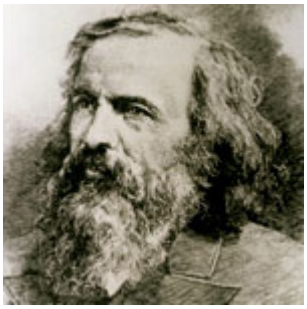
Mendeleev's periodic table



Dmitri Mendeleev (1834 - 1907)

In 1869, just five years after John Newlands put forward his law of octaves, a Russian chemist called Dmitri Mendeleev published a periodic table. Mendeleev also arranged the elements known at the time in order of relative atomic mass, but he did some other things that made his table much more successful.

He realized that the physical and chemical properties of elements were related to their atomic mass in a 'periodic' way, and arranged them so that groups of elements with similar properties fell into vertical columns in his table.

Part of Mendeleev's periodic table

Row	Group I	Group II	Group III	Group IV	Group V	Group VI	Group VII	Group VIII
1	H							
2	Li	Be	B	C	N	O	F	
3	Na	Mg	Al	Si	P	S	Cl	
4	K	Ca	?	Ti	V	Cr	Mn	Fe, Co, Ni, Cu

Gaps and predictions

Sometimes this method of arranging elements meant there were gaps in his horizontal rows or 'periods'. But instead of seeing this as a problem, Mendeleev thought it simply meant that the elements which belonged in the gaps had not yet been discovered.

He was also able to work out the atomic mass of the missing elements, and so predict their properties. And when they *were* discovered, Mendeleev turned out to be right. For example, he predicted the properties of an undiscovered element that should fit below aluminium in his table. When this element, called gallium, was discovered in 1875, its properties were found to be close to Mendeleev's predictions. Two other predicted elements were later discovered, lending further credit to Mendeleev's table.

The modern periodic table

Mendeleev's table needed one important modification before it became the modern periodic table – the use of **atomic number** to order the elements.

All atoms of the same element contain the same number of particles called protons, and this is called the element's atomic number.

Henry Moseley (1887 - 1915)

Mendeleev put the elements in order of their relative atomic mass, and this gave him some problems. For example, iodine has a lower relative atomic mass than tellurium, so it should come before tellurium in Mendeleev's table. In order to get iodine in the same group as other elements with similar properties such as fluorine, chlorine and bromine, he had to put it after tellurium, so breaking his own rules.

Using atomic **number** instead of atomic **mass** as the organising principle was first proposed by the British chemist Henry Moseley in 1913, and it solved anomalies like this one. Iodine has a higher atomic number than tellurium. So, even though he didn't know why, Mendeleev was right to place it after tellurium after all!