

World's oldest periodic table chart found in St Andrews

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Periodic Table washing treatment. Credit: University of St Andrews

A periodic table chart discovered at the University of St Andrews is

thought to be the oldest in the world.

The chart of elements, dating from 1885, was discovered in the University's School of Chemistry in 2014 by Dr. Alan Aitken during a clear out. The storage area was full of chemicals, equipment and laboratory paraphernalia that had accumulated since the opening of the chemistry department at its current location in 1968. Following months of clearing and sorting the various materials a stash of rolled up teaching charts was discovered. Within the collection was a large, extremely fragile periodic table that flaked upon handling. Suggestions that the discovery may be the earliest surviving example of a classroom periodic table in the world meant the document required urgent attention to be authenticated, repaired and restored.

Mendeleev made his famous disclosure on periodicity in 1869, the newly unearthed table was rather similar, but not identical to Mendeleev's second table of 1871. However, the St Andrews table was clearly an early specimen. The table is annotated in German, and an inscription at the bottom left – 'Verlag v. Lenoir & Forster, Wien' – identifies a scientific printer who operated in Vienna between 1875 and 1888. Another inscription – 'Lith. von Ant. Hartinger & Sohn, Wien' – identifies the chart's lithographer, who died in 1890. Working with the University's Special Collections team, the University sought advice from a series of international experts. Following further investigations, no earlier lecture chart of the table appears to exist. Professor Eric Scerri, an expert on the history of the periodic table based at the University of California, Los Angeles, dated the table to between 1879 and 1886 based on the represented elements. For example, both gallium and scandium, discovered in 1875 and 1879 respectively, are present, while germanium, discovered in 1886, is not.

Periodische Gesetzmässigkeit der Elemente nach Mendeleeff

Reihen	Gruppe I R ² O	Gruppe II RO	Gruppe III R ² O ³	Gruppe IV RH ⁴ RO ²	Gruppe V RH ³ R ² O ⁵	Gruppe VI RH ² RO ³	Gruppe VII RH R ² O ⁷	Gruppe VIII RO ⁴
1	H=1							
2	Li=7	Be=9,4	B=11	C=12	N=14	O=16	F=19	
3	Na=23	Mg=24	Al=27,3	Si=28	P=31	S=32	Cl=35,5	
4	K=39	Ca=40	Sc=44	Ti=48	V=51	Cr=52	Mn=55	Fe=56, Co=59 Ni=59, Cu=63
5	(Cu=63)	Zn=65	Ga=68	--=72	As=75	Se=79	Br=80	
6	Rb=85	Sr=87	Yt=88	Zr=90	Nb=94	Mo=96	--=100	Ru=104, Rh=104 Pd=106, Ag=108
7	(Ag=108)	Cd=112	In=113	Sn=118	Sb=122	Te=125	J=127	
8	Cs=133	Ba=137	Ce=137	La=139	--	Di=145?	--	--
9	(-)	--	--	--	--	--	--	--
10	--	165	169 Er=170	--	173 Ta=182	W=184	--	Pt=194, Os=195(?) Ir=193, Au=196
11	(Au=196)	Hg=200	Tl=204	Pb=208	Bi=210	--	--	--
12	--	--	--	Th=231	--	U=240	--	--

Credit: University of St Andrews

In view of the table's age and emerging uniqueness it was important for the teaching chart to be preserved for future generations. The paper support of the chart was fragile and brittle, its rolled format and heavy linen backing contributed to its poor mechanical condition. To make the chart safe for access and use it received a full conservation treatment. The University's Special Collections was awarded a funding grant from the National Manuscripts Conservation Trust (NMCT) for the conservation of the chart in collaboration with private conservator Richard Hawkes (Artworks Conservation). Treatment to the chart included: brushing to remove loose surface dirt and debris, separating the chart from its heavy linen backing, washing the chart in de-ionised water adjusted to a neutral pH with [calcium hydroxide](#) to remove the soluble discolouration and some of the acidity, and finally a 'de-

acidification' treatment by immersion in a bath of magnesium hydrogen carbonate to deposit an alkaline reserve in the paper and finally repairing tears and losses using a Japanese kozo paper and wheat starch paste. The funding also allowed production of a full-size facsimile which is now on display in the School of Chemistry. The original periodic table has been rehoused in conservation grade material and is stored in Special Collections' climate-controlled stores in the University.

A researcher at the University, M Pilar Gil from Special Collections, found an entry in the financial transaction records in the St Andrews archives recording the purchase of an 1885 table by Thomas Purdie from the German catalogue of C Gerhardt (Bonn) for the sum of 3 Marks in October 1888. This was paid from the Class Account and included in the Chemistry Class Expenses for the session 1888-1889. This entry and evidence of purchase by mail order appears to define the provenance of the St Andrews periodic table. It was produced in Vienna in 1885 and was purchased by Purdie in 1888. Purdie was professor of Chemistry from 1884 until his retirement in 1909. This in itself is not so remarkable, a new professor setting up in a new position would want the latest research and teaching materials. Purdie's appointment was a step-change in experimental research at St Andrews. The previous incumbents had been mineralogists, whereas Purdie had been influenced by the substantial growth that was taking place in organic chemistry at that time. What is remarkable however is that this table appears to be the only surviving one from this period across Europe. We are very keen to know if there are others out there that are close in age or even predate the St Andrews table.

Professor David O'Hagan, recent ex-Head of Chemistry at the University of St Andrews, said: "The discovery of the world's oldest classroom periodic table at the University of St Andrews is remarkable. The table will be available for research and display at the University and we have a number of events planned in 2019, which has been designated

international year of the periodic table by the United Nations, to coincide with the 150th anniversary of the table's creation by Dmitri Mendeleev."

Gabriel Sewell, Head of Special Collections, University of St Andrews, added: "We are delighted that we now know when the oldest known [periodic table](#) chart came to St Andrews to be used in teaching. Thanks to the generosity of the National Manuscripts Conservation Trust, the table has been preserved for current and future generations to enjoy and we look forward to making it accessible to all."

Provided by University of St Andrews

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