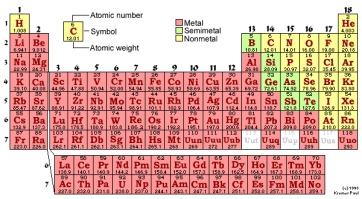


The Periodic Law

Mr. Sudbury

History of the Periodic Table

Mr. Sudbury

The Periodic Table

- The periodic table is an arrangement of the elements in order of their atomic numbers so that elements with similar properties fall into the same column, or group.

The Periodic Table

- By 1860, more than 60 elements had been discovered.
- Chemist were just learning the properties of these elements and the compounds they formed.
- 1860 the First International Congress of Chemists met in Karlsruhe, Germany.
- They determined uniform way to determine atomic mass of atoms.

The Father of the PT

- Russian Chemist Dmitri Mendeleev heard about new naming methods and included them in the textbook he was writing.
- He placed the name and properties of each known element on a card and included a list of observed physical and chemical properties.
- He then arranged the cards in many various ways while looking for trends or similar properties.

The Father of the PT

- Mendeleev noticed that when he arranged the elements by ***increasing atomic mass***, there were similarities that repeated themselves.
- PERIODIC means that there is a repeating pattern.
- First to publish a "Periodic Table" in 1869.
- His first PT left empty spaces where Mendeleev ***predicted new undiscovered elements*** would be discovered and fill in the gaps.

Mendeleev's Periodic Table

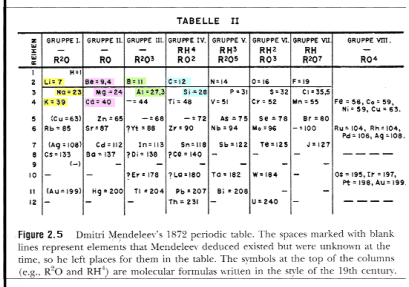


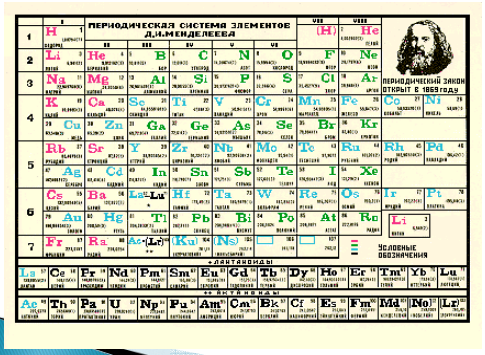
TABELLE II

REIHEN	GRUPPE I. — R^1O	GRUPPE II. — RO	GRUPPE III. — RO^3	GRUPPE IV. RH^4 RO^2	GRUPPE V. RH^3 RO^5	GRUPPE VI. RH^2 RO^3	GRUPPE VII. RH RO^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	—=44	Ti=48	V=51	Cr=52	Mn=55	Fe=56, Co=59, Ni=59, Cu=63.
5	(Cu=63)	Zn=65	—=68	—=72	As=75	Se=78	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	?Di=138	?Ce=140	—	—	—	— — — —
9		(—)	—	—	—	—	—	
10	—	—	?Er=178	?La=180	Ta=182	W=184	—	Os=195, Ir=197, Pt=198, Au=199.
11	(Au=199)	Hg=200	Tl=204	Pb=207	Bi=208	—	—	
12	—	—	—	Th=231	—	U=240	—	— — — —

Figure 2.5 Dmitri Mendeleev's 1872 periodic table. The spaces marked with blank lines represent elements that Mendeleev deduced existed but were unknown at the time, so he left places for them in the table. The symbols at the top of the columns (e.g., R^2O and RH^2) are molecular formulas written in the style of the 19th century.

Dmitri Mendeleev

Modern Russian PT



Moseley "fixes" the PT

- ***Henry Moseley*** (1911) working with Ernest Rutherford recognized a PERIODIC pattern that had previously been overlooked.
- He was analyzing spectra for 38 different metals when he discovered that the elements fit into patterns better when ***increasing atomic number***. (AKA # of protons)

Periodic Law

- The principle of chemical periodicity is correctly stated in what is known as ***Periodic Law:***
  - *"The physical and chemical properties of the elements are periodic functions of their atomic numbers."*

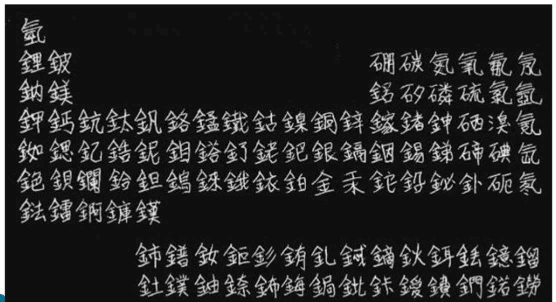
The Modern PT

- In recent years, chemists have discovered more than 40 naturally occurring and synthetic elements, that can all be placed on the PT into groups with other elements that share physical and chemical properties.
- **Modern PT is arranged by increasing atomic number.**

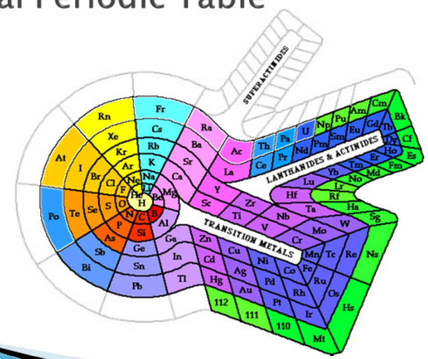
The Modern Periodic Table

- ***Groups (AKA Families)*** – Columns on the periodic table in which all the elements share similar properties.
- ***Periods*** – A horizontal row on the periodic table.

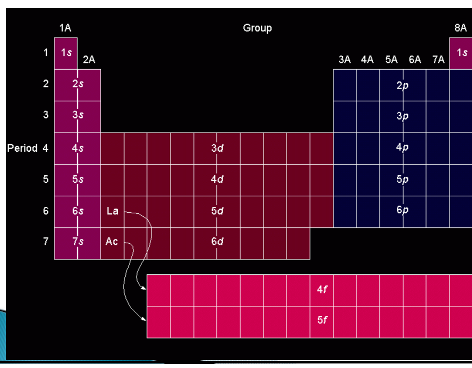
Chinese Periodic Table



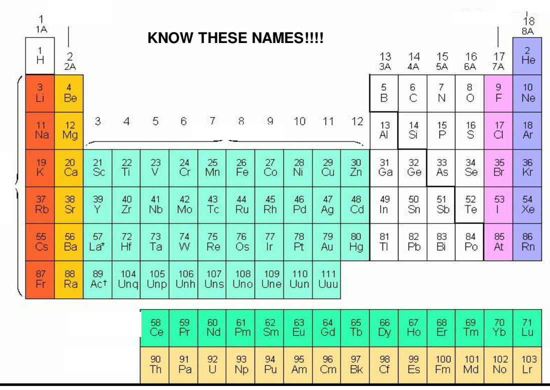
Spiral Periodic Table



Orbital Filling Periodic Table



Periodic Table with Group Names



The End

- Intro to PT
  - Father of the table – Mendeleev
  - “Fixed” the PT – Moseley
  - Modern Table – Increasing Atomic Number
- Groups & Periods