

chemistry just when it began to explode theoretically in the early 1840s.

Kolbe never felt comfortable with the ideas of Dumas, Laurent, and Gerhardt and preferred to try to stem this rising tide of reform with inventive and polemics. However, by late 1855 Kolbe had realized that he was fighting a losing battle, especially after Wurtz's synthesis of both symmetrical and unsymmetrical hydrocarbons. These results showed that complete substitution of hydrogen by many elements was possible. Kolbe's most productive period now followed, as he used his own version of type theory. Rocke presents us with a detailed description of Kolbe's life and work at Marburg which was the most scientifically creative period in his life. Although poorly paid, his institute chronically underfunded and ill-equipped, he nevertheless managed to attract many students because of his brilliance.

In 1865 Kolbe was called to Leipzig, There he received an excellent salary while the best chemical institute in all of Germany was constructed for him. Just as he had accommodated himself to type theory, structural formulas were being almost universally accepted by German chemists. Rocke does a superb job of showing how Kekule developed his structural ideas based upon the reform of atomic weights and the concept of valence. Kekulé is portrayed as the diametrical opposite of Kolbé. Whereas Kolbe came from a humble background, Kekulé came from a prosperous family in Darmstadt, Hesse. Whereas Kolbe's education was very basic, Kekulé received a classical as well as scientific education at the Darmstadt Gymnasium. He is described by Rocke as "handsome, tall, strong, and athletic, an enthusiastic gymnast and dancer."

Kolbe could not and would not accept the idea of a carbon chain because structural theory excluded any electrical basis as the reason for bonding. Kolbe was an

early adherent of Berzelian dualism and never really felt comfortable with other views. From the pages of the *Journal für praktische Chemie*, of which Kolbe was editor from 1870, there appeared the most venomous ridicule of structural theory. Increasingly, Kolbe became isolated and alienated from the German chemical community, something which did not seem to bother Kolbe at all. Kolbe manifested the worst excesses of xenophobia, particularly anything French, and a virulent, almost pathological anti-Semitism. As Rocke states in his book:

Kolbe was nothing if not conservative in his theoretical preferences, and he began to view novel developments in chemistry as just another aspect of modernism. Somehow he began to associate structural formulas with sensualism and materialism, possibly even with irreligion. His whole life was devoted to the science of organic chemistry, and he saw that science almost in the personification of a pure virgin being seduced and destroyed by meretricious villains, by liberals, social democrats, traitors, atheists, Catholics, and Jews. In the 1850s and 1860s, he suffered periods of paranoia and severe depression, and after 1870 he appears to have had delusions of grandeur.

This is the Kolbe that most remember, rather than the man of many major scientific achievements. Rocke presents a balanced view of Kolbe with a level of scholarship, thoroughness, and documentation (83 pages of notes) that will please both the chemist and historian alike.

*The Quiet Revolution* will serve as an invaluable reference work on the development of organic chemistry in the nineteenth century and belongs on the chemist's bookshelf and in the library of every college and university with a chemistry program. *Martin D. Saltzman, Providence College, Providence, RI 02918.*

Issue 15/16, page 10: Credit for the portrait of Benjamin Silliman, Jr. to the Smithsonian.

#### Erratum

Issue 15/16, page 38: The structure of benzoic acid, the product in the last equation, should be:

