Carbon2Chem®

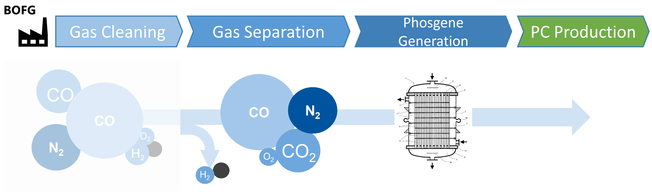
Carbon2Polymers

From Basic Oxygen Furnace Gas to Polycarbonates

Covestro Deutschland AG | RWTH Aachen University | Max Planck Institute for Coal Research

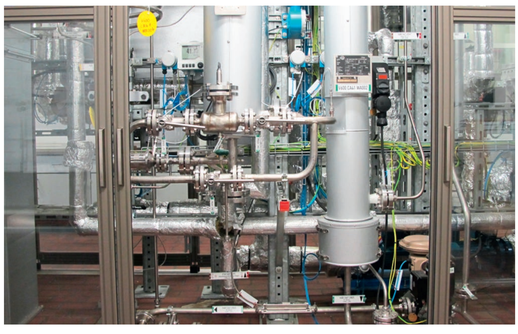
Objective

For the use of CO from steel industry (BOFG) in polycarbonate (PC) production, it should be clarified to which extent the impurities from the off gases influence two process steps of the polycarbonate production. Therefore, these two process steps are being researched and further developed to ensure resource- and energy-efficient implementation of CO based on BOFG.



Approach

For the evaluation of the possible use of CO coming from off gases in the production of polycarbonate the catalytic mechanism and catalyst stability of CO conversion were investigated in a laboratory facility and a pilot plant. This is an important aspect because catalysts can be very sensitive to trace amounts of impurities, affecting conversion rates and therefore manufacturing efficiency. In addition, the experimental work was supported and complemented by reactor modeling and simulation of the process steps.



Miniplant for CO usage built up at Covestro.

Results

- The deactivation of phosgene generation catalysts (AC) could be elucidated by Cl_2 adsorption measurements and Raman spectroscopy (MPI).
- Promising N-doped activated catalyst has been synthesized and tested (MPI).
- Miniplant for phosgene production was set up
- Successful testing of high N_2 loads in phosgene production (laboratory scale and miniplant) (COV) was carried out.
- Refinement of the detailed reactor modelling for phosgene production was successfully completed on the basis of experimental data and successful model simplification for process simulation (AVT).
- Overall process simulation with gas separation (detailed evaluation), phosgene generation and phosgene separation was carried out (AVT).
- Integrating stochastic process optimization with LCA identified the process concept for phosgene production with the lowest greenhouse gas emissions and its optimal operational parameters (LTT & AVT).
- The models for simulating the influence of impurity on phosgenation could be transferred to solvent-based phosgenation (LTT).

Conclusion

In summary, we have evaluated the use of CO from the converter gas in all process steps and no showstopper has been identified so far. It is therefore currently assumed that CO from the gas converter can also be used on an industrial scale in the future.

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FOR THE CLIMATE PROTECTION

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