

# ANECDOTES OF NAMED CHEMISTS

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**(1) Chemistry contributions from non-chemists**

Black, Joseph (chemist/physician)	1728 - 1799	Scottish (b. Bordeaux, France)	discovered magnesium in <b>1755</b> Edinburgh, Scotland
Brown, Robert (botanist)	1773 - 1858	Scottish (b. Montrose, Scotland)	Brownian motion ( <b>1827</b> )
Clapeyron, Benoît Paul Émile (civil engineer, railways, locomotives)	1799 - 1864	French (b. Paris, France)	Clapeyron equation of state ( <b>1834</b> ), Clausius-Clapeyron equation
Cronstedt, Axel Frederik, Baron (metallurgist)	1722 - 1765	Swedish (b. Södermanland, Sweden)	discoverer of nickel in <b>1751</b> Stockholm, Sweden
Dean, Ernest Woodward (chemist/oil company executive <i>Standard Oil</i> <i>Development Co.</i> )	1888 - 1959	American (b. Taunton, Massachusetts, USA)	Dean-Stark apparatus ( <i>Ind. Eng. Chem.</i> <b>1920</b> , <u>12</u> , 486)
del Rio, Andrés Manuel (minerologist)	1764 - 1849	Spanish (b. Madrid, Spain)	discoverer of vanadium in <b>1801</b> Mexico City, Mexico
Fuller, Richard Buckminster (Bucky) (architect)	1895 - 1983	American (b. Milton, Massachusetts, USA)	buckminsterfullerene, fullerenes ( <b>1985</b> )

Gahn, Johan Gottlieb (minerologist/ miner)	1745 - 1818	Swedish (b. Voxna, Gävleborg, Sweden)	discoverer of manganese in <b>1774</b> Stockholm, Sweden
Gregor, Rev. William (clergyman)	1761 - 1817	British (b. Trewarthenick, Cornwall, England)	co-discoverer of titanium in <b>1791</b> Creed, Cornwall, England
Hasselbalch, Karl Albert (physician)	1874 - 1962	Danish (b. ?)	Henderson-Hasselbalch equation ( <b>1908</b> )
Lambert, Johann Heinrich (mathematician)	1728 - 1777	German (b. Mulhouse, Alsace, France)	Beer-Lambert-Bouguer law, Lambert law ( <b>1852</b> )
Navier, Claude Louis Marie Henri (civil engineer, elastic behaviour of structural materials)	1785 - 1836	French (b. Dijon, France)	Navier-Stokes equations
Nieuwland, Julius Arthur (clergyman)	1878 - 1936	Belgian-American (b. Hansbeke, Belgium)	Nieuwland enyne synthesis ( <b>1934</b> ), invented neoprene
Raney, Murray (mechanical engineer)	1885 - 1966	American (b. Carrollton, Kentucky, USA)	Raney nickel ( <b>1927</b> )
Reynolds, Osborne (engineer, centrifugal pumps)	1842 - 1912	British (b. Belfast, Northern Ireland)	Reynolds number ( <b>1883</b> )
Rutherford, Daniel (physician/botanist)	1749 - 1819	Scottish (b. Edinburgh, Scotland)	discovered nitrogen in <b>1772</b> Edinburgh, Scotland

**(2) Two people or one person?**

Gay-Lussac, Joseph Louis	1778 - 1850	French (b. St. Léonard, Haute Vienne, France)	Gay-Lussac's law ( <b>1809</b> ), co-discoverer of boron
Lennard-Jones, Sir John Edward	1894 - 1954	British (b. Leigh, England)	Lennard-Jones potential ( <b>1924</b> )

**(3) Same name, same person?**

Dewar, Michael James Stuart	1918 - 1997	British-American (b. Ahmednagar, India)	Dewar semi-empirical methods
Dewar, Sir James	1842 - 1923	Scottish (b. Kincardine-on-Forth, Scotland)	Dewar flask ( <b>1895</b> ); Dewar benzene ( <b>1867</b> )

Fischer, Emil Hermann <b>Nobel Prize Chemistry 1902</b>	1852 - 1919	German (b. Euskirchen, Rhenish Prussia, near Bonn, Germany)	Fischer projection ( <b>1891</b> ), Fischer esterification ( <b>1895</b> ), Fischer indole synthesis ( <b>1883</b> ), Kiliani-Fischer synthesis ( <b>1885/1889</b> )
Fischer, Ernst Otto <b>Nobel Prize Chemistry 1973</b>	1918 -	German (b. Munich, Germany)	Fischer carbenes ( <b>1964</b> )
Fischer, Joseph Karl Anton	1901 – 1958	German (b. Pasing, near Munich, Germany)	Karl Fischer reagent, Karl Fischer titration ( <b>1935</b> )

Fischer, Franz Joseph Emil	1877 - 1947	German (b. Freiburg im Breisgau, Germany)	Fischer-Tropsch process <b>(1923)</b>
Graham, Thomas	1805 - 1869	Scottish (b. Glasgow, Scotland)	Graham's law <b>(1833)</b>
Graham, William Hardin	1932 -	American (b. Birmingham, Alabama, USA)	Graham reaction <b>(1965)</b>
Henry, Joseph	1797 - 1878	American (b. Albany, New York, USA)	henry unit of inductance <b>(1832)</b>
Henry, William	1774 - 1836	British (b. Manchester, England)	Henry's law <b>(1804)</b>
Meyer, Viktor	1848 - 1897	German (b. Berlin, Germany)	Viktor Meyer method, Viktor Meyer tube
Meyer, Kurt Heinrich	1883 - 1952	German-Estonian (b. Dorpat, Estonia)	Meyer-Schuster rearrangement <b>(1922)</b>
Michaelis, August Karl Arnold	1847 - 1916	German (b. Bierbergen, Hannover, Germany)	Arbuzov-Michaelis reaction <b>(1898)</b>
Michaelis, Leonor	1875 - 1949	German-American (b. Berlin, Germany)	Michaelis-Menten kinetics <b>(1913)</b> , Michaelis-Menten equation, Michaelis constant, Michaelis complex

Stark, David D.	1893 -	?	Dean-Stark apparatus ( <i>Ind. Eng. Chem.</i> <b>1920</b> , <u>12</u> , 486)
Stark, Johannes <b>Nobel Prize Physics 1919</b>	1874 - 1957	German (b. Schikenhof, Upper Palatinate, Germany)	Stark effect, Stark-Einstein law of photochemical equivalence

Stern, Otto <b>Nobel Prize Physics 1943</b>	1888 - 1969	German-American (b. Sohrau, Upper Silesia, Germany, (now Zory, Poland))	Stern-Gerlach experiment ( <b>1922</b> ), Stern-Volmer plot ( <b>1919</b> )
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Weiss, Ulrich	1908 -	Czech (b. Prague, Czech Republic)	Weiss reaction ( <b>1968</b> );
Weiss, Pierre Ernest	1865 - 1940	French (b. Mulhouse, France)	Curie-Wiess law ( <b>1895/1905</b> )

**(4) Women in chemistry**

Blodgett, Katherine Burr	1898 - 1979	American (b. Schenectady, New York, USA)	Langmuir-Blodgett film
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<i>Creutz, Carol</i>	1944 -	American (b. Washington, D.C., USA)	Creutz-Taube complex, ion <b>(1969)</b>
Curie, Marie (Manya née Sklodowska) <b>Nobel Prizes Chemistry 1911 and Physics 1903</b>	1867 - 1934	French (b. Warsaw, Poland)	co-discoverer of radium in <b>1898</b> Paris, France  curie unit of radiation, curium (element 96)
Menten, Maud Leonora	1879 - 1960	Canadian (b. Port Lambton, Ontario, Canada)	Michaelis-Menten kinetics <b>(1913)</b>
Noddack, Ida Eva Tacke	1896 - 1978	German (b. Lackhausen, Germany)	co-discoverer of rhenium in <b>1925</b> Berlin, Germany
Perey, Marguerite Catherine	1909 - 1975	French (b. Villemomble, France)	discoverer of francium in <b>1939</b> Paris, France
<i>Zucker, Lois Mason</i>	1913 -	American (b. Franklin, Pennsylvania, USA)	Zucker-Hammett hypothesis <b>(1939)</b>

Kathleen Blodgett (1898 - 1979)

Kathleen Blodgett was the first female research scientist ever employed at General Electric in Schenectady, New York. Her father was the head of the patent department at the GE plant though he had already been dead before Kathleen was born. After completing her M.Sc. at U Chicago she worked as an assistant to Irving Langmuir from 1918 to 1924. She then obtained a Ph.D. degree in physics from Cambridge University under Ernest Rutherford, the first woman to have received a doctorate

from that institution. Her entrance to Cambridge required the persuasion of Langmuir to overcome biases of faculty and administrators.

E. Hilda Usherwood Ingold (wife of Sir Christopher K. Ingold) was also a chemist. She and her husband described mesomeric and inductive effects in a series of papers beginning with *J. Chem. Soc.* **1926**, 1310. Her work is cited in C.K. Ingold's celebrated classic "*Structure and Mechanism in Organic Chemistry*" in which she also assisted her husband in preparing the manuscript.

Marie Anne Lavoisier (1758 - 1836)

Marie Lavoisier married Antoine when she was 14 years old. Her training was in draftsmanship and she transcribed and translated Antoine's chemistry texts. She published Antoine's *Memoires de chemie*. It is speculated that she worked in her husband's laboratory as she is depicted in a painting by Jacques Louis David (1788) as working alongside Antoine. Her father and Antoine were guillotined in 1794 due to their involvement as tax farmers during the French Revolution. Soon after she married Count Rumford in 1805 after an affair, however the marriage did not last. They separated in 1809. Little else is known about her.

