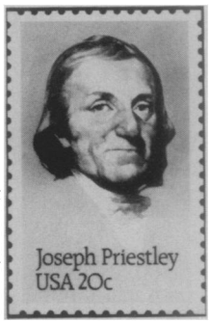
Happy Birthday, Joseph Priestley

Celebrations mark the 250th anniversary of the birth of a chemist who discovered oxygen

By LINDA GARMON



U.S. Postal Service

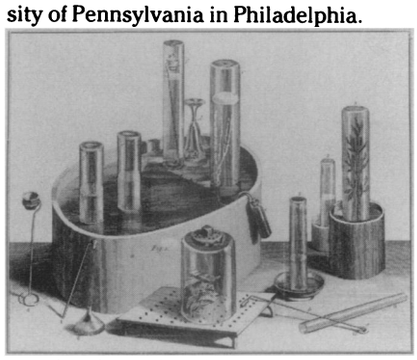
"The feeling of it to my lungs was not sensibly different from that of common air; but I fancied that my breast felt peculiarly light and easy for some time afterwards. Who can tell but that, in time, this pure air may be a fashionable article of luxury."

Courtesy of Derek A. Davenport, Purdue Univ.

In this caricature drawn by James Gillray and published June 18, 1792, Priestley is depicted demanding "The [King's] Head, here!" at a Bastille Day celebration. Priestley did not actually attend this celebration held by his colleagues; nonetheless, his Birmingham, England, home was destroyed that evening by a "Church and King" mob.

The 18th century Englishman Joseph Priestley wrote these words after breathing the colorless, tasteless, odorless gas he had liberated by using lens-focused sun rays to heat a sample of red mercuric oxide. Priestley found that a candle's flame would burn more vigorously in the presence of that gas. He found that the gas could keep a glass-enclosed mouse alive for more than twice as long as could an equal volume of "common air." Priestley had discovered oxygen.

A Swedish chemist, Carl Wilhelm Scheele, and perhaps others, actually preceded him in isolating oxygen, but Priestley, in 1775, was the first to publish his findings. He called the isolated gas "dephlogisticated air," because he adhered to the then-prevailing theory that ordinary air could no longer support combustion or life when it became saturated with phlogiston—an imaginary substance thought to be given off during burning and respiration. "This wasn't an irrational theory for that time," says David J. Rhees, a science historian at the University of Pennsylvania in Philadelphia.



The major piece of equipment pictured is Priestley's pneumatic trough. The scientist used this apparatus to heat substances under water to liberate gases and then to collect those evolving gases in the glass tubes.

Originally pictured in *Experiments and Observations on Different Kinds of Air, 1766,* the photograph is from the Edgar Fahs Smith Memorial Collection in History of Chemistry, U of P.

Rhees has gathered an assortment of Priestley memorabilia — replicas of his primitive laboratory apparatus, personal letters and portraits and caricatures drawn of him—that now constitute a special exhibit at the university's Rosenwald Gallery. The exhibit — which opened March 11 and runs until May 27 — is just one of several events commemorating the 250th anniversary of the March 13, 1733, birth of Priestley. For example, as part of the inauguration ceremony of the recently established U of P Center for History of Chemistry—which was co-founded by the American Chemical Society — program participants will journey to Northumberland, Pa., where Priestley died in 1804. Next month, the U.S. Postal Service will set up temporary shop in that city to issue a Priestley commemorative stamp. In addition, special Priestley symposia are scheduled throughout the year at major conferences, including the September meeting of the Royal Society of Chemistry and the British Oxygen Co. at Imperial College of Science and Technology in London.

The numerous tributes illustrate that "Priestley appealed to a number of different groups for different reasons," Rhees says. Among scientists, Priestley is known as the father of pneumatic (gas) chemistry. In addition to his work with oxygen, he was the first to isolate and describe such common gases as nitric oxide (NO), nitrous oxide (N_2O)—later dubbed "laughing gas" — hydrogen chloride (HCl) and ammonia (NH_3). Also, he was the first to observe the basic photosynthetic process — that plants "reverse" the process of breathing by taking in "foul" air and giving off "good" air. Finally, he paved the way for the modern soft-drink industry: he was fascinated with CO_2 bubbles he once noticed rising to the top of huge vats at a brewery and eventually found both a means of generating that gas by mixing chalk, water and hydrochloric acid and a method of using pressure to force the CO_2 into water.

But Priestley also is recognized outside the boundaries of science. "The scientific work we're celebrating and getting all excited about ... really only represents the amateur [Priestley]," says Robert E. Schofield, of Iowa State University in Ames, who already has spent 15 years working on a two-volume biography of the father of pneumatic chemistry. "Professionally, he was a clergyman and a teacher," Schofield explains, "and it wasn't trivial ... what he did in his profession."

Long before he seriously pursued his scientific interests, Priestley was a nonconformist minister whose beliefs clashed with those held by the official Church of England. His religious views, combined with his then-considered-treasonous sympathy for the French revolution, caused him to be labeled a political dissident. In 1794, against a backdrop of growing rancor against him, Priestly fled to the United States, where he would inspire the founding of this country's first permanent Unitarian church. Says Schofield, Priestley "was probably the first important political refugee in the United States." □