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CC/NUMBER 8
FEBRUARY 20, 1984

Field R J, Körös E & Noyes R M. Oscillations in chemical systems. II. Thorough analysis of temporal oscillation in the bromate-cerium-malonic acid system. *J. Amer. Chem. Soc.* 94:8649-64, 1972.

[Dept. Chem., Univ. Oregon, Eugene, OR; Inst. Inorganic and Analytical Chem., L. Eötvös Univ., Budapest, Hungary; and Physical Chem. Lab., Oxford Univ., England]

This paper proposed and supported with detailed kinetic and thermodynamic arguments a mechanism for the oscillations in intermediate concentrations appearing during the metal-ion-catalyzed reaction of bromate with organic materials. [The *SCI*® indicates that this paper has been cited in over 280 publications since 1972.]

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December 27, 1983

"The oscillating chemical reaction that was the subject of our paper is referred to as the BZ reaction after its discoverers, B.P. Belousov and A.M. Zhabotinskii.[1] Our mechanistic analysis of it was the first done for any chemical oscillator. The Field, Körös, and Noyes (FKN) mechanism was supported by detailed kinetic and thermodynamic arguments of such strength that it was quickly adopted as the basis of further work. Activity in the area increased greatly after the appearance of this paper and recognition[2] that it was possible to reduce the mechanism to a tractable mathematical model (the Oregonator) that forged a link between oscillating reactions and rapidly developing theories[3] of the properties of systems operating far from equilibrium and governed by nonlinear dynamic laws. Further interest developed when we[4] showed that the mechanism could be applied to the traveling waves of chemical activity appearing in related systems to uncatalyzed bromate oscillators.[5] A forthcoming book[6] describes development in the area of oscillating reactions since the appearance of our work.

"The basic experimental work for this paper was done in Richard Noyes's laboratory at the University of Oregon in 1970. I was a fresh postdoc and Körös was a visiting professor from Budapest. However, the paper was written in 1971 while I was in Oregon, Noyes was on sabbatical in Oxford, and Körös was at home in Budapest. The international mails were active! Much of the information needed to design and support the mechanism fell into our hands serendipitously. A value of $\Delta G_f^\circ(BrO_2)$ and kinetic data on the oxidation of metal ions by bromate appeared and were found just when we needed them. An important older paper was found as it happened to follow an unrelated paper, a serendipity even ISI® would have difficulty matching.

"Each of our careers has been profoundly affected by this paper and later papers built upon it. We have all built very successful research programs in the area of chemical oscillations, which this paper established us as pioneers in. We have remained close personally and professionally. Scientific ties between Hungary and the US have been strengthened by our interaction and the exchange of colleagues among our laboratories.

"The BZ reaction was an opportunity to take an unusual phenomenon whose very existence was doubted by some people and fit it into the framework of existing scientific understanding. We realize how lucky we were."

1. **Zhabotinskiĭ A M.** Periodic oxidation reactions in the liquid phase. *Dokl. Akad. Nauk SSSR* 157:392-3, 1964. (Cited 145 times.)
2. **Field R J & Noyes R M.** Oscillations in chemical systems. IV. Limit cycle behavior in a model of a real chemical reaction. *J. Chem. Phys.* 60:1877-84, 1974. (Cited 195 times.)
3. **Nicolis G & Prigogine I.** *Self-organization in nonequilibrium systems.* New York: Wiley-Interscience, 1977. 488 p.
4. **Field R J & Noyes R M.** Oscillations in chemical systems. V. Quantitative explanation of band migration in the Belousov-Zhabotinskii reaction. *J. Amer. Chem. Soc.* 96:2001-6, 1974. (Cited 60 times.)
5. **Orbán M, Körös E & Noyes R M.** Chemical oscillations during the uncatalyzed reaction of aromatic compounds with bromate, part 2. A plausible skeleton mechanism. *J. Phys. Chem.* 83:3056-8, 1979.
6. **Field R J & Burger M, eds.** *Oscillations and traveling waves in chemical systems.* New York: Wiley-Interscience. In press, 1984.