Invention by Otto Roelen Paved the Way for Oxea

Kohlechemie AG, a company collectively founded by a consortium of mining companies in 1927, was renamed Ruhrchemie in April 1928, and began production of fertilizer in 1929 at its Holten site. In 1934, the first facilities for the production of liquid hydrocarbons using the Fischer-Tropsch process became operational. But it was in 1938 that Otto Roelen discovered the hydroformylation process by chance, during an attempt to lead ethylene produced by the Fischer-Tropsch reaction back into the process.

During experiments in which both ethylene and ammonia were fed to the Fischer-Tropsch process, Roelen observed the deposition of propionaldimine, a condensation product of ammonia and propionaldehyde. Unlike other researchers in the area, he attributed the formation of propionaldehyde to a separate reaction that depended on the addition of ethylene to the process, not merely as a side-reaction of the Fischer-Tropsch synthesis. As catalyst, he used a mixture containing cobalt, thorium and magnesium oxide that was commonly used for the Fischer-Tropsch synthesis. However, he later found that many other cobalt salts were suitable as catalyst precursors and speculated that cobalt carbonyl hydride was the catalytically active species. After the first attempt at optimizing the reaction towards the synthesis of aldehydes, Roelen submitted a patent application for the so-called "oxo synthesis" (hydroformylation) at the end of 1938.

Roelen later expanded work on the hydroformylation process to include Fischer-Tropsch olefins with chain lengths of 11 to 17 carbon atoms for the production of fatty alcohols, which were used for the production of detergents. In 1940 Ruhrchemie began construction of a facility for the production of 10,000 t/a of fatty alcohols. The construction was significantly hindered by the Second World War, and the plant never became operational, either during or after the war.

After 1945 a ban on the production of synthetic fuels was enforced by the Allies, along with the dismantling of the respective production facilities, which in any case had been significantly destroyed during the war.
This led, during the 1950s, to a shift in the production focus of Ruhrchemie from coal chemistry to petrochemistry. This is exemplified by the commencement of production of high-density polyethylene (HDPE) in 1960 and low-density polyethylene (LDPE) in 1972. Other technical milestones of the site include:

- 1953 Construction of a butyraldehyde facility (cobalt-catalysed)
- 1960 Start of production of intermediate organic products (alcohols, carboxylic acids, amines)
- 1976 Start of production of 2-Ethylhexanol
- 1984/88 Launch of the Ruhrchemie/Rhône Poulenc process for the production of butyraldehyde (rhodium/TPPTS as catalyst)
- 1986 Construction of the SAR (coal-based syngas) facility
- 1987 Start of production of Neopentylglycol
- 2002 Start of production of Cycloolefin copolymers
- 2003 Construction of a new (natural gas-based) syngas facility
- 2003 Construction of the first specialty ester facility

In the 80ies, Ruhrchemie AG was integrated into Hoechst AG and later on reassigned to the Hoechst subsidiary company Celanese.

In March 2007, Oxea was assembled by the financial investor Advent from business units of Celanese Chemicals and European Oxo (a joint venture of Celanese and Evonik, previously Degussa). With a production capacity of more than 1.4 million t and turnover of ca. 1.5 billion €, Oxea is the second largest producer of oxo products by volume, and has the largest commercial market share. The products of Oxea are produced at three sites in Europe (Oberhausen, Marl, Amsterdam), and two sites in the United States (Bay City, Bishop). A sixth site in China (Nanjing) is currently under construction. Over 1,400 employees work to ensure reliable and safe production and competent customer support.

In October 2013, Advent International announced its divestment from Oxea. Oman Oil Company (OOC), a commercial company wholly owned by the government of the Sultanate of Oman, will acquire the oxo chemicals manufacturer to strengthen its position in the global chemicals sector.

Oxo Intermediates and Oxo Derivatives form the core competencies of the company. Oxea sits either in first or second place worldwide in the sale of aldehydes, alcohols and esters, while in carboxylic acids Oxea offers the widest product portfolio and the highest capacity. Oxea is also the sole producer of a number of specialty aldehydes, diols and olefin derivatives. The 70-plus products of Oxea are used in a wide variety of industries and applications.
Since its discovery in 1938, the hydroformylation process has been continuously developed and optimized over the years. Today, it represents the backbone of the company. Oxea has a broad portfolio of sophisticated proprietary production processes including oxidation, hydrogenation, amination, esterification, aldolisation as well as in particular various hydroformylation processes. A key to the success of Oxea is the consistent implementation of its corporate and product strategy based on three pillars: expanding the product portfolio along its own wide-ranging value chain, complementing the portfolio with products that are used in the same applications as existing products, as well as expansion in growth markets.

In the years following Oxea's inception, the processes at all locations were optimised, and all capacities expanded. Already in 2008, the first new product, 3G8, a 2-ethylhexylester of triethyleneglycol was introduced, and products such as DOA, TOTM, 3NG810 and GPO quickly followed. These phthalate- and VOC-free plasticizers are an attractive alternative to conventional plasticizers, which are coming under increasing pressure from consumer organizations and legislators in many countries.

Around this time, demand for these specialty esters had risen so rapidly that capacity-increasing measures in existing facilities were no longer adequate to meet the growing demand. Based on this, it was decided at the end of 2010 to build a second ester plant in Oberhausen. In parallel, the demand was growing for carboxylic acids, required for the production of phthalate-free plasticizers, but also for the production of energy-efficient lubricants, whose use to reduce greenhouse gases was likewise flourishing as a result of the Montreal Protocol. Due to these factors, the decision to construct a third carboxylic acid plant in Oberhausen was made in early 2011.

The new ester plant, and the corresponding carboxylic acid plant, became operational in late 2012 and late April 2013, respectively.

The construction of the derivatives plant in the Nanjing Industrial Park in China was inaugurated with a symbolic groundbreaking ceremony on site in late 2011. At this site specialty esters and phthalate-free plasticizers will be produced in the future.

The production capacity of butanol and propanol in Bay City will be increased by 25% by mid-2014. With this investment, Oxea hopes to take advantage of the favorable prices of natural gas, propylene, and especially ethylene. The project pipeline of Oxea is still well stocked, and all signs point to continued growth. All
projects have one thing in common: the hydroformylation reaction, a groundbreaking discovery that even 75 years later has lost none of its importance.

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