Maud Leonora Menten (1879 - 1960)

Text of plaque in front of Medical Sciences Building, University of Toronto, Queen's Park  
erected by the Ontario Heritage Foundation, Ministry of Culture and Recreation:

*"An outstanding medical scientist, Maud Menten was born in Port Lambton. She graduated in medicine from the University of Toronto in 1907 and four years later became one of the first Canadian women to receive a medical doctorate. In 1913, in Germany, collaboration with Leonor Michaelis on the behaviour of enzymes resulted in the Michaelis-Menten equation, a basic biochemical concept which brought them international recognition. Menten continued her brilliant career as a pathologist at the University of Pittsburgh from 1918, publishing extensively on medical and biochemical subjects. Her many*

*achievements included important co-discoveries relating to blood sugar, haemoglobin, and kidney functions. Between 1951 and 1954 she conducted cancer research in British Columbia and returned to Ontario six years before she died."*

Helen Cecilia deSilver Abbott Michael (wife of Arthur Michael of the Michael 1,4-addition reaction) was also a chemist. She published 15 papers between 1883 and 1896. She was his assistant in his private laboratory on the Isle of Wight. She also published a book "*Studies in Plant and Organic Chemistry and Literary Papers,*" Cambridge, 1907. She was born on December 23, 1857 in Philadelphia. She studied medicine at Tufts University and obtained her medical degree in 1903. She also studied chemistry with Prof. Michael at Tufts College in Boston and married him in June 1888. She died of grippe on November 29, 1904. (See Grinstein, L. S.; Rose, R.K.; Rafailovich, M.H., *Women in Chemistry and Physics: A Biobibliographic Sourcebook*, Greenwood Press: Westport, Conn., 1993, pp. 405 – 9; Tarbell, A.T.; Tarbell, D.S. *J. Chem. Educ.* **1982**, 59, 548 – 9)

Marguerite Perey (1909 - 1975)

Marguerite Perey was the first woman to be admitted to the French Academy of Sciences. She was a lab assistant in the labs of Marie Curie at the Radium Institute in Paris. When Perey first met Curie, Curie thought that Perey was the lab's secretary and not a coworker. Despite this first encounter her talents impressed Curie enough to forge a lasting mentor relationship. Due to her work with radioactive materials she too died of cancer as did Curie.

Margaret Hilda Thatcher (nee Roberts) (1925 - ) earned a B.Sc. in Chemistry from Somerville College, Oxford. She worked with Dorothy Mary Hodgkin (nee Crowfoot) (1910 - 1994), b. Cairo, Egypt, Nobel Laureate in Chemistry 1964) on the structure of nucleic proteins by x-ray crystallography.

**(5) Relationships:**

**(i) Father-son combinations**

Arbuzov, Aleksandr Erminingeldovich	1877 - 1968	Russian (b. Arbuzov-Baran, near Kazan, Russia)	Arbuzov-Michaelis reaction <b>(1898)</b>
Arbuzov, Boris Aleksandrovich (chemist)	1903 - 1992	Russian (b. Kazan, Russia)	

Auger, Victor Emile (chemist)	1864 - 1949	French (b. Amboise, France)	
Auger, Pierre Victor	1899 - 1993	French (b. Paris, France)	Auger effect, Auger electron spectroscopy <b>(1923)</b>

Auwers, Georg Friedrich Julius Arthur von (astronomer)	1838 - 1915	German (b. Gottingen, Germany)	
Auwers, Karl Friedrich von	1863 - 1939	German (b. Gotha, Germany)	

Bohr, Niels Henrik David <b>Nobel Prize Physics 1922</b>	1885 - 1962	Danish (b. Copenhagen, Denmark)	Bohr radius, Bohr orbit, Bohr magneton, Bohr theory, Bohr model of atom ( <b>1913</b> ), bohrium (element 107), Bohr correspondence principle ( <b>1921</b> )
Bohr, Aage Niels <b>Nobel Prize Physics 1975</b>	1922 -	Danish (b. Copenhagen, Denmark)	

Bragg, Sir William Henry <b>Nobel Prize Physics 1915</b>	1862 - 1942	British (b. Westward, Cumberland, England)	Bragg angle of diffraction, Bragg planes, Bragg reflection indices
Bragg, Sir William Lawrence <b>Nobel Prize Physics 1915</b>	1890 - 1971	British (b. Adelaide, England)	

Brillouin, Marcel Louis	1854 - 1948	French (b. Melle, Deux-Sèvres, France)	Brillouin scattering, Brillouin zone ( <b>1931</b> )
Brillouin, Léon Nicolas (physicist)	1889 - 1969	French (b. Sèvres, Seine-et-Oise, France)	WKB or JWKB method ( <b>1926</b> )

<i>Brook, Adrian Gibbs</i>	1924 -	Canadian (b. Toronto, Ontario, Canada)	Brook rearrangement ( <b>1958</b> )
<i>Brook, Michael Adrian</i> (chemist)	1955 -	Canadian (b. ?)	

Carnot, Lazare Nicolas Margu�rite	1753 - 1823	French (b. Nolay, Burgundy, France)	
Carnot, Nicholas L�onard Sadi	1796 - 1832	French (b. Paris, France)	Carnot cycle ( <b>1824</b> )

Curie, Jacques (physicist)	1856 - 1941	French (b. Paris, France)	Curie law, Curie temperature, Curie point ( <b>1880</b> )
Curie, Maurice (physicist)	1888 - ?	French (b. Paris, France)	

Curie, Maurice (physicist)	1888 - ?	French (b. Paris, France)	
Curie, Daniel (physicist)	1927 -	French (b. Paris, France)	

Erlenmeyer, Richard August Carl Emil	1825 - 1909	German (b. Wehen, near Wiesbaden, Germany)	Erlenmeyer flask
Erlenmeyer, Friedrich Gustav Carl Emil (chemist)	1864 - ?	German (b. Heidelberg, Germany)	

Fischer, Emil Hermann <b>Nobel Prize Chemistry 1902</b>	1852 - 1919	German (b. Euskirchen, Rhenish Prussia, near Bonn, Germany)	Fischer projection ( <b>1891</b> ), Fischer esterification, Fischer indole synthesis ( <b>1883</b> ), Kiliani-Fischer synthesis ( <b>1885/1889</b> )
Fischer, Hermann Otto Laurenz (chemist)	1888 - 1960	German (b. Würzburg, Germany)	

Friedel, Charles	1832 - 1899	French (b. Strasbourg, France)	Friedel-Crafts acylation ( <b>1877</b> ), Friedel-Crafts alkylation ( <b>1877</b> )
Friedel, Georges (crystallographer)	1865 - 1933	French (b. Mulhouse, France)	

Grottrian, Otto Natalius August (physicist)	1847 - 1921	German (b. Braunschweig, Germany)	
Grottrian, Walter Robert Wilhelm	1890 - 1954	German (b. Aachen, Germany)	Grottrian diagrams ( <b>1928</b> )

Haldane, John Scott	1860 - 1936	British-Scottish (b. Edinburgh, Scotland)	
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Haldane, John Burdon Sanderson	1892 - 1964	British-Scottish (b. Oxford, England)	Haldane equation ( <b>1930</b> )
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Ingold, Sir Christopher Kelk	1893 - 1970	British (b. Forest Gate, London, England)	Cahn-Ingold-Prelog convention ( <b>1951</b> )
Ingold, Keith Usherwood (chemist)	1929 -	British (b. Leeds, England)	

Kohlrausch, Rudolf Hermann Arndt	1809 - 1858	German (b. Göttingen, Germany)	Kohlrausch current theory
Kohlrausch, Friedrich Wilhelm Georg	1840 - 1910	German (b. Rinteln, Germany)	Kohlrausch relaxation function, Kohlrausch square root law, Kohlrausch law of independent migration of ions

Leuckart, Carl Louis Rudolf Alexander	1854 - 1889	German (b. Giessen, Germany)	Leuckart reaction ( <b>1885</b> )
Leuckart, Karl Georg Friedrich Rudolf (parasitologist, zoologist)	1822 - 1898	German (b. Helmstedt, Germany)	

Lewis, Gilbert Newton	1875 - 1946	American (b. Weymouth, Massachusetts, USA)	Lewis structures ( <b>1916</b> ) Lewis acid ( <b>1923</b> )
Lewis, Edward S.			
Lewis, Richard			

Menshutkin, Nikolai Aleksandrovich	1842 - 1907	Russian (b. St. Petersburg, Russia)	Menshutkin reaction ( <b>1890</b> )
Menshutkin, Boris Nikolaevich (chemist, historian)	1874 - 1938	Russian (b. St. Petersburg, Russia)	

Mulliken, Samuel Parsons (chemist)	1864 - 1934	American (b. Newburyport, Massachusetts, USA)	
Mulliken, Robert Sanderson <b>Nobel Prize Chemistry 1966</b>	1896 - 1986	American (b. Newburyport, Massachusetts, USA)	Mulliken population analysis ( <b>1955</b> )

Perkin, Sir William Henry	1838 - 1907	British (b. Shadwell, South London, England)	Perkin reaction ( <b>1868</b> ), Perkin rearrangement ( <b>1870</b> ), Perkin triangle
Perkin, William Henry, Jr. (chemist)	1860 - 1929	British (b. Sudbury, near London, England)	

