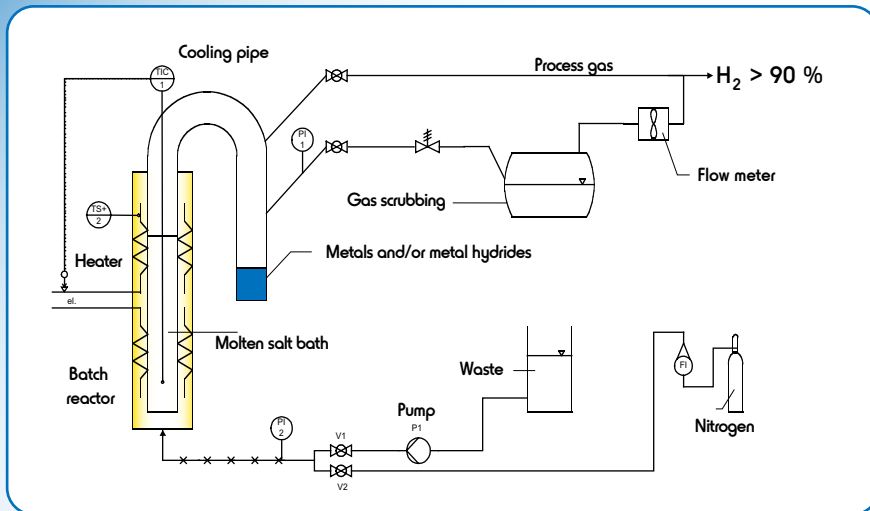


LUXOTHERM 1

(molten bath process)

The only waste utilisation process producing simultaneously hydrogen and alkali hydrides



Process:

- Thermal cracking associated with chemical reactions in a molten bath batch reactor.
- Waste materials are converted in a melt of alkali-hydroxides in a temperature regime around 800 °C at ambient pressure in an oxygen-free atmosphere
- The products are primarily hydrogen, alkali metals, metal hydrides and salts.
- The process gas stream is cooled to condense and collect the solid reaction products Na and NaH.
- After filtering and washing, the gas is essentially composed of hydrogen (>90%) and some methane.
- The solidified melt residue, essentially raw soda with Na₂O and carbon impurities, can be put to further use as-is or can be refined through oxidation.

Advantages of the LUXOTHERM 1 process

- Ecologically and economically efficient
- Conversion of waste into directly utilisable materials with high-tech applications (hydrogen, alkali hydrides)
- Reduction of waste volume
- Multiple applications for hydrogen
- Total absence of the greenhouse gas CO₂

The process was tested on the laboratory and pilot plant scale with model substances as well as with wastes from the following companies

Mc Donald's
Goodyear
DuPont de Nemours
Cegedel
Superdreckseschicht

The LUXOTHERM process is patented world wide

INPUT

In principle all hydrocarbon containing wastes

Liquid :

- Waste oils and engine oils
- Solvents
- Greases and waxes
- Lubricants and cutting oils
- Cryogenic agents and refrigerants

Pasty or solid :

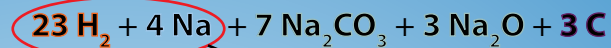
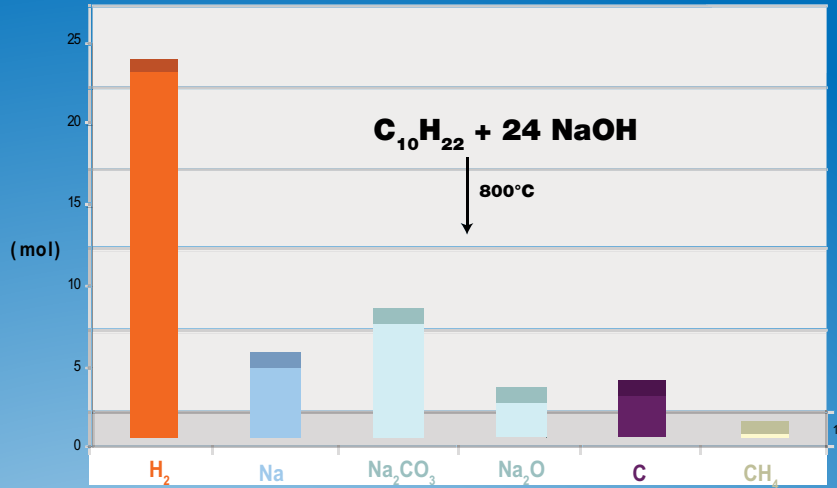
- Varnish and paints
- Glues and resins
- Plastics and rubber
- Bituminous residues
- Animal and plant residues

Tolerance towards halogenated hydrocarbons

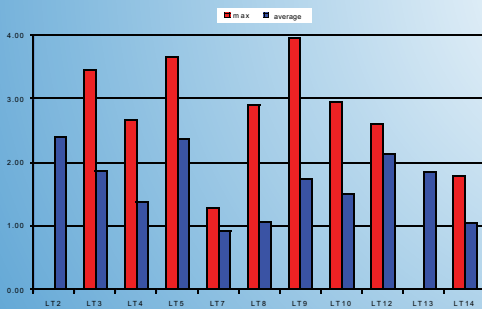
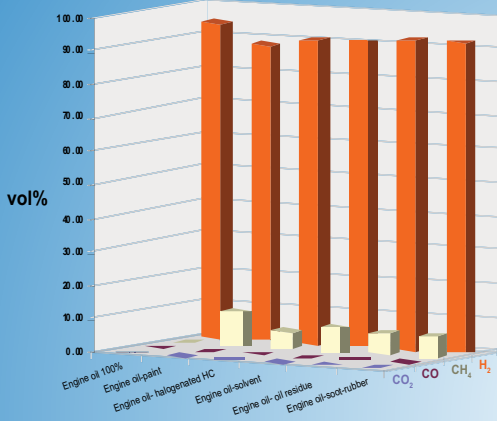
OUTPUT

Secondary raw materials

Theoretical reaction and stoichiometry for the reference substance decane



Gas composition for used oil mixtures



Gas yield: up to 4 Nm³/l input

Utilisation of H₂

- Chemical synthesis
- Metallurgy
- Food industry (fat hardening)
- Power generation
- Fuel

Na and NaH:

- Reducing agents in metallurgy
- Base materials for organic syntheses

NaH :

- Excellent hydrogen storage medium
- Easily contained and transported, in principle suitable as a hydrogen source in mobile and portable applications
- Storage density of 4.2 wt %, higher than most other metal hydrides
- Base material in the production of the hydrides NaBH₄ and NaAlH₄ with even higher storage density
- Hydrogen can be easily released on demand by addition of water
- The obtained hydrogen is very pure, suitable for direct use in PEM fuel cells
- Generated NaOH can be recycled in a closed loop as input material for the process

