

Classification of Elements and Periodicity in Properties

one law, one table, and every property tracing the same shape across it

A quick history, before Mendeleev

- Döbereiner's triads: three elements where the middle atomic mass $\approx$ average of the other two
- e.g. Li, Na, K; worked for only a few triads
- Newlands' law of octaves: by atomic mass, every eighth element repeated the first's properties
- like notes in music; broke down after calcium
- forced unrelated elements together just to keep the pattern
- Mendeleev's periodic law: properties are a periodic function of atomic mass
- he left gaps for undiscovered elements and predicted their properties correctly
- hydrogen's position never sat cleanly in the table
- Te/I had to break strict atomic-mass order (Te heavier, yet placed before I)
- kept to match chemical family: atomic mass wasn't quite the right basis

The modern periodic law

- Moseley refined it: properties are a periodic function of atomic number (Z), not mass
- this fixed every ordering problem Mendeleev's table had
- atomic number = number of protons; it fixes an element's identity and chemistry
- this is the law the modern periodic table is actually built on

How many elements per period

Period 1

2 elements

Periods 2 & 3

8 elements each

Periods 4 & 5

18 elements each

Periods 6 & 7

32 elements each (includes the f-block)