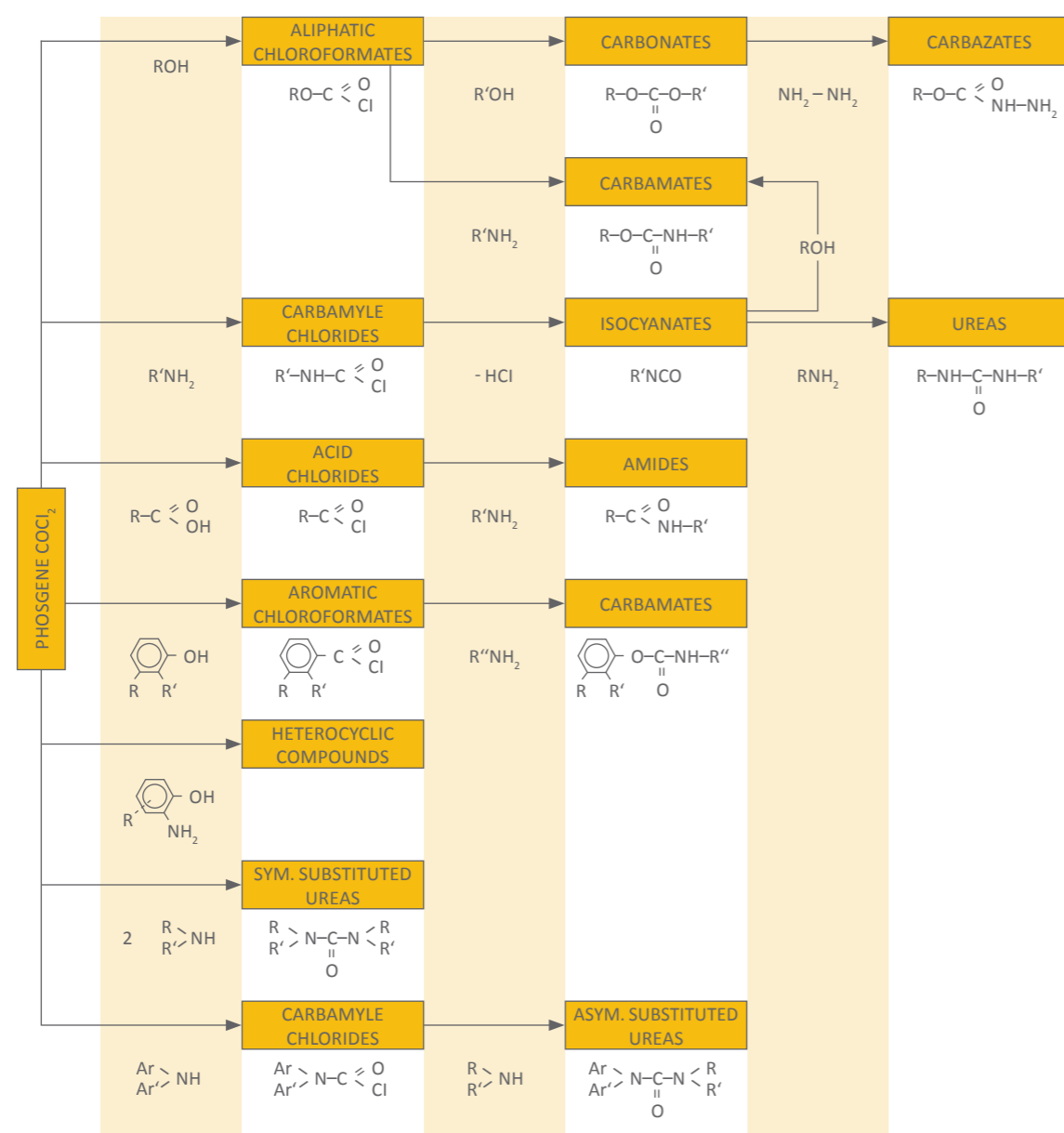


## Examples of phosgene Chemistry



## Custom Syntheses

Product description

### Our partners benefit from

- Long-term experience in the field of special technologies
- Nitration with 98 %  $\text{HNO}_3$
- Hydrogenation
- Phosgenation
- In-house phosgene production
- Variability of production equipment for the quick launch of new projects
- Balanced Quality
- Production capacity suitable for projects from 10 MT
- Location in Central Europe
- Prompt deliveries and logistics cost reduction
- Successful implementation of many projects in cooperation with leading European and worldwide producers
- Customer service

## Custom Syntheses

The complex and sophisticated nature of current industrial production processes, combined with their diversity, require individually designed solutions which are tailored to the needs of specific customers. Synthesia, a.s., having gained ample experience in the area of special production processes for organic compounds, is capable of meeting even non-standard and specific requirements.

