PARTING SHOTS

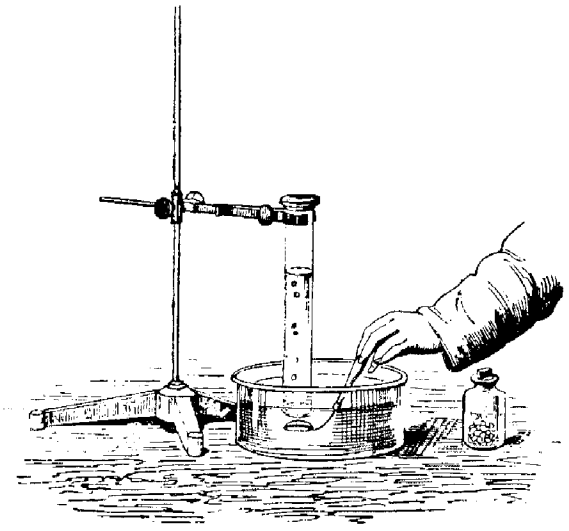
Reinventing the Hofmann Sodium Spoon

Several years ago the local high school chemistry teachers in Cincinnati invited Henry Bent to speak at a one-day conference on the teaching of introductory chemistry. As always, Henry gave a superb talk on the interactive use of lecture demonstrations, emphasizing a three-fold reinforcement of each concept: the direct observation of the chemical phenomena itself, its concrete representation by means of molecular models, and its abstract representation by means of chemical symbols and balanced equations.

At dinner afterward, the conversation turned to one of the demonstrations that Henry had used - the reaction of sodium metal with water done in a large crystallization dish on top of an overhead projector. The problem, Henry noted, was that although one could easily see how vigorous the reaction was and even demonstrate the production of NaOH by putting a little phenolphthalein in the water, it was almost impossible to collect and test for the dihydrogen gas which was also produced.

He recalled that he had once tried following the madly racing piece of sodium around the dish with an empty inverted test tube, hoping to collect enough dihydrogen so that the resulting mixture with the air in the tube would give a characteristic "pop" with a burning splint, but with no luck. One of the other teachers confessed that he had tried wrapping the sodium in a wad of paper in order to immobilize it long enough to get an inverted test tube full of water over it, and yet another had tried impaling the sodium on the tip of a spatula and holding it under the tube, but in each case the reaction with the water was so violent that the sodium immediately escaped.

Musing on this dilemma over dessert, the party finally



The Hofmann sodium spoon in action.

August Wilhelm Hofmann

agreed that the ideal solution would be a small wire mesh cup on a handle, similar to a small kitchen strainer, that could be held over the piece of sodium to confine it and also allow one to press it under the surface of water in order to position it beneath the opening of the inverted collection tube - the mesh allowing the dihydrogen gas to escape into the tube. Elaborating on this kitchen metaphor, one teacher even suggested that a device similar to a tea ball would work even better.

About a year later, while working on an article on the 19th century German chemist, August Wilhelm Hofmann (1818-1892), and an obscure atomic weight unit called the microcrith (1), I had occassion to examine carefully the first German edition (1866) of Hofmann's book, *Einleitung in die Moderne Chemie* (2). This consisted of 12 lectures on introductory chemical theory that Hofmann had given as part of his course on chemistry at the Royal College of Chemistry in London, where he had taught for 20 years before returning to Germany in 1865 to accept a position at the University of Berlin. This book is beautifully illustrated with original woodcuts showing most of the demonstrations used by Hofmann in his lectures and there, to my astonishment, in figures 3 and 4, both of which showed the reaction of sodium with water, was the very device that the high school chemistry teachers had wistfully concocted at dinner a year earlier!

A quick perusal of several of the laboratory supply catalogs in the Oesper Collection further showed that Hofmann's device had once been commercially manufactured. There it was on page 259 of the 1914 catalog for the E. H. Sargent Company of Chicago (2): "Item 3531, Sodium Spoon, 40¢." Examination of the 1929 catalog for the same company showed that by this date the original spoon had been further elaborated, was now called a sodium basket, now cost 85¢, and consisted of two

wire mesh hemispheres on the end of a handle with a metal slide to open and close them. When closed, one had a wire mesh version of the tea ball - the second idea suggested by the high school teachers. The 1937 catalog still listed the sodium basket, though it now cost 90¢, but by the time the 1967 catalog appeared, it had vanished.

The Sodium Basket

The sodium spoon wasn't the only demonstration device to come out of Hofmann's lectures. The Hofmann (universally misspelled as Hoffman) apparatus for the electrolysis of water, found in virtually every chemistry department, was also based on one of the figures in the book (4). Indeed, the same 1914 catalog of the E. H. Sargent Company listed no less than 12 items under the heading of "Hoffman Lecture Apparatus", all of them based on the devices described in Hofmann's original volume. By 1929 this list had shrunk to nine items, by 1937 to four items, and by 1967 just the standard electrolysis apparatus used today was listed. Probably no other chemist originated so many pieces of commercially manufactured lecture apparatus.

All of this has caused me to ruminate on the sad decline of the lecture demonstration as a teaching device in chemistry, though I will spare you the painful details, and to timidly suggest that the study of the history of chemistry may well have some very practical consequences for the teacher, in addition to the usual humanizing qualities which have been traditionally invoked in order to justify its study.

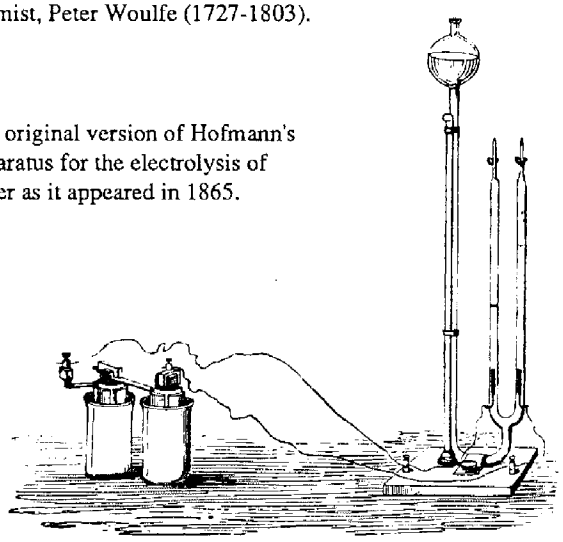
References and Notes

1. W. B. Jensen, "Whatever Happened to the Microcrith?", *Bull. Hist. Chem.*, **1988**, *2*, 16-19.

2. A. W. Hofmann, *Einleitung in die Moderne Chemie*, 2nd ed., Vieweg, Braunschweig, 1866. The 1st edition (1865) was in English.

3. *Scientific Laboratory Apparatus*, E. H. Sargent Co, Chicago, IL, 1914 (No. 20), pp. 201-202, 259; *Ibid.*, 1929 (No. 35), pp. 308, 511; *Ibid.*, 1937 (No. 50), pp. 387, 448; *Ibid.*, 1967 (No. 115), p. 406.

4. A second example of misspelling apparently propagated by laboratory supply catalogs is the name "Woulff bottle" for the multiple necked bottles named in honor of the 18th century English chemist, Peter Woulfe (1727-1803).



The original version of Hofmann's apparatus for the electrolysis of water as it appeared in 1865.

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