

Twenty years after Gauss's great mathematical achievements, two new discoveries announced to the scientific world that Germany had again taken a foremost position in chemistry. These were Mitscherlich's discovery of isomorphism in 1819,¹ and Wöhler's preparation of an organic compound from inorganic materials in 1828.²

In 1830 Liebig succeeded in finally establishing that simple and accurate method of organic analysis known by his name. Organic chemistry, in its modern sense,

20.
Liebig's
organic
analysis.

The direction I had received in Paris was a different one. . . . I saw very soon that all progress in organic chemistry depended on its simplification. . . . The first years of my residence at Giessen were almost exclusively devoted to the improvement of organic analysis, and with the first successes there began at the small university an activity such as the world had not yet seen. . . . A kindly fate had brought together in Giessen the most talented youths from all countries of Europe. . . . Every one was obliged to find his own way for himself. . . . We worked from dawn to the fall of night: there were no recreations and pleasures at Giessen. The only complaints were those of the attendant, who in the evenings, when he had to clean, could not get the workers to leave the laboratory." See 'Deutsche Rundschau,' vol. lxvi. pp. 30-39.

¹ Eilhard Mitscherlich (1794-1863), a pupil of Berzelius, discovered in 1819 that in compound bodies which crystallise in definite forms certain elements can be replaced by others in the proportion of their chemical equivalence without changing the form of crystallisation. Such elements are termed "isomorphous." Berzelius declared

this to be the most important discovery that had been made since the theory of chemical proportions had been established.

² This synthesis was the preparation of urea, a highly organic substance, out of the compounds of cyanogen, with the examination of which he and Liebig were then occupied. "It was the first example of the fact that an organic substance could, by chemical methods alone, be produced out of inorganic materials; this discovery destroyed the difference which was then considered to exist between organic and inorganic bodies—viz., that the former could only be formed under the influence of vegetable or animal vital forces, whereas the latter could be artificially produced" (Kopp, 'Geschichte der Chemie,' vol. i. p. 442). It must here be remarked that this statement is only correct if the substances, cyanic acid and ammonia, out of which Wöhler produced urea, are considered to be inorganic; inasmuch as neither of them had then been produced otherwise than out of organic substances, the popular notion on Wöhler's important discovery requires this correction. See Kopp, 'Gesch. der Wissenschaften in Deutschland,' vol. x. p. 546.