

A sound approach to synthesis

The same ultrasonic waves that are used to clean instruments in medical and dental offices soon may be used to synthesize new chemicals, report Philip Boudjouk and colleagues of North Dakota State University in Fargo.

Ultrasonic waves are sound waves too high pitched to be heard by the human ear. These waves already have proved useful for cleaning objects that are difficult to wash by conventional means due to their sizes, shapes or delicate structures. In cleaning solutions, the waves form bubbles and then collapse, sending off powerful shock waves that can gently clean these objects' surfaces by vibrating away their particles.

This same phenomenon can greatly accelerate certain chemical reactions, Boudjouk and colleagues have discovered. While the exact mechanism is not understood, the researchers believe the ultrasound may remove impurities from the surfaces of certain substances, allowing them to better react with other molecules in the reaction mixture. Moreover, the shock waves also may produce short-lived high-temperature and pressure conditions that encourage certain reactions to take place.

Anti-arthritis oral gold and osmarins

The disease afflicts its victims with crippling pain, swelling, redness and fever. The disease is arthritis, and its 100 different forms strike 7 percent of the total worldwide population. An estimated 6.5 million persons in the United States alone suffer from one of those forms, rheumatoid arthritis — an inflammation of the joints usually characterized by a progressive deterioration of the cartilage that protects those joints. Now, two independent groups of researchers report progress in their studies of new ways to use metals to combat that inflammatory disorder.

One group, Blaine M. Sutton and colleagues of Smith Kline & French in Philadelphia, Pa., has developed auranofin (or Ridaura) — a new gold-containing drug that can be taken orally. "Gold has been used for about 50 years to treat rheumatoid arthritis," says Sutton. But the conventional gold formulations must be given by painful intramuscular injections in high quantities that can damage the kidney and perhaps cause other harmful side effects, he says. The new oral gold, on the other hand, can be given daily in smaller doses — a method that appears to lessen some of that metal's unwanted secondary actions.

In clinical studies, auranofin has successfully treated 1,200 rheumatoid arthritis patients with only minor side effects such as mild diarrhea and skin rash, Sutton says. "A New Drug Application filed by Smith Kline & French for approval to market Ridaura is under review by the U.S. Food and Drug Administration," he reports. The FDA decision is expected later this year.

Meanwhile, another group of researchers, Conrad C. Hinckley and colleagues of Southern Illinois University in Carbondale, is investigating the anti-inflammatory potential of a new class of substances called osmarins — osmium-carbohydrate polymers that have properties that suggest they "may be useful as anti-inflammatory agents in the treatment of rheumatoid arthritis."

As with gold, there is a long-standing association between arthritis and osmium. For about 30 years, osmium tetroxide (OsO_4) has been used on a limited basis — mostly in Europe — to treat arthritis in humans. But the treatment is controversial because it is believed that it destroys the synovial membrane that lines the fluid-filled space between joint bones. While this membrane quickly regenerates, opponents of the osmium method still believe that the tissue damage inherent in the method "exact a price too high," Hinckley explains. However, some long-term benefits of the procedure were demonstrated in 1976 by Swiss researchers. Hinckley now is investigating in animal tests whether his osmarins can maximize those long-term effects.

Polysugar: Hard to digest?

What do you get when you cross ordinary cane sugar with poly (vinyl alcohol)? Ival Salyer and Arthur Usmani believe the answer is a product that retains the characteristic sweetness of sugar but that resists digestion. If the University of Dayton researchers are correct, then this product could prove to be a useful sugar substitute for overweight and diabetic patients.

"Although various substitutes for ordinary cane sugar, sucrose, have been developed in recent years, none of the substitutes are completely satisfactory in taste and/or health safety," Salyer reports. What is needed, he says, is a stable form of sugar that cannot be readily broken down in the mouth, as ordinary sugar can, to form organic acids and that is of such high molecular weight that it cannot travel through the intestinal wall into the bloodstream.

This is not a totally new concept. For years, researchers at Dynapol in Palo Alto, Calif., have been developing an indigestible antioxidant, a food additive used to inhibit rancidity in fat-containing foods. In a modification of that research, Usmani and Salyer — who also are known for their work on color photograph coatings (SN: 4/10/82, p. 250) — attached poly (vinyl alcohol) groups to sucrose. Nine different "polysugars" — distinguished by the number of poly (vinyl alcohol) groups attached — were synthesized. A panel of taste testers found that while the polysugar with the highest number of attached groups was extremely bitter, most products were sweet.

Determining the optimum number of attached groups is just one of several areas of further polysugar research, Salyer says. In addition, he and Usmani must use C-14 tagged polysugar to investigate whether the product truly is indigestible. Finally, animal toxicity tests must be performed to determine the safety of polysugar for human consumption.

Food safety legislation discussed

The traditional attitude in dealing with potentially harmful food additives or contaminants has been "whatever can be measured shouldn't be there," said chemist Joseph V. Rodricks at a press conference on food safety regulation. "Regulatory standards," said Rodricks, formerly of Clement and Associates in Washington, "have become linked to detection ability and available analytical methods." But now that analytical methods are detecting not only parts per million, but also parts per billion and trillion, Rodricks and others believe the traditional approach to food safety is needlessly ambitious. In fact, a reform to the food safety provisions of the Federal Food, Drug and Cosmetic Act, introduced to Congress on Feb. 9 by Rep. Albert Gore Jr. (D-Tenn.), is now pending before the House Subcommittee on Health and Environment. The controversial proposed legislation was discussed at the press conference.

The proposed legislation calls for three major changes in the traditional approach to food safety. First, it defines "safe" as "a reasonable certainty that the risks of a substance under the intended conditions of use are insignificant." Second, it would amend the Delaney Clause — which now bans adding *any* amount of an animal carcinogen to food — in accordance with the bill's definition of "safe." Finally, it clarifies current law that could be "construed to force" the U.S. Food and Drug Administration to ban "basic and traditional foods" if trace contaminants of or naturally occurring harmful substances are found — nitrate in spinach, for example.

Such proposed amendments to current food safety laws neglect the consumer, says Bruce Silverglade of the nutrition-oriented Center for Science in the Public Interest in Washington. "It's unfortunate," Silverglade said in a telephone interview, "that industry has the ear of Congress."