

The Periodic Table

Key Concepts

- The modern periodic table organizes elements in groups and periods based on a repeating pattern in element properties
- There are several ways to classify elements
- The period table shows how properties of elements change in predictable patterns
- The periodic table has gone through many revisions to arrive at its current design.
- Antoine Lavoisier (1789) grouped elements based on their properties into gases, non-metals, metals and earths

Dmitri Mendeleev

- Was first to try to organize known elements systematically
- Grouped elements according to increasing mass and chemical and physical properties of known elements
- Discovered the periodic nature of elements when arranged by mass (common properties of elements would occur at regular intervals)
- Left gaps and predicted that elements would be discovered in the future that fit in there and had the predicted properties.

REIHE	Gruppe I	Gruppe II	Gruppe III	Gruppe IV	Gruppe V	Gruppe VI	Gruppe VII	Gruppe VIII
	- R ² O	- RO	- R ² O ³	RH ⁴ RO ²	RH ³ R ² O ⁵	RH ² RO ³	RH R ² O ⁷	- RO ⁴
1	H=1							
2	Li=7	Be=94	B=11	C=12	N=14	O=16	F=19	
3	Na=23	Mg=24	Al=273	Si=28	P=31	S=32	Cl=355	
4	K=39	Ca=40	- =44	Ti=48	V=51	Cr=52	Mn=55	Fe=56, Ni=59, Co=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	-	- - - -

Rules for naming elements in the periodic table

1. Jon Berzelius Developed a symbolic system to identify elements using letters found in the common name or Latin name of a given element
2. The first letter of an element is always a capital letter ex nitrogen N

3. If as second letter is required if the first letter is the same as another element. In this case the second letter is lower case i.e. Tin is Sn, Sn comes from the latin for tin Stannum
4. He used these symbols to show the type and ratio of elements in a given compound
Ex. H_2O means this compound has 2 hydrogen and for every 1 oxygen.
5. Some newer elements are named after countries and even famous scientists

The modern periodic table

- developed by Henry Moseley
 - elements Ordered by increasing atomic number (number of protons) moving from left to right across the rows
 - A vertical column is called a group or family, number 1 to 18
 - A horizontal row is called a period (1 to 7)
 - 3 main groups: metals, non-metals, semi-metals/metalloids

The Periodic Table of the Elements

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Elements are arranged into 3 broad groups: metals, non-metals, semi-metals

Activity: Colour and fill in large periodic table.

- There are 92 naturally occurring elements
- Some elements don't exist in large enough quantities for there to be natural sources
- Some form naturally during nuclear decay but are unstable

- Some are man made or synthetic (technetium first one) *isolated in 1937 by Emilio sergre in molybdenum that had been exposed to radiation*

Metals

Properties:

- Shiny and hard
- Malleable and ductile (can be hammered into shapes and drawn into wire)
- Conduct electricity and heat well (because atoms are close together)

Special groups of Metals

Group 1 (Alkali metals)

- Hydrogen not included!
- Shiny and soft (can be cut with a knife)
- Highly reactive with water and oxygen
- Used in batteries!
- Melting Point decreases as you go down the table!

Group 2 Alkali Earth metals

- Harder than group 1, low density
- Very reactive (barium and calcium react with water!)
- Used to make alloys (bronze, stainless steel) to increase strength.

Transition Metals

- Group 3 to 12
- All metallic properties but

Non-metals

- Dull, brittle solids or gases
- Poor conductors of electricity or heat (good insulators)

Special Elements

Hydrogen

- Often found on both the left and right side of periodic table (because it can give up or accept an electron so sometimes it acts like a metal and other times like a nonmetal)
- Lightest element

- Colourless, odourless, tasteless
- Highly flammable
- Makes up over 90% of atoms in the universe
- On earth most found combined with oxygen in water
- Uses: in acids fuel in fuel cells

Group 17 Halogens

- Highly reactive (most often found in compounds in nature)
- Mainly Gases (bromine liquid at room temp 20C)
- Brightly coloured gases
- Toxic in elemental form
- Applications: pesticides, disinfectants, plastics

Group 18 Nobel Gases

- Least reactive of all elements
- Helium and neon never form compounds
- Full valence shell
- Odourless, colourless gases

Semimetals or metalloids

- Found on either side of the staircase
- Have physical and chemical properties of both metals and non-metals
- Shiny (like metals)
- Brittle and not ductile (like non-metals)
- Poor conductors
- Silicon for example second most abundant element in earth's crust
- Used in many electronic device
- Used to make silicone (used in cookware, contact lenses, prosthetics)