Perrin, Jean Baptiste <b>Nobel Prize Physics 1926</b>	1870 - 1942	French (b. Lille, France)	
Perrin, Francis Henri Jean Siegfried (physicist)	1901 - ?	French (b. Paris, France)	

Polanyi, Michael	1891 - 1976	Hungarian-British (b. Budapest, Hungary)	BeMaHaPoThLe principle, Bell-Evans-Polanyi principle <b>(1938)</b>
Polanyi, John Charles <b>Nobel Prize Chemistry 1986</b> (chemist)	1929 -	British-Canadian (b. Berlin, Germany)	

Rayleigh, Lord John William Strutt, 3rd Baron <b>Nobel Prize Physics 1904</b>	1842 - 1919	British (b. Langford Grove, near Maldon, Essex, England)	Rayleigh-Jeans law <b>(1900)</b> , Rayleigh light scattering <b>(1871)</b> , Rayleigh wave
Rayleigh, Robert John Strutt, 4th Baron (physicist)	1875 - 1947	British (b. Terling Place, Essex, England)	

Schlenk, Wilhelm	1879 - 1943	German (b. Munich, Germany)	Schlenk tube, Schlenk equilibrium <b>(1929)</b>
Schlenk, Wilhelm, Jr. (chemist)	1907 - 1974	German (b. Munich, Germany)	Schlenk equilibrium <b>(1929)</b>

Thomson, Sir Joseph John <b>Nobel Prize Physics 1906</b>	1856 - 1940	British (b. Cheetham Hill, near Manchester, England)	Thomson model of atom <b>(1903)</b>
Thomson, Sir George Paget <b>Nobel Prize Physics 1937</b>	1892 - 1975	British (b. Cambridge, England)	electron diffraction by crystals

Van der Waals, Johannes Diderik <b>Nobel Prize Physics 1910</b>	1837 - 1923	Dutch (b. Leiden, Netherlands)	Van der Waals' forces, radii <b>(1911)</b> , Van der Waals equation of state <b>(1912)</b>
Van der Waals, Johannes Diderik, Jr. (chemist)	1873 - ?	Dutch (b. s'Gravenhage, Netherlands)	

Watt, James	1736 - 1819	Scottish (b. Greenock, Scotland)	watt unit of energy
Watt, James Jr. (marine engineer)	1769 - 1848	Scottish (b. Scotland)	

**(ii) Husband-wife combinations**

Fieser, Louis Frederick	1899 - 1977	American (b. Columbus, Ohio, USA)	Fieser's reagent (chromium trioxide/acetic acid), Fieser's solution ( <b>1924</b> )
Fieser, Mary Peters	1909 - 1997	American (b. Atchison, Kansas, USA)	(potassium hydroxide-water-sodium anthraquinone ?-sulfonate-sodium hydrosulfite)  M.A. 1936 Harvard College (Louis F. Fieser)
Haber, Fritz	1868 - 1934	German (b. Breslau, now Wroclaw, Poland)	<b>Nobel Prize Chemistry 1918</b> Haber nitrogen fixation process ( <b>1910</b> ), Born-Haber cycle ( <b>1919</b> )
Haber-Immerwahr, Clara	1870 - 1915	German (b. Polkendorf, Silesia)	Ph.D. 1900 Breslau (Richard Abegg)
Hunsdiecker, Heinz	1904 - 1981	German (b. Cologne, Germany)	Borodin-Hunsdiecker reaction ( <b>1861/1942</b> )
Hunsdiecker, Clare (nee Dieckmann)	1903 - 1995	German (b. Kiel, Germany)	Ph.D. 1928 Cologne (Robert Wintgen)

Karle, Jerome <b>Nobel Prize Chemistry 1985</b>	1918 -	American (b. New York City, USA)	crystal structure determinations; both did their doctoral theses under Lawrence O. Brockway at U Michigan in 1943
Karle, Isabelle (nee Lugoski)	1921 -	American (b. Detroit, Michigan, USA)	
Lavoisier, Antoine Laurent	1743 - 1794	French (b. Paris, France)	Lavoisier's law ( <b>1755</b> )
Lavoisier, Marie Anne Pierrette (née Paulze)	1758 - 1836	French (b. Montbrison, Loire, France)	
Libby, Willard Frank	1908 - 1980	American (b. Grand Valley, Colorado)	<b>Nobel Prize Chemistry 1960</b> (radiocarbon <sup>14</sup> C dating) Ph.D. 1923 Yale (Robert S. Mulliken)
Libby, Leona Woods Marshall	1919 - 1986	American (b. La Grange, Illinois, USA)	
Michael, Arthur	1853 - 1942	American (b. Buffalo, New York, USA)	Michael 1,4-addition reactions ( <b>1887</b> )
Michael, Helen Cecilia Desilver Abbott	1857 - 1904	American (b. Philadelphia, Pennsylvania, USA)	M.D. 1903 Tufts College

Noddack, Walter Karl Friedrich	1893 - 1960	German (b. Bamberg, Germany)	co-discoverers of rhenium in <b>1925</b> Berlin, Germany
Noddack, Ida Eva Tacke	1896 - 1978	German (b. Lackhausen, Germany)	Ph.D. 1921 U. Berlin- Charlottenburg (engineering)
Robinson, Sir Robert	1886 – 1975	British (b. Bufford near Chesterfield, Derbyshire, England)	Robinson annulation ( <b>1935</b> )  M.Sc. 1908 Manchester
Robinson, Gertrude Maud Walsh	1886 - 1954	British (b. Winsford, England)	
Stieglitz, Julius Oscar	1867 - 1937	American (b. Hoboken, New Jersey, USA)	Ph.D. 1889 Berlin (Johann Tiemann)
Stieglitz, Mary Rising	1889 - 1977	American (b. Ainsworth, Nebraska, USA)	Ph.D. 1920 Chicago (Julius Stieglitz)

**(iii) Brothers combination**

Ångström, Anders Jonas	1814 - 1874	Swedish (b. Lögdö, Sweden)	angstrom unit of length <b>(1868)</b>
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Ångström, Knut Johan (physicist)	1857 - 1910	Swedish (b. Uppsala, Sweden)	
Compton, Arthur Holly <b>Nobel Prize Physics 1927</b>	1892 - 1962	American (b. Wooster, Ohio, USA)	Compton effect, Compton wavelength ( <b>1923</b> )
Compton, Karl Taylor (physicist)	1887 - 1954	American (b. Wooster, Ohio, USA)	
Curie, Pierre <b>Nobel Prize Physics 1903</b>	1859 - 1906	French (b. Paris, France)	Curie law, Curie temperature, Curie point ( <b>1880</b> )
Curie, Jacques (physicist)	1856 - 1941	French (b. Paris, France)	Curie law, Curie temperature, Curie point ( <b>1880</b> )
de Broglie, Prince Louis Victor Pierre Raymond, 7th Duc <b>Nobel Prize Physics 1929</b>	1892 - 1987	French (b. Dieppe, France)	de Broglie's law, de Broglie wavelength ( <b>1925</b> )
de Broglie, Louis César Victor Maurice, Duc (physicist)	1875 - 1960	French (b. Paris, France)	
D'Elhuyar, Don Juan José	1754 - 1796	Spanish (b. Logroño, Spain)	discovered tungsten (W) in <b>1783</b>
D'Elhuyar, Don Fausto	1755 - 1833	Spanish (b. Logroño, Spain)	Vergara, Spain

Hückel, Erich Armand Arthur Joseph	1896 - 1980	German (b. Berlin- Charlottenburg, Germany)	Hückel molecular orbital, Hückel MO theory ( <b>1931</b> ), Debye-Hückel law ( <b>1923</b> )
Hückel, Walter Karl Friedrich Bernhard (chemist)	1895 - 1973	German (b. Charlottenburg, Germany)	

Kiliani, Heinrich	1855 - 1945	German (b. Würzburg, Bavaria, Germany)	Kiliani-Fischer synthesis <b>(1885/1889)</b>
Kiliani, Martin (chemist)	1858 - 1895	German (b. Würzburg, Bavaria, Germany))	

London, Fritz Wolfgang	1900 - 1954	German-American (b. Breslau, now Wroclaw, Poland)	London dispersion forces, Heitler-London treatment <b>(1927)</b>
London, Heinz (physicist)	1907 - 1970	German (b. Bonn, Germany)	

Lossen, Wilhelm	1838 - 1906	German (b. Kreuznach, Germany)	Lossen rearrangement ( <b>1872</b> )
Lossen, Karl August (geologist)	1841 - 1893	German (b. Kreuznach, Germany)	

Madelung, Erwin	1881 - 1972	German (b. Bonn, Germany)	Madelung constant, series <b>(1918)</b>
Madelung, Walter Otto (chemist)	1879 - ?	German (b. Bonn, Germany)	

Oppenheimer, Julius Robert	1904 - 1967	American (b. New York, New York, USA)	Born-Oppenheimer approximation <b>(1927)</b>
Oppenheimer, Frank Friedman (physicist)	1912 - 1985	American (b. New York, New York, USA)	

Reformatskii, Sergei Nikolaevich	1860 - 1934	Russian (b. Borisoglebskoe, near Ivanovo, Russia)	Reformatskii reaction <b>(1887)</b>
Reformatskii, Aleksandr Nikolaevich	1864 - 1937	Russian (b. Borisoglebskoe, near Ivanovo, Russia)	

