

AIChE Centennial Recognizes Contributions to the Profession

FIFTY FORERUNNERS — THE ANSWERS

The Achievements

- 1515** – Conceived use of parabolic mirror concentrators for dyeing cloth
- mid-1700s** – Derived equation relating potential and dynamic flow energies
- mid-1700s** – Proposed equations describing conservation of mass and momentum for inviscid fluids
- 1775** – Invented soda water as cure for scurvy (it didn't); published papers on electrical discharges and electrical conductivities of charcoals
- 1780** – Developed process for making soda ash from common salt, used to make glass, soap, paper and more
- early 1800s** – With George Stokes, added viscous transport to Euler equations
- early 1800s** – Built solar furnace that could melt platinum
- 1802** – Broke ground for superior explosives plant on Brandywine River, Delaware
- 1823** – Patented waterproofing method using India rubber dissolved in coal-tar to cement layers of wool cloth together
- 1829** – Developed relationship relating rate of advection of a flow to its rate of diffusion
- 1829** – Found that gas diffusion is inversely proportional to the square root of densities and, hence, molecular weights
- 1839** – Accidentally vulcanized rubber lump while attempting to harden gum by boiling with sulfur
- 1843** – Invented first successful multiple-effect vacuum process for producing sugar
- 1845** – Patented process for manufacturing gelatin (Jell-O); founded first free college in U.S.
- 1856** – Patented conversion of aniline into purplish mixture after alcohol extraction when 18 years old
- 1846** – Developed ether as surgical anesthetic
- 1855** – Formulated law of gas diffusion across membranes, which led to technique to measure cardiac output
- 1859** – Produced oil drilling tools and drilled Edwin Drake's Titusville, PA, oil well; was paid \$2.50/day
- 1861** – Developed process for manufacturing soda ash using ammonia, carbon dioxide and lime soda
- 1860s** – Invented celluloid by combining nitrocellulose, camphor and alcohol heated under pressure
- 1866** – Formulated kinetic theory of gases (early statistical mechanics concept); with Maxwell, found that average molecular motion is the same in all directions
- 1869** – Established gas/liquid relationships; accounted for molecular volumes/forces
- 1871** – Discovered scattering of light or other electromagnetic radiation by particles much smaller than the wavelength of the light
- 1872** – First environmentalist, published "Air and Rain" studies of the chemistry of atmospheric precipitation
- 1876** – Developed graphical method for analyzing multi-phase chemical systems

The Individuals

- Leonardo daVinci
- Daniel Bernoulli
- Leonhard Euler
- Joseph Priestley
- Nicolas LeBlanc
- Claude-Louis Navier
- Antoine Lavoisier
- Eleuthère Irénée du Pont
- Charles Macintosh
- Jean Claude Eugène Peclet
- Thomas Graham
- Charles Goodyear
- Norbert Rillieux
- Peter Cooper
- William Henry Perkin
- William T. G. Morton
- Adolf Eugen Fick
- William A. Smith, "Uncle Billy"
- Ernest Solvay
- John Hyatt
- Ludwig Boltzmann
- Johannes Diderik van der Waals
- John William Strutt (Lord Rayleigh)
- Angus Smith
- Josiah Willard Gibbs

1883 – Formulated fundamental relationships for transitions from laminar to turbulent flow	Osborne Reynolds
1886 – Invented electrolytic aluminum manufacturing process	Charles Hall
1886 – Defined chemical engineering as conversion of laboratory processes into industrial ones	Ivan Levinstein
1888 – Developed MIT's "Course X," which combined mechanical engineering with industrial chemistry	Lewis Norton
1889 – Creator of the modern American chemical industry; thought of as both an engineer and a chemist	Herbert Dow
1890 – Developed milk quality tester, allowing widespread use of dairy products; paved the way for vitamins A and D	Stephen Babcock
1891 – Invented underground extraction process using superheated water to liquefy/deliver sulfur from deep deposits	Herman Frasch
1893 – Developed mathematical basis for interpretation of distillation of binary solutions; published "La rectification de l'alcohol"	E. Sorel
1900 – Recognized convection and diffusion mixing as key in vapor-phase oxidation of sulfur dioxide to sulfuric acid	Rudolf T. J. Knietsch
1902 – Identified chemical compositions of dyes, milk, alkaloids and wine using the capillarity of paper; later became known as the grandfather of paper chromatography	Friedrich Goppelsroeder
1904 – Published chemical engineering concepts as "A Handbook of Chemical Engineering"	George E. Davis
1904 – Revolutionized fluid mechanics with concept of a boundary layer between surfaces and moving fluids	Ludwig Prandtl
1906 – Made fundamental contributions to electrochemistry, solid-state chemistry, photochemistry and more	Walther Nernst
1906 – Used selective adsorbents and extraction to purify chlorophyll from plants; termed it "chromatography"	Mikhail S. Tswett
1908 – Formulated continuous-flow stirred-tank plug-flow equations; received 1932 Nobel prize for monolayer and two dimensional physics	Irving Langmuir
1908 – Received Nobel Prize for reproducing colors photographically based on the phenomenon of interference	Gabriel Lippmann
1908 – Received Nobel Prize for work in hematology and chemotherapy; predicted autoimmunity ("horror autotoxicus")	Paul Ehrlich
1909 – Received Nobel Prize for fundamental work on catalysis, chemical equilibrium and reaction velocities	Wilhelm Ostwald
1910 – Developed carbon-free chromium, tungsten, molybdenum and vanadium processes using direct oxide reductions	Fredrick Becket
1912 – Developed theory of boundary layers and fluid flow to calculate air resistance of aircraft and rockets, leading to the first all-metal cantilevered wing	Theodore von Karman
1913 – Introduced concept of velocity fluctuations in turbulent flows, critical to development of solid mechanics	Geoffrey Ingram Taylor
1915 – Devised basic heat-transfer relationships later bearing his name	Wilhelm Nusselt
1923 – Developed first viable catalytic cracking process using anhydrous aluminum chloride as catalyst	Almer McDuffie McAfee
1928 – Accidentally created bacteria-free penicillin annulus in staphylococcus culture even if diluted eight-hundredfold	Alexander Fleming
1931 – Confirmed his discovery of mass-2 hydrogen (deuterium); proposed centrifugal separation of uranium	Harold C. Urey