

Classifying Elements Döbereiner's Elemental Triads

Elements repeat properties in groups of three based on mass. The mass of the middle element is the average of the mass of the first and third element.

Set I		Set II		Set-III	
Element	Atomic mass	Element	Atomic mass	Element	Atomic mass
Calcium	40	Lithium	7	Chlorine	35.5
Strontium	87.5	Sodium	23	Bromine	80
Barium	137	Potassium	39	Iodine	127
Average of the atomic masses of calcium and barium = $\frac{40+137}{2} = 88.5$		Average of the atomic masses of lithium and potassium = $\frac{7+39}{2} = 23$		Average of the atomic masses of chlorine and iodine = $\frac{35.5+127}{2} = 81.2$	
Atomic mass of strontium = 87.5		Atomic mass of sodium = 23		Atomic mass of bromine = 80	



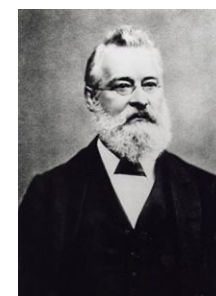
Johann Döbereiner
German Chemist
1780 – 1840AD

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Classifying Elements Newland's Law of Octaves

Table 4.2 Newland's table of octaves (oct- eight)

NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
H1	F8	Cl 15	Co&Ni 22	Br 29	Pd 36	I 42	Pt & Ir 50
Li 2	Na 9	K 16	Ca 23	Rb 30	Ag 37	Cs 44	Ov 51
G 3	Mg 10	Ca 17	Zn 24	Sr 31	Cd 38	Ba & V 45	Hg 52
BO 4	Al 11	Cr 19	V 25	Ce & La 33	U 40	Ta 66	Ti 53
C 5	Si 12	Ti 18	In 26	Sn 39	W 47	Pb 54	
N 6	P 13	Mn 20	As 27	Di&Mo 34	Sb 41	Nb 48	Bi 55
O 7	S 14	Fe 21	Se 28	Ro&Ru 35	To 43	Au 49	Th 56



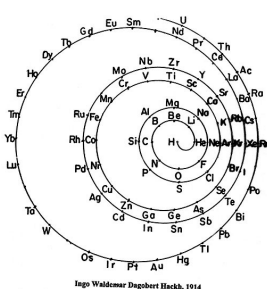
John Newlands
British Chemist
1837 – 1898AD

Elements repeat properties when arranged in rows (*periods*) of 8 elements (*the octave*)

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Classifying Elements Hinrich's Spiral Periodic Table

Elements repeat properties when arranged into a double spiral. The spiral doubles over when elements of similar properties come near each other

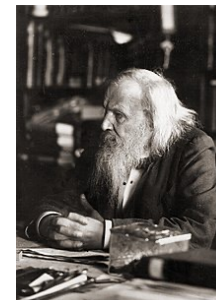


Gustav Hinrichs
German Chemist
1836 – 1924AD

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Classifying Elements Mendeleev's Periodic Table

Elements repeat properties when arranged by atomic mass. (*rows and periods*)



Dmitri Mendeleev
Russian Chemist
1834 – 1907AD

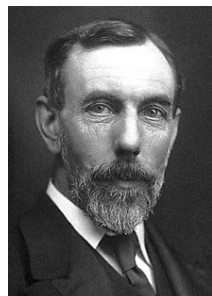
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Classifying Elements

Discovery of the Noble Gases

Ramsay along with other scientists of the time purified a new inert (can't react) gas, the noble gases, the final group of the periodic table

Noble Gas:	First discovered	Who Discovered
Helium	August 18 th , 1869 [11]	Pierre-Jules-César Janssen
Neon	1898	Sir William Ramsay and Morris W. Travers
Argon	1894	Sir William Ramsay and Lord Rayleigh
Krypton	May 30, 1898 [12]	Sir William Ramsay and Morris W. Travers
Xenon	July 12, 1898 [13]	Sir William Ramsay
Radon	1900	Friedrich Ernst Dorn
Unnottium	2002	Scientists in the Joint Institute for Nuclear Research and Lawrence Livermore National Laboratory [13]



William Ramsay
Scottish Chemist
1852 – 1916AD

Classifying Elements

Modern Periodic Table

With the discovery of the subatomic particles (e^- , p^+ , and n^0), and the nucleus, the modern periodic table was arranged by atomic number.

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Modern Periodic Table

Groups and Periods

Elements are arranged into groups (*up and down*), and periods (*left to right*) based on atomic number.

The periodic table is arranged into 8 groups and 7 periods.

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Modern Periodic Table

Groups Naming and Numbering

Groups are numbered in two ways (*modern + trad*)

- 1 (1A) – Alkali Metals
- 2 (2A) – Alkali Earth Metals
- 13 (3A) – Earth Metals
- 15 (5A) – Pnictogens
- 16 (6A) – Chalcogens
- 17 (7A) – Halogens
- 18 (8A) – Noble Gases

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