We are currently producing 24 products for European as well as US customers, while strictly respecting the agreed stipulations governing the protection of know-how; the respective production processes fall into the category of complex and sophisticated. The turnover of Synthesia, a.s. from sales in this segment is in excess of € 12 million.

### From your project to your synthesis



### Synthesia Expertise list A–Z

In addition to classic chemical reactions, Synthesia has developed extensive expertise in the following fields:

Acetylation	Diazotization	Hydrogenation
Alkali Fusion	Dissolution	Nitration
Blending	Distillation	Packaging
Carboxylation	Drying	Phosgenation
Condensation	Esterification	Reduction
Contract Research	Filtration	Separation
Chlorsulphonation	Formulation	Sulphonation
Crystallization	Granulation	Toxicological Research

### Reaction Capabilities

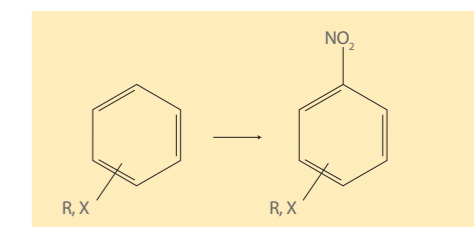
Synthesia has many years of experience in the broad field of chemical production and has great production facilities potential which can be used for complicated synthesis such as nitration, hydrogenation and phosgenation, to name a few. Synthesia is the biggest producer of organic specialities in the Czech Republic, having been producing dyes, pharmaceutical intermediates and APIs for sixty years.

Synthesia, as the owner of the largest Czech research institute involved in research and development in the field of organic chemistry and toxicology, can capitalize on systematic and continuous R&D work.

### Core Technologies

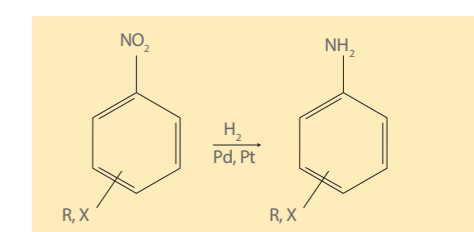
#### Nitration

- Nitration in organic solvent & nitration in concentrated or diluted nitric acid
- More than 20 reactors for nitration in stainless steel, carbon steel and glass-lined; volumes 4–10 m<sup>3</sup>
- Own production of nitric and sulphuric acid
- Waste acid treatment
- Pilot production – reactors (GL, SS, CS) in volumes between 50 l up to 1000 l



#### Hydrogenation

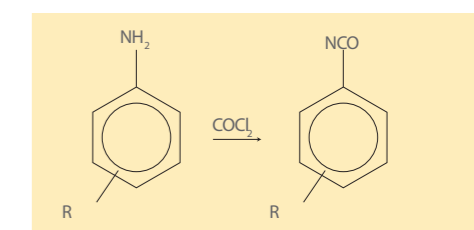
- Hydrogenation in solution & hydrogenation without solvent
- Two independent Buss Loop Reactors (2.3 m<sup>3</sup> each) made of stainless steel and Hastelloy
- One batch type reactor made of steel. For use at temperature up to 140 °C and pressure up to 40 bar
- Own hydrogen generator situated next to hydrogenations
- Synthesia's R&D department is well equipped for scaling up – hydrogenation reactors in volume between 0.5 l–300 l made of Hastelloy, carbon steel and stainless steel



#### Phosgenation

More than 50 years' experience in the production and treatment of phosgene. From "basic" production of arylisocyanates to the highly sophisticated phosgenation of amino acids.

- Phosgenation in water and different organic solvents
- Three independent production lines for isocyanates
- Two multipurpose production unit equipped by:
  - Brine cooling (–15 °C)
  - Water cooling (+20 °C)
  - Glycol heating / cooling system (–15 / +50 °C)
  - Steam heating (+150 °C)
- Facilities for solvent recycling
- Phosgenation under GMP conditions
- Pilot plant (250 l reactor)



### Research and Development

- Fast, safe and effective transition to commercial scale production
- Development and optimization of existing processes
- Optimizing the number of manufacturing steps and costs
- Increasing the efficiency, yield and capacity of processes
- Analytical services and support throughout the project
- Close cooperation with the Synthesia subsidiary VUOS in promoting REACH registrations