Saytzeff, Aleksandr Mikhailovich (also Zaitsev, Saytzev)	1841 - 1910	Russian (b. Kazan, Russia)	Saytzeff rule <b>(1875)</b>
Saytzeff, Mikhail Mikhailovich (also Zaitsev, Saytzev) (chemist)	1845 - ?	Russian (b. Kazan, Russia)	

Schiff, Hugo Joseph	1834 - 1915	German (b. Frankfurt, Germany)	Schiff base, Schiff's reagent
Schiff, Moritz (physiologist)	1823 - 1896	German (b. Frankfurt, Germany)	

Schlenk, Wilhelm	1879 - 1943	German (b. Munich, Germany)	Schlenk tube, Schlenk flask, Schlenk equilibrium ( <i>Chem. Ber.</i> <b>1929</b> , <u>62B</u> , 920)
Schlenk, Johann Oskar (chemist)	1874 - 1951	German (b. Munich, Germany)	

Siemens, Sir Carl Wilhelm (Charles William) (physicist)	1823 - 1883	German-British (b. Lenthe, Hanvover, Germany)	
Siemens, Ernst Werner von	1816 - 1892	German-British (b. Lenthe, Hanvover, Germany)	siemens unit of conductance

Weber, Wilhelm Eduard	1804 - 1891	German (b. Wittenberg, Germany)	weber unit of magnetic flux <b>(1848)</b>
Weber, Ernst Heinrich (anatomy & physiology)	1795 - 1878	German (b. Wittenberg, Germany)	Weber-Fechner law of skin stimuli sensitivity <b>(1834)</b>

**(iv) Brother-Sister combination**

Pockels, Agnes	1862 - 1935	Austrian (b. Venice, Italy)	
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Pockels, Friedrich Karl Alwin	1865 - 1913	Austrian (b. Vicenza, Italy)	Pockels cell, Pockels effect
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**(v) Professor-graduate student combinations**

Hammett, Louis Plack	1894 - 1987	American (b. Wilmington, Delaware, USA)	Hammett equation, Hammett sigma constants, Curtin-Hammett principle ( <b>1954</b> ), Zucker-Hammett hypothesis ( <b>1939</b> )
Zucker, Lois Mason	1913 -	American (b. Franklin, Pennsylvania, USA)	Zucker-Hammett hypothesis ( <b>1939</b> )

Diels, Otto Paul Hermann <b>Nobel Prize Chemistry 1950</b>	1876 - 1954	German (b. Hamburg, Germany)	Diels-Alder reaction ( <b>1928</b> ), Dieldrin
Alder, Kurt <b>Nobel Prize Chemistry 1950</b>	1902 - 1958	German (b. Konigshütte, Upper Silesia, now Chorzow, Poland)	Diels-Alder reaction ( <b>1928</b> ), Alder rule ( <b>1960</b> ), Aldrin

Born, Max <b>Nobel Prize Physics 1954</b>	1882 - 1970	German (b. Breslau, Germany now Wroclaw, Poland)	Born-Oppenheimer approximation ( <b>1927</b> ), Born postulate, Born-Haber cycle
Oppenheimer, Julius Robert	1904 - 1967	American (b. New York, USA)	Born-Oppenheimer approximation ( <b>1927</b> )

Saytzeff, Alexander Mikhailovich (also Zaitsev, Saytzev)	1841 - 1910	Russian (b. Kazan, Russia)	Saytzeff rule ( <b>1875</b> )
Arbuzov, Aleksandr Erminingeldovich	1877 - 1968	Russian (b. Arbuzov-Baran, near Kazan, Russia)	Arbuzov-Michaelis reaction ( <b>1898</b> )

Gomberg, Moses	1866 - 1947	Ukrainian- American (b. Elisabetgrad, Ukraine now Kirovograd, Ukraine)	Gomberg-Bachmann reaction ( <b>1924</b> )
Bachmann, Werner Emmanuel	1901 - 1951	American (b. Detroit, Michigan, USA)	Gomberg-Bachmann reaction ( <b>1924</b> )

Thorpe, Sir Jocelyn Field	1872 - 1940	British (b. London, England)	Thorpe reaction ( <b>1904</b> )
Baker, John William	1898 - 1967	British (b. London, England)	Baker-Nathan effect ( <b>1935</b> )

Bunsen, Robert Wilhelm Eberhard	1811 - 1899	German (b. Göttingen, Germany)	Bunsen burner ( <b>1850's</b> )
Baeyer, Johann Friedrich Wilhelm Adolf von <b>Nobel Prize Chemistry 1905</b>	1835 - 1917	German (b. Berlin, Germany)	Baeyer-Villager oxidation ( <b>1899</b> )

Kekulé von Stradonitz, Friedrich August	1829 - 1896	German (b. Darmstadt, Germany)	Kekulé structure ( <b>1858/1865</b> )
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Claisen, Rainer Ludwig	1851 - 1930	German (b. Cologne, Germany)	Claisen rearrangement ( <b>1912</b> ), Claisen condensation ( <b>1887</b> ), Claisen-Schmidt reaction ( <b>1881</b> ), Mixed Claisen condensation, Reverse Claisen condensation, Claisen adapter, Claisen flask
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Arndt, Fritz	1885 - 1969	German (b. Hamburg, Germany)	Arndt-Eistert synthesis ( <b>1935</b> )
Eistert, Bernd	1902 - 1978	German (b. Ohlau, Lower Silesia, Germany)	Arndt-Eistert synthesis ( <b>1935</b> )

Baeyer, Johann Friedrich Wilhelm Adolf von <b>Nobel Prize Chemistry 1905</b>	1835 - 1917	German (b. Berlin, Germany)	Baeyer-Villager oxidation ( <b>1899</b> )
Fischer, Emil Hermann <b>Nobel Prize Chemistry 1902</b>	1852 - 1919	German (b. Euskirchen, Rhenish Prussia, near Bonn, Germany)	Fischer esterification, Fischer indole synthesis ( <b>1883</b> ), Kiliani-Fischer synthesis ( <b>1885/1889</b> ), Fischer projection ( <b>1891</b> )

Knorr, Ludwig	1859 - 1921	German (b. Munich, Germany)	Knorr pyrrole synthesis ( <b>1884/6</b> ), Paal-Knorr pyrrole synthesis ( <b>1885</b> )
Fischer, Hermann Otto Laurenz	1888 - 1960	German (b. Würzburg, Germany)	
Zincke, Ernst Karl Theodor	1843 - 1928	German (b. Uelzen, Germany)	
Fries, Karl Theophil	1875 - 1962	German (b. Kiedrich, near Wiesbaden, Germany)	Photo-Fries rearrangement, Fries rearrangement ( <b>1908</b> )
Fehling, Hermann Christian von	1812 - 1885	German (b. Lübeck, Germany)	Fehling solution (aqueous solution of copper sulfate, sodium tartrate, and sodium hydroxide)
Hell, Carl Magnus von	1849 - 1926	German (b. Stuttgart, Germany)	Hell-Volhard-Zelinsky reaction ( <b>1881</b> )
Liebig, Justus Freiherr von	1803 - 1873	German (b. Darmstadt, Germany)	Liebig condenser

Hofmann, August Wilhelm von (Johann Wilhelm)	1818 - 1892	German (b. Giessen, Germany)	Hofmann degradation-elimination ( <b>1881</b> ), Hofmann-Löffler-Freytag reaction ( <b>1883/1909</b> ), Hofmann rearrangement ( <b>1871</b> )
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Markovnikov (Markownikoff), Vladimir Vasilevich	1838 - 1904	Russian (b. Knyaginino, Nizhegorodskaya (now Gorki region), Russia)	Markovnikov rule ( <b>1870</b> ), anti-Markovnikov addition
Kishner, Nikolai Matveevich	1867 - 1935	Russian (b. Moscow, Russia)	Wolff-Kishner reduction ( <b>1911-1912</b> )

Saytzeff, Alexander Mikhailovich (also Zaitsev, Saytzev)	1841 - 1910	Russian (b. Kazan, Russia)	Saytzeff rule ( <b>1875</b> )
Reformatskii, Sergius (Sergei Nikolaevich)	1860 - 1934	Russian (b. Borisoglebskoe, near Ivanovo, Russia)	Reformatskii reaction ( <b>1887</b> )

Hofmann, August Wilhelm von (Johann Wilhelm)	1818 - 1892	German (b. Giessen, Germany)	Hofmann degradation-elimination ( <b>1881</b> ), Hofmann-Löffler-Freytag reaction ( <b>1883/1909</b> ), Hofmann rearrangement ( <b>1871</b> )
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Reimer, Karl Ludwig	1845 - 1883	German (b. Leipzig, Germany)	Reimer-Tiemann reaction <b>(1876)</b>
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Curtius, Theodor	1857 - 1928	German (b. Duisburg, Ruhr, Germany)	Curtius rearrangement <b>(1890)</b>
Schmidt, Karl Friedrich	1887 - 1971	German (b. Heidelberg, Germany)	Schmidt reaction <b>(1924)</b>

Liebig, Justus Freiherr von	1803 - 1873	German (b. Darmstadt, Germany)	Liebig condenser
Strecker, Adolf Friedrich Ludwig	1822 - 1871	German (b. Darmstadt, Germany)	Strecker synthesis <b>(1850)</b>

Liebig, Justus Freiherr von	1803 - 1873	German (b. Darmstadt, Germany)	Liebig condenser
Volhard, Jacob	1834 - 1910	German (b. Darmstadt, Germany)	Hell-Volhard-Zelinsky reaction <b>(1881)</b>

