Atomic structure and the periodic table

Development of the periodic table
Early attempt to classify the elements

Arrangement by atomic mass

Before scientist discovered protons Neutrons and electrons they tried to arrange element by their atomic mass
This method was not perfect some elements ended up in the wrong groups because scientist ignore their chemical properties

Earlier periodic models

The first version of periodic table had many gaps and some elements were placed in the wrong spots
This made the early models incomplete and confusing

Mendeleeves periodic table

In 1869 a Russian scientist called Dimitri Mendeleeve made the first modern periodic table

- **He arranged elements in order of increasing atomic mass but he also locked at their chemical and physical properties**

- he notice that elements with similar properties appeared in the same columns called groups
- he even change the order of some elements to make sure they fit the pattern
- at that time protons were not yet discovered so his work was based only or known properties

Gaps in the periodic table

- mendeleev left gaps in the periodic table for elements that were not yet discovered
- he used patterns and trends to predict to what those elements would be like
- For example he predicted the element such as Silicon which was latest discovered and called Germanium
- When these missing elements were found their properties matched with mandleeves prediction proving his table was correct

Swapping elements

Mendleeve was flexible he did not always follow atomic mass tricky

For example

- tellurium and has a higher atomic mass than iodine but he placed iodine after telling
- This is because iodine properties matched chlorine fluorine and Bromide while tellurium was more similar to oxygen Sulphur and Selenium

The modern periodic table

it has same structure but new order

the Modern Periodic Table is similar to mendeleeves but now the elements are arranged by atomic number instead of atomic mass

Arrangement by atomic number

- The elements are placed in order of increasing atomic number from top left to bottom right
- For example hydrogen has atomic number 1
- Helium has atomic number 2
- The vertical columns are called groups and elements in the same group have similar properties

Representation of elements

each box in the periodic table shows element symbol

atomic number
relative atomic mass
example oxygen has atomic number 8 and relative atomic mass 16

categorizing elements
elements can be grouped to main base

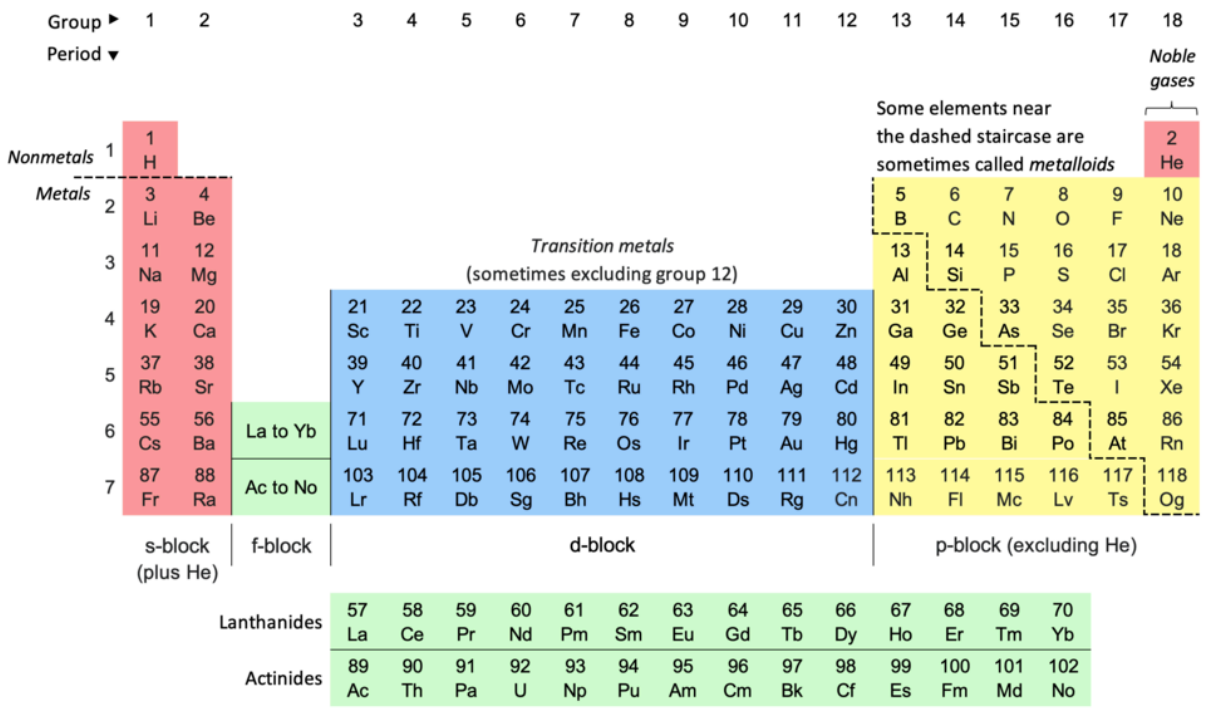
- Groups
- periods

Groups

groups are vertical columns
elements in the same group have similar behaviour chemically
group 7 elements like fluorine and fluorine are called halogen

Period

horizontal rows are called periods
elements in the same period have same number of electron shells
the position of each element depend upon its
Example
Iron has atomic number 26
Cobalt has atomic number 27
Nickel has atomic number 28


Group ▶ 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
Period ▼
Noble gases
Some elements near the dashed staircase are sometimes called metalloids
Nonmetals
Metals
1 H He
2 Li Be B C N O F Ne
3 Na Mg Al Si P S Cl Ar
4 K Ca Sc Ti V Cr Mn Fe Co Ni Cu Zn Ga Ge As Se Br Kr
5 Rb Sr Y Zr Nb Mo Tc Ru Rh Pd Ag Cd In Sn Sb Te I Xe
6 Cs Ba La to Yb Lu Hf Ta W Re Os Ir Pt Au Hg Tl Pb Bi Po At Rn
7 Fr Ra Ac to No Lr Rf Db Sg Bh Hs Mt Ds Rg Cn Nh Fl Mc Lv Ts Og
Transition metals
(sometimes excluding group 12)
s-block (plus He)
f-block
d-block
p-block (excluding He)
Lanthanides La Ce Pr Nd Pm Sm Eu Gd Tb Dy Ho Er Tm Yb
Actinides Ac Th Pa U Np Pu Am Cm Bk Cf Es Fm Md No