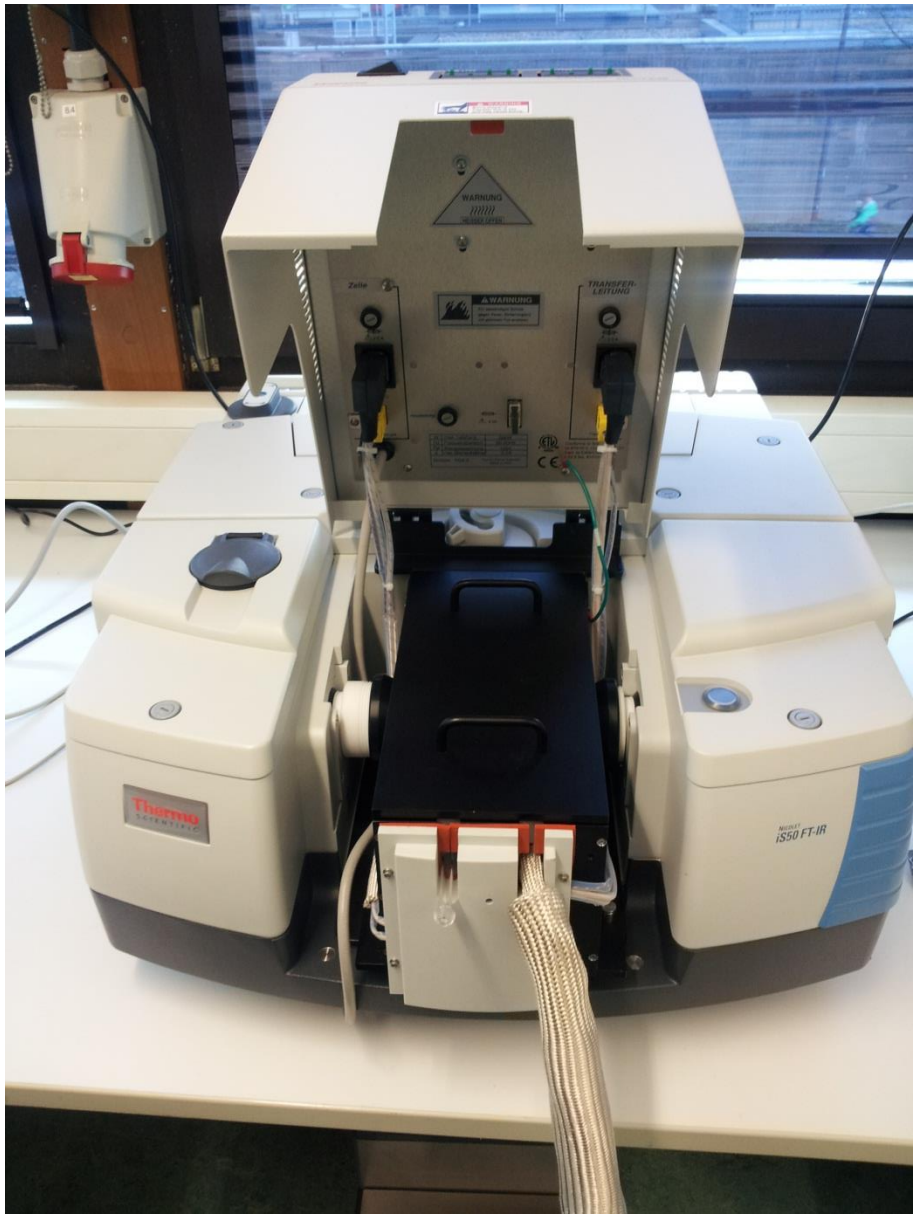

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