Zinin, Nikolai Nikolaevich	1812 - 1880	Russian (b. Shusha, Azerbaydzhan)	
Borodin, Aleksandr Porphyrevich	1833 - 1887	Russian (b. St. Petersburg, Russia)	Borodin-Hunsdiecker reaction <b>(1861/1942)</b>

**(6) Canadian connections**

<i>Boyd, Russell Jaye</i>	1945 -	Canadian (b. Kelowna, British Columbia, Canada)	Boyd-Edgecombe electronegativity parameters <b>(1988)</b>
<i>Brook, Adrian Gibbs</i>	1924 -	Canadian (b. Toronto, Ontario, Canada)	Brook rearrangement <b>(1958)</b>
<i>Cox, Robin</i>	1943 -	British-Canadian (b. England)	Cox-Yates acidity function <b>(1978)</b>
Eadie, George Sharp	1895 - 1976	Canadian-American (b. Toronto, Ontario, Canada)	Eadie plot <b>(1942)</b>
<i>Edgecombe, Kenneth E.</i>	?	Canadian ?	Boyd-Edgecombe electronegativity parameters <b>(1988)</b>
Edward, John (Jack) Thomas	1919 - 1999	British-Canadian (b. London, England)	Edward-Lemieux effect (anomeric effect)
Hanes, Charles Samuel	1903 - 1993	Canadian (b. Toronto, Ontario, Canada)	Hanes plot <b>(1932)</b> , Hanes-Woolf plot
<i>Lemieux, Raymond Urgel</i>	1920 -	Canadian (b. Lac la Biche, Alberta, Canada)	Lemieux-Johnson reaction <b>(1956)</b> , Lemieux-Johnson reagent <b>(1956)</b> (sodium periodate-osmium tetroxide), Lemieux-von Rudloff reagent <b>(1955)</b> (sodium periodate-potassium permanganate)
<i>Lever, A. Barry P.</i>	1936 -	British-Canadian (b. London, England)	Lever electrochemical parameters <b>(1990)</b>

<i>Marcus, Rudolph Arthur</i> <b>Nobel Prize Chemistry 1992</b>	1923 -	Canadian-American (b. Montreal, Canada)	Marcus equation ( <b>1956</b> ), BeMaHaPoThLe principle, Marcus-Hush relationship, Marcus inverted region
Menten, Maud Leonora	1879 - 1960	Canadian (b. Port Lambton, Ontario, Canada)	Michaelis-Menten kinetics ( <b>1913</b> )
<i>Moffatt, John Gilbert</i>	1930 -	Canadian-American (b. Victoria, British Columbia, Canada)	Pfitzner-Moffatt reagent ( <b>1963</b> ) (dimethylsulfoxide-dicyclohexylcarbodiimide)
Saunders, Frederick A.	1875 - 1963	Canadian (b. London, Ontario, Canada)	Russell-Saunders coupling ( <b>1925</b> )
<i>Siebrand, Willem</i>	1932 -	Dutch-Canadian (b. Ijsselmuiden, Netherlands)	Albery-Siebrand model ( <b>1986</b> )
<i>Taube, Henry</i> <b>Nobel Prize Chemistry 1983</b>	1915 -	Canadian-American (b. Neudorf, Saskatchewan)	Creutz-Taube complex, ion ( <b>1969</b> )
Winstein, Saul	1912 - 1969	Canadian-American (b. Montreal, Quebec, Canada)	Winstein equation, Grunwald-Winstein equation ( <b>1948</b> ), Winstein-Holness equation ( <b>1955</b> )
<i>Yates, Keith</i>	1928 -	British-Canadian (b. Preston, England)	Cox-Yates acidity function ( <b>1978</b> )

Fischer, Hermann Otto Laurenz: Banting Institute, University of Toronto (1937 - 1948), synthesis of optically pure ?-monoglycerides and ?-glycerophosphoric acids; demonstrated action of lipase enzymes on above compounds.

Frederick Soddy worked at McGill University (1900 - 1903) with Ernest Rutherford. He came to Canada to increase his chances for a faculty position at the University of Toronto, however the University of Toronto was not interested in him.

Frederick Albert Saunders studied chemistry at the University of Toronto (1890's) then switched to physics.

Frederic Phillip Olsen was a professor at McMaster University, Hamilton, Ontario.

Donald Frank Stedman (Stedman columns) worked at the National Research Council in Ottawa (1930 - ?)

Ernst Max von Rudloff (Lemieux-von Rudloff) is at the Prairie Research Labs of the NRC in Saskatoon.

The U.S. Pavilion at Expo 67 in Montreal was designed by Richard Buckminster Fuller. The geodesic dome design inspired Harold Kroto, Richard Smalley, and Robert Curl, Jr. to name the newest form of carbon, C60, buckminsterfullerene when it was discovered in 1985.

**(7) Knighted scientists**

<i>Baldwin, Sir Jack E.</i>	1938 -	British (b. Bow Bells, U.K.)	Baldwin's rules <b>(1976)</b>
Barton, Sir Derek Harold Richard <b>Nobel Prize Chemistry 1969</b>	1918 - 1998	British (b. Gravesend, Kent, England)	Barton reaction <b>(1960)</b>

Bragg, Sir William Henry <b>Nobel Prize Physics 1915</b>	1862 - 1942	British (b. Westward, Cumberland, England)	Bragg angle of diffraction, Bragg planes, Bragg reflection indices ( <b>1912</b> )
Bragg, Sir William Lawrence <b>Nobel Prize Physics 1915</b>	1890 - 1971	British (b. Adelaide, England)	
Brewster, Sir David	1781 - 1868	Scottish (b. Jedburgh, Scotland)	Brewster angle, Brewster's law, Brewster's fringes ( <b>1815</b> )
Crookes, Sir William	1832 - 1919	British (b. London, England)	discoverer of Thallium in <b>1861</b> London, England
Davy, Sir Humphry	1778 - 1829	British (b. Penzance, Cornwall, England)	co-discoverer of Na ( <b>1807</b> ), K ( <b>1807</b> ), B ( <b>1808</b> ), Ca ( <b>1808</b> ), Ba ( <b>1808</b> ), Cd ( <b>1817</b> )
Dewar, Sir James	1842 - 1923	Scottish (b. Kincardine-on- Forth, Scotland)	Dewar flask ( <b>1895</b> )
Hamilton, Sir William Rowan	1805 - 1865	Irish (b. Dublin, Ireland)	Hamiltonian operator ( <b>1830</b> )
Haworth, Sir Walter Norman <b>Nobel Prize Chemistry 1937</b>	1883 - 1950	British (b. Chorley, Lancashire, England)	Haworth formula ( <b>1929</b> )
Hinshelwood, Sir Cyril Norman <b>Nobel Prize Chemistry 1956</b>	1897 - 1967	British (b. London, England)	Hinshelwood equation
Ingold, Sir Christopher Kelk	1893 - 1970	British (b. Forest Gate, London, England)	Cahn-Ingold-Prelog convention ( <b>1951</b> )
Jeans, Sir James Hopwood	1877 - 1946	British (b. Ormskirk, near Southport, England)	Rayleigh-Jeans law ( <b>1900</b> )

Jeffreys, Sir Harold	1891 - 1989	British (b. Fatfield, near Durham, England)	Wenzel-Kramers-Brillouin (WKB) method or JWKB method (Jeffreys- Wenzel-Kramers-Brillouin) ( <b>1926</b> )
<i>Jones, Sir Ewart Ray Herbert</i>	1911 -	British (b. Wrexham, Wales)	Jones oxidation ( <b>1946</b> ), Jones reagent
Krebs, Sir Hans Adolf <b>Nobel Prize Physiology or Medicine 1953</b>	1900 - 1981	German-British (b. Hildensheim, Germany)	Kreb's cycle ( <b>1935</b> )
Larmor, Sir Joseph	1857 - 1942	Irish (b. Magheragall, Ireland)	Larmor frequency, Larmor precession ( <b>1900</b> )
Lennard-Jones, Sir John Edward	1894 - 1954	British (b. Leigh, England)	Lennard-Jones potential ( <b>1924</b> )
Perkin, Sir William Henry	1838 - 1907	British (b. Shadwell, South London, England)	Perkin reaction ( <b>1868</b> ), Perkin rearrangement ( <b>1870</b> )
Raman, Sir Chandrasekhara Venkata <b>Nobel Prize Physics 1930</b>	1888 - 1970	Indian (b. Trichinopoly, now Tiruchirappalli, India)	Raman spectroscopy ( <b>1928</b> )
Ramsay, Sir William	1852 - 1916	Scottish (b. Glasgow, Scotland)	co-discoverer of Ar ( <b>1894</b> ), He ( <b>1895</b> ), Ne ( <b>1898</b> ), Kr ( <b>1898</b> ), Xe ( <b>1898</b> )
Robinson, Sir Robert <b>Nobel Prize Chemistry 1947</b>	1886 - 1975	British (b. Bufford near Chesterfield, Derbyshire, England)	Robinson annulation ( <b>1935</b> )

Stokes, Sir George Gabriel, 1st Baronet	1819 - 1903	British (b. Skreen, County Sligo, Ireland)	Stokes's law of hydrodynamics, Stokes's law of fluorescence ( <b>1852</b> ), Stokes lines, anti-Stokes lines, Navier-Stokes equations, Stokes shifts
Thomson, Sir Joseph John	1856 - 1940	British (b. Cheetham Hill, near Manchester, England)	Thomson model of atom ( <b>1903</b> )
Thorpe, Sir Jocelyn Field	1872 - 1940	British (b. London, England)	Thorpe reaction ( <b>1904</b> )
Townsend, Sir John Sealy Edward	1868 - 1957	Irish (b. Galway, Ireland)	Townsend effect ( <b>1922</b> )
Wheatstone, Sir Charles	1802 - 1875	British (b. Gloucester, England)	Wheatstone bridge ( <b>1844</b> )
Wilkinson, Sir Geoffrey <b>Nobel Prize Chemistry 1973</b>	1921 - 1996	British (b. Todmorden, Yorkshire, England)	Wilkinson's catalyst (chlorotris(triphenylphosphine) rhodium (I))

### (8) People?

Kugelrohr apparatus: Ger. *kugel* = ball, sphere    *rohr* = tube, pipe

Aufbau principle: Ger. *aufbau* = building, construction

### (9) Misspelled Names

Bose, Satyendra Nath ("Satyendranath")	1894 - 1974	Indian (b. Calcutta, India)	bosons
Debye, Peter Joseph Wilhelm (Willem) (real spelling: Debije, Petrus Josephus Wilhelmus) <b>Nobel Prize Chemistry 1936</b>	1884 - 1966	Dutch-American (b. Maastricht, Netherlands)	Debye-Hückel law ( <b>1923</b> ), Debye unit of electric dipole moment, Debye equation for polarization, Debye length, Debye temperature, Debye $T^3$ law ( <b>1912</b> )
Hasselbalch, Karl Albert ("Hasselbach")	1874 - 1962	Danish (b. ?)	Henderson-Hasselbalch equation ( <b>1908</b> )

### (10) Interesting Tidbits

1. **Morris William Travers** was 26 years old when he and **Sir William Ramsay** discovered elements Ne, Kr, and Xe.
2. **Sir William Ramsay** discovered the noble gas group (He, Ne, Ar, Kr, Xe) yet no element is named after him.
3. **Sir Humphry Davy** discovered 6 elements (B, Na, K, Ca, Cd, Ba) yet no element is named after him.
4. **Hieronymous Theodor Richter** was 19 when he discovered In.
5. **Smithson Tennant** discovered Os and Ir (*Phil. Trans.* **1804**, 94, 411) and proved that diamond is pure carbon (*Phil. Trans.* **1797**, 87, 123). He died in a horse riding accident.
6. **Frederick Soddy** coined the term *isotope*.
7. Idea of potential energy surfaces was proposed by **René Marcelin** (1885 - 1914).
8. Latent heat and specific heat were discovered by **Joseph Black** (1728 - 1799).
9. Neutron was discovered by **Sir James Chadwick** (1891 - 1974). Electron was discovered by **Sir Joseph John Thomson** (1856 - 1940).

10. Molecular orbital theory was proposed by **Charles Alfred Coulson** (1910 - 1974).
11. Theory of valence was originated by **Sir Edward Frankland** (1825 - 1899).
12. Law of conservation of charge was formulated by **Benjamin Franklin** (1706 - 1790).
13. The words galvanize and galvanometer are named after **Luigi Galvani** (1737 - 1798) although he did not invent the process or the instrument.
14. The first classifier of organic compounds was **Auguste Laurent** (1807(8) - 1853).
15. Radiocarbon dating invented by **Willard Frank Libby** (1908 - 1980).
16. Chromosome theory of heredity was proposed by **Thomas Hunt Morgan** (1866 - 1945).
17. First person to synthesize a gene was **Har Gobind Khorana** (1922 - ).
18. Earliest classification of the elements (the Law of Octaves) was proposed by **John Alexander Reina Newlands** (1837-1898). He formulated concept of periodicity in properties of elements before Mendeleev but they were not accepted at the time.
19. **Hans Christian Oersted** (1777 - 1851) discovered that an electric current produces an associated magnetic field.
20. **Friedrich Wilhelm Ostwald** (1853 - 1932) is considered the pioneering father of physical chemistry.
21. **Pierre Joseph Pelletier** (1788 - 1842) pioneered alkaloid chemistry; discovered quinine, caffeine, strychnine, colchicine, veratrine, and chlorophyll.
22. First definitive demonstration that atoms exist was made by **Jean Baptiste Perrin** (1870 - 1942).
23. The founding fathers of stereochemistry are **Jacobus Henrikus van't Hoff** (1852 - 1911) and **Joseph Achille Le Bel** (1847 - 1930).
24. **Richard Willstatter** (1872 - 1942) discovered the structure of chlorophyll.
25. **Soren Sorensen** (1868 - 1939) invented pH scale for acidity.
26. Niobium (Nb) was originally named columbium (Cb). Element francium (Fr) was originally named actinium K.
27. Element radon (Rn) was named after element radium (Ra).
28. **John Wesley Hyatt** (1837 - 1920) invented celluloid, the first man-made plastic.
29. **Frederick Stanley Kipping** (1863 - 1949) invented the term "silicone".
30. **Archer John Porter Martin** (1910 - ) invented paper chromatography; was a Chemistry Nobel Laureate in 1952.

31. **Viktor Meyer** (1848 - 1897) discovered thiophene and concept of steric hindrance.
32. **Thomas Midgley** (1889 - 1944) discovered that tetraethyl lead is a good anti-knocking agent in gasoline; also introduced freons in refrigerators.
33. **Paul Hermann Müller** (1899 - 1965) invented insecticide DDT; was a Physiology & Medicine Nobel Laureate in 1948.
34. Concepts of hybridization of atomic orbitals and chemical bonding were proposed by **Linus Carl Pauling** (1901 - 1994); was Chemistry (1954) and Peace (1962) Nobel Laureate, the first to win two unshared Nobel Prizes.
35. **Joseph Louis Proust** (1754 - 1826) proposed that every true chemical compound has exactly the same composition regardless of how it is prepared (Proust's Law).
36. **Henri Victor Regnault** (1810 - 1878) invented the air thermometer and hygrometer. He discovered carbon tetrachloride.
37. **Karl William Scheele** (1742 - 1786) discovered the following compounds:  
arsenic acid, arsine, barium oxide, benzoic acid, calcium tungstate (scheelite), citric acid, chlorine, copper arsenite (Scheele's green), gallic acid, glycerol, hydrogen cyanide, hydrocyanic acid, hydrogen fluoride, hydrogen sulfide, lactic acid, malic acid, manganese, manganates, molybdic acid, nitrogen gas, oxalic acid, oxygen, permanganates, silicon tetrafluoride, tartaric acid, tungstic acid, uric acid.
38. **Rudolf Schoenheimer** (1898 - 1941) used isotopes as tracers to study biochemical reactions.
39. **Harold Clayton Urey** (1893 - 1981) discovered deuterium and heavy water.
40. **Louis Nicolas Vauquelin** (1763 - 1829) discovered asparagine, pectin, malic acid in apples, camphoric acid, quinic acid.
41. **Alfred Werner** (1866 - 1919) invented theory of co-ordination bonding in molecules.
42. **Eugen Baumann** (1846 - 1896) discovered thyroxin, an iodine containing organic compound found in the thyroid gland.
43. **Hans Goldschmidt** (1861 - 1923) invented the welding process.
44. **Ludwig Knorr** (1859 - 1921) discovered antipyrine (1833), quinoline and pyrazole (1844).
45. **Carl Ludwig Schotten** (1853 - 1910) discovered piperidine and bile acids.
46. **Friedrich August Raschig** (1863 - 1928) discovered nitramide and chloramine.
47. **Andrew Norman Meldrum** (1876 - 1934) was a chemical educator and a chemical historian.

48. **Mikhail Semenovitch Tswett** (1872 - 1919) was a Russian-Polish botanist who invented method of separation of compounds by column chromatography using a solid support (absorbent) and solvent (diluent). He performed the first separation on spinach leaves extract and obtained four separate pigments (*Ber. Deut. Botan. Gesell.* **1906**, 24, 385).
49. **Ludwig Ferdinand Wilhelmy** (1812 - 1864) was the first to formulate rate laws as differential equations, rate concentration dependence, and temperature dependence of rates. The first studied kinetic reaction was the inversion of sucrose by acid using polarimetry published in 1850 (*Ann. Physik* **1850**, 81, 413; 499). He obtained his doctorate in 1846 in Heidelberg and then was a Privatdozent there from 1849 to 1854. Soon after he left chemistry and led a private life in Berlin.
50. **Egor Egorovich Vagner** (1849 - 1903) used the German spelling of his name (Georg Wagner) in publications.
51. **Vladimir Markovnikov** (1838 - 1904) used the spelling Markownikoff; **Sergei Reformatskii** (1860 - 1934) used the spelling "Sergius Reformatsky". **Alexandr Saytzeff** (1841 - 1910) used the spelling "Saytzeff".
52. **Carl Friedrich Mohr** (1806 - 1879) invented the technique of titration. He was an apothecary.
53. **Karl Pearson** (1857 - 1936) invented the chi-square statistical test.
54. **Eilhard Mitscherlich** (1794 - 1863) discovered isomorphism, the observation that substances of analogous chemical composition crystallize in the same crystal form.
55. **Theodor Svedberg** (1884 - 1971) invented the ultracentrifuge.
56. **Aleksandr Borodin** (1833 - 1887) was a noted composer (*Prince Igor*) as well as a chemist (Borodin-Hunsdiecker reaction, discovered by Borodin in 1861 and rediscovered by Heinz and Clare Hunsdiecker in 1942).
57. **Lord Kelvin's** real name was **William Thomson**. Kelvin is the name of a river in Scotland. Among his accomplishments include: creating the first physics lab in Britain, suggesting the process of refrigeration, playing a leading role in laying down the first transatlantic cable in 1858, urging the adoption of the metric system and cgs (centimetre-gram-second) absolute system of measurement, introducing terms "susceptibility" and "permeability", reforming the mariner's compass (1873 – 1878), and inventing a tide predicting machine. He is buried in Westminster Abbey next to **Sir Isaac Newton**.
58. **Walter Norman Haworth** coined the term "conformation".
59. **Mikhail Saytzeff** (brother of Alexandr) discovered the transformation of acid chlorides to aldehydes (*J. Prakt. Chem.* **1872**, 6, 128) before Rosenmund (*Chem. Ber.* **1918**, 51, 585), yet the reaction is known as the Rosenmund reduction.

60. **Don Fausto D'Elhuyar** is given credit for the discovery of tungsten, however, it was his older brother **Don Juan** who actually deserves the credit. **Don Fausto** was the one who had a research position in Vergara, not his brother, and he had outlived **Don Juan** by 37 years.
61. **Victor Meyer** (discoverer of oximes and thiophene), **Christian Grotthuss** (Grotthuss-Draper law, and Grotthuss chains), **Hans von Pechmann** (Pechmann reaction), **Wallace Carothers** (discoverer of neoprene and nylon), and **Ludwig Boltzmann** (Boltzmann constant and Maxwell-Boltzmann statistics) all committed suicide. **Lev Chugaev** died from typhus in 1922; **Pierre Curie** died in a traffic accident in 1906; **Oskar Piloty** (advisor of **Wilhelm Schlenk**) died in action in World War I (He had enlisted when he found out his son also died in action in the war); **Smithson Tennant** (discoverer of osmium and iridium, and proved that diamond is a form of carbon) died in a horse riding accident in 1815.
62. Boyle's law had been known in France as Mariotte's law after **Edme Mariotte** (1620 - 1684) who had discovered it in 1676, fourteen years after **Robert Boyle**.
63. **Jacques Alexandre César Charles** discovered the relationship between volume and temperature of a gas in 1787 but did not publish his results. Instead he communicated them to **Gay-Lussac** who published what is now known as Gay-Lussac's law in 1802, six months after **John Dalton** who also deduced the law independently.
64. **Gustav Robert Kirchhoff** established the loop (voltage law) and point (current law) rules for circuit analysis in 1845 - 1856 while still a student at the University of Königsberg, Prussia. His work spanned a wide variety of subjects: electrolytes, diffraction, heat radiation, and circuit analysis and his name has been associated with laws in all four areas. He is also claimed to be a co-discoverer of the elements rubidium and cesium.
65. **Josef Loschmidt** and **Johann Balmer** were both school teachers in Austria and Switzerland respectively. Avogadro's number was known as Loschmidt's number in Germany and was taught as such in German schools.
66. **Rudolf Clausius** deduced that light scattering is responsible for the blue colour of the sky during the day and red at sunrise and sunset (*Ann. Physik* **1849**, 76, 161; 188).
67. **Pierre Bouguer** had discovered that light transmission decreases with the thickness of a transparent sample in 1729. This law was later rediscovered by Lambert, a mathematician, and then by Beer, who published in 1852 what is now known as the Beer-Lambert-Bouguer law. Beer's 1852 paper is the one that is often cited in older textbooks. Bouguer's contribution is rarely mentioned and the law is known as either "Beer's law" or "the Beer-Lambert law".

68. The **Leyden jar** is named after the University of Leyden where Peter von Muschenbrock invented it in 1746. It was also invented independently by Dean von Kleist in Camil, Germany in 1745.
69. **Walter Gilbert's** educational pathway is an excellent example of cross-disciplinary studies and changing career paths. He studied physics and chemistry at Harvard College in 1953. He then did a Ph.D. in mathematical physics at Cambridge University in 1957. During his first faculty position (1957 - 1964) at Harvard as a theoretical physicist he began research in molecular biology with James D. Watson. He fully switched to biophysics in 1964. His name is associated with the DNA sequencing method along with **Allan Maxam**.
70. **Erik Clemmensen** of the Clemmensen reduction reaction also invented preservative processes for canned goods.
71. **John Joseph Griffin** was a bookseller-publisher who also was a dealer in scientific apparatus. The company name was J.J. Griffin & Sons of Covent Garden which later became Griffin & George Ltd. The common beaker is often named the Griffin beaker.
72. **Felix Richard Allihn**, whose name is attached to the Allihn condenser, was a glassblower whose enterprise was based in Berlin, Germany under the name Warmbrunn, Quilitz, & Co. **Henri Vigreux** was also a glassblower and a distillation column is named after him.
73. **Pierre Maurice Marie Duhem's** original doctoral thesis in 1884 challenged **Pierre Eugene Marcelin Berthelot's** principle of maximum work which stated that the criterion of reaction spontaneity is the heat of reaction. Duhem suggested that free energy was the criterion, an assertion that was later confirmed by **Willard Josiah Gibbs** and **Hermann von Helmholtz**. Berthelot had considerable influence and had Duhem's thesis refused resulting in Duhem choosing another thesis topic on the theory of magnetism (1888). Duhem later published his original thesis ideas as a book, "Le Potentiel Thermodynamique", 1886. Fortunately, Duhem's contribution was given credit in the naming of the Gibbs-Duhem equation.
74. **August Kekule** did his initial studies in architecture in Giessen in 1847 before beginning his studies in chemistry under Heinrich Will. It is not surprising then how he was able to transfer his skill in architecture to molecular architecture.
75. **Sir William Rowan Hamilton** was an Irish mathematician who defined the Hamiltonian operator named after him. His work lay dormant for over 100 years before the rise of quantum mechanics!

76. Two Russian scientists, **Aleksandr Saytzeff** and **Nikolai Menshutkin**, appear to have obtained “double Ph.D.” degrees from different institutions. Saytzeff originally worked for Hermann Kolbe in Leipzig and obtained his doctorate in 1866. When he returned to Kazan his degree was not recognized and he then obtained a second doctorate in 1870 under the direction of **Aleksandr Butlerov**. Obtaining his degree in a foreign university was somehow frowned upon although Butlerov himself obtained his doctorate in St. Petersburg for work he had done in Giessen under Justus Liebig in the late 1830’s. Kolbe was instrumental in influencing the Russians in his “second” thesis defense. Menshutkin first obtained his Dr. Phil. degree in 1862 at St. Petersburg. Between 1863 and 1865 he then went to Germany and France to gain hands-on experimental experience under Adolf Strecker in Tübingen (2 semesters), Charles Wurtz in Paris (1 year), and Hermann Kolbe in Marburg (1 semester). When he returned to St. Petersburg his original doctoral degree was not recognized even though he had obtained it in Russia. His biographers give little information as to why, except to hint that the decision may have been politically motivated. The phrase “he was sent down” was used to describe this demotion. At St. Petersburg he obtained his master and doctorate degrees in 1866 and 1869, respectively.
77. **James Prescott Joule** came from a wealthy brewing family. His papers on the relationship between heat and electric current were initially rejected by the *Royal Society*. He then published them in a newspaper called the *Manchester Courier* whereupon **Lord Kelvin** read them and brought them back to the attention of the Royal Society whereupon they were accepted.
78. **Josiah Willard Gibbs** (1839 – 1903) was awarded one of the first Ph.D. degrees in the United States from Yale University in 1863. He was appointed as a professor there in 1871 and for 9 years was not paid a salary. Once he had a job offer from Johns Hopkins University in Maryland, Yale began to pay him. He gained little recognition for his work during his lifetime mainly because of his inability to communicate his ideas so that others could understand the concepts he was discussing, and also because he had published in an obscure journal called the *Transactions of the Connecticut Academy of Science* **1875 – 8**. Lord Kelvin for example was unimpressed by Gibbs work. However, if it had not been for Dutch physical chemist **Hendrik Roozeboom’s** (1854 - 1907) popularization of Gibbs phase rule in intelligible terms, he may not have received any recognition at all. Gibbs’ papers were translated into German by Friedrich Ostwald in 1892 and into French by Henri Le Chatelier in 1899. **James Clerk Maxwell** (1831 – 1894) was the only reported person to have understood Gibbs work at the time because he worked out the maths himself.

79. **John William Draper** whose name is associated with the Grotthuss-Draper law of photochemical absorption by molecules obtained his early professional training in medicine, earning an M.D. degree in 1836 from the University of Pennsylvania. He was also one of the pioneers of photography. In 1840 he took the very first portrait photograph. It was of his sister Dorothy Catherine. He also took the first astronomical photograph, a daguerrotype of the moon. He was also elected the first president of the *American Chemical Society* in 1876.
80. **Svante Arrhenius** did not have an easy time defending his doctoral thesis in 1884 at the University of Uppsala. He had originally snubbed that university citing that he couldn't find an appropriate advisor to work for. There were only two possible choices an inorganic chemist, **Per Theodor Cleve**, (discoverer of holmium and thulium), and **Tobias Thalen**, a spectroscopist. He went to work under the direction of **Eric Edlund** at the Physical Institute for the Swedish Academy of Sciences. **Friedrich Ostwald** played a significant role in supporting Arrhenius' research ideas. Arrhenius was also involved in immunochemistry, cosmology, origin of life, and causes of the Ice Age. He was the first to coin the term "greenhouse effect" in a paper entitled "On the Influence of Carbonic Acid in the Air Upon the Temperature of the Ground", published in *Philosophical Magazine* **1896**, 41, 237.
81. **Friedrich Ostwald** was the first to realize what a catalyst is in his paper in *Zeitschrift fur Physikalische Chemie* **1894**, 15, 705. He denied the existence of atoms, ions, and molecules until **Sir Joseph John Thomson's** experiments on cathode rays, and **Jean Baptiste Perrin's** experiments on Brownian movement. He became disillusioned with chemistry and academic life in his late forties.
82. **Adolf Baeyer** discovered barbiturates in 1863. The name originated from the first name of his girlfriend at the time, Barbara. This relationship evidently didn't last as he married Adelheid Bendemann, the daughter of his father's friend, in 1868.
83. The following scientists were also clergymen: **Thomas Bayes** (Bayes theorem), **St. Albertus Magnus** (discoverer of arsenic), **Reverend William Gregor** (discoverer of titanium), **Albert Abraham Michelson** (Michelson-Morley experiment), and **Julius Arthur Nieuwland** (Nieuwland alkyne coupling reaction).
84. **John Lennard-Jones** was the first to introduce the concept constructing molecular orbitals as a linear combination of atomic orbitals (LCAO approximation) (*Trans. Faraday Soc.* **1929**, 25, 668).

85. **Louis Pasteur** was the first to propose the principle of optical activity based on structure and the definition of enantiomeric structures as non-superimposable mirror images (*Ann. Chim. Phys.* **1848**, 24, 442).

86. **William Christopher Zeise**, a pharmacist, discovered xanthates (1823), thiols (1833), and sulfides (1836).

87. The following scientists obtained degrees in medicine *before* embarking on studies and careers in the physical sciences:

Baumann, Eugen	1872 (MD)	Tubingen
Berzelius, Jöns Jakob	1802 (MD)	Uppsala
Black, Joseph	1754 (MD)	Edinburgh
Bouveault, Louis	1892 (MD)	Sorbonne
Brandt, Georg	1726 (MD)	Rheims
Cannizzaro, Stanislao	1842 (MD)	Palermo
Draper, John William	1836 (MD)	Pennsylvania
Ehrlich, Paul	1874 (MD)	Breslau
Fick, Adolph Eugen	1851 (MD)	Marburg
Galvani, Luigi	1762 (MD)	Bologna
Gmelin, Leopold	1812 (MD)	Göttingen
Helmholtz, Hermann von	1842 (MD)	Berlin
Hempel, Walter Mathias	1872 (MD)	Leipzig
Henderson, Lawrence Joseph	1902 (MD)	Harvard
Henry, William	1807 (MD)	Edinburgh
Hess, Germain Henri	1825 (MD)	Dorpat
<b>Jencks, William Platt</b>	1951 (MD)	Harvard
Krebs, Sir Hans Adolf	1925 (MD)	Freiburg
Menten, Maud Leonora	1907 (MD)	Toronto
Michaelis, Leonor	1897 (MD)	Freiburg
Miller, William Hallows	1841 (MD)	Cambridge
Mosander, Carl Gustav	1825 (MD)	Uppsala
Ringer, Sydney	1863 (MD)	London
Savart, Félix	1816 (MD)	Strasbourg
Seebeck, Thomas Johann	1802 (MD)	Göttingen
Tennant, Smithson	1796 (MD)	Cambridge
Wallis, John	1640 (MD)	Cambridge

Wöhler, Friedrich	1823 (MD)	Heidelberg
Wurtz, Charles Adolphe	1843 (MD)	Strasbourg

88. The following scientists were instrumental in bringing chemistry knowledge from one country to another:

<b>To United States from Germany</b>			
SCIENTIST	UNIVERSITY	DEGREE YEAR	ADVISOR
Eben N. Horsford	Giessen	1844	Justus Liebig
Georg F. Merck	Giessen	1848	Justus Liebig
Charles F. Chandler	Gottingen	1856	Friedrich Wohler, Heinrich Rose
Henry A. Weber	Munich	1868	Justus Liebig
Ira Remsen	Gottingen	1870	Rudolf Fittig
Harmon N. Morse	Gottingen	1875	Hans Hubner
Edgar Fahs Smith	Gottingen	1876	Friedrich Wohler
John U. Nef	Munich	1886	Adolf Baeyer
Michael I. Pupin	Berlin	1889	Hermann von Helmholtz
Julius Stieglitz	Berlin	1889	Johann Tiemann
William Albert Noyes	Munich	1889 (post-doc)	Adolf Baeyer
Arthur A. Noyes	Leipzig	1890	Friedrich Ostwald
John L.R. Morgan	Leipzig	1895	Friedrich Ostwald
Moses Gomberg	Munich Heidelberg	1896 – 7 (post-doc) 1898 (post-doc)	Johannes Thiele Victor Meyer
William C. Bray	Leipzig	1905	R.T.D. Luther
Irving Langmuir	Gottingen	1906	Walther Nernst
Walter Abraham Jacobs	Berlin	1907	Emil Fischer
Rudolf J. Anderson	Berlin	1911	Emil Fischer

George E. Gibson	Breslau	1911	Richard Abegg
Julius Robert Oppenheimer	Gottingen	1927	Max Born
Edward Teller	Leipzig	1930	Werner Heisenberg
John Bardeen	Princeton	1936	Eugene Wigner
<b>To United States from Italy</b>			
SCIENTIST	UNIVERSITY	DEGREE YEAR	ADVISOR
Leo James Rainwater	Columbia	1946	Enrico Fermi
Owen Chamberlain	Chicago	1948	Enrico Fermi
Chen Ning Yang	Chicago	1948	Enrico Fermi
Tsung-Dao Lee	Chicago	1950	Enrico Fermi
Jerome I. Friedman	Chicago	1956	Enrico Fermi
<b>To United States from Britain</b>			
SCIENTIST	UNIVERSITY	DEGREE YEAR	ADVISOR
Owen W. Richardson	London	1904	Sir J.J. Thomson
William F.G. Swann	London	1910	
John A. Pople	Cambridge	1951	Sir John Lennard-Jones
<b>To United States from France</b>			
SCIENTIST	UNIVERSITY	DEGREE YEAR	ADVISOR
Guy Ourisson	Harvard	1952	Louis F. Fieser
<b>To Britain from Germany</b>			
SCIENTIST	UNIVERSITY	DEGREE YEAR	ADVISOR
Lyon Playfair	Giessen	1840	Justus Liebig
Alexander Williamson	Giessen	1845	Justus Liebig
Sir Edward Frankland	Marburg	1849	Robert Bunsen
Benjamin C. Brodie	Giessen	1849	Justus Liebig

Sir William H. Perkin	Royal College of Science, London	1850's	August W. Hofmann
Sir William Crookes	Royal College of Science, London	1854	August W. Hofmann
Thomas E. Thorpe	Heidelberg	1868	Robert Bunsen
Henry E. Armstrong	Leipzig	1869	Adolf Kolbe
Sir William Ramsay	Tubingen	1872	Rudolf Fittig
Francis Robert Japp	Heidelberg	1875	Robert Bunsen
William H. Perkin, Jr.	Wurzburg	1882	Johannes Wislicenus
Samuel Cox Hooker	Munich	1885	Eugen Bamberger
Frederick Stanley Kipping	Munich	1887	Sir William H. Perkin
Sir Jocelyn Field Thorpe	Heidelberg	1895	Karl von Auwers
Ian M. Heilbron	Leipzig	1910	Arthur Hantzsch
Sir Walter N. Haworth	Gottingen	1910	Otto Wallach
Hans Thacher Clarke	Berlin	1911 – 3 (post-doc)	Emil Fischer
Sir Eric K. Rideal	Bonn	1912	R. Auschutz
<b>To Russia from Germany</b>			
SCIENTIST	UNIVERSITY	DEGREE YEAR	ADVISOR
Nikolai N. Zinin	St. Petersburg	1840	Work done in Giessen under Justus Liebig
Aleksandr M. Saytzeff	Leipzig	1866	Adolf Kolbe
Vladimir N. Ipatieff	Munich	1896 (no degree)	Adolf Baeyer
<b>To Germany from Sweden</b>			
SCIENTIST	UNIVERSITY	DEGREE YEAR	ADVISOR
Heinrich Rose	Kiel	1821	Jons Jakob Berzelius

Friedrich Wohler	Heidelberg	1823 (post-doc)	Jons Jakob Berzelius
<b>To France from Germany</b>			
SCIENTIST	UNIVERSITY	DEGREE YEAR	ADVISOR
Jean Charles Galisard de Marignac	Giessen	1840	Justus Liebig
Charles Adolphe Wurtz	Giessen	1842	Justus Liebig
<b>To Canada from Germany</b>			
SCIENTIST	UNIVERSITY	DEGREE YEAR	ADVISOR
Maud Leonora Menten	Berlin	1913 (post-doc)	Leonor Michaelis
Gerhard Herzberg	TU Darmstadt	1928	Hans Rau
<b>To Canada from Britain</b>			
SCIENTIST	UNIVERSITY	DEGREE YEAR	ADVISOR
Charles Samuel Hanes	Cambridge	1929	F.F. Blackman
John Charles Polanyi	Manchester	1952	Ernest Warhurst