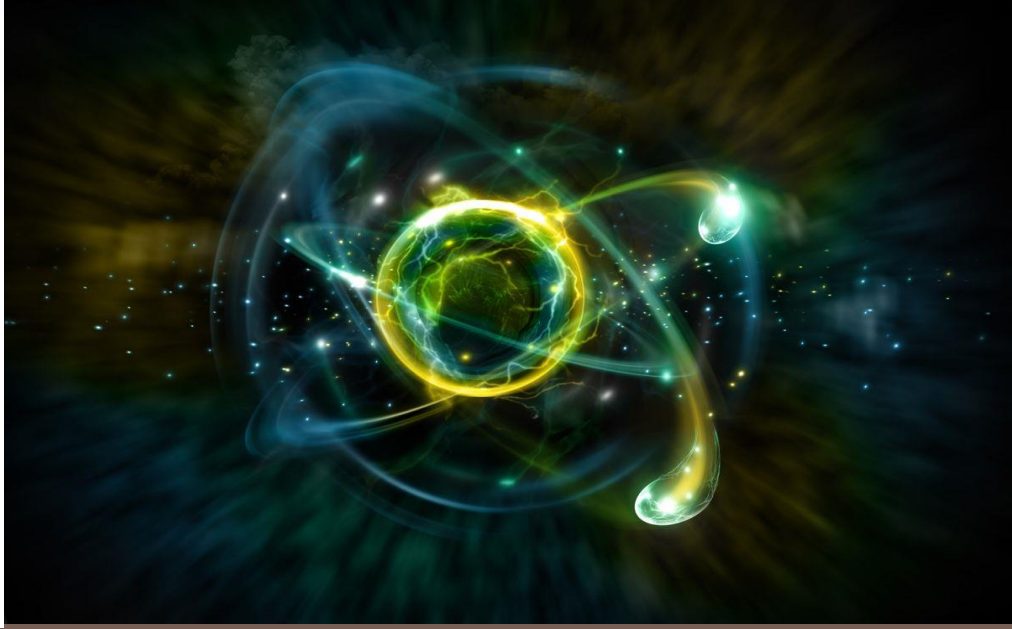

MODERN PERIODIC TABLE

Parag Palod

Dobereiners Triad

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Newlands law of Octaves

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Mendeléev's Periodic Table

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Modern Periodic Table

Döbereiner's Triads

- In the year 1817, Johann Wolfgang Döbereiner, a German chemist, tried to arrange the elements with similar properties into groups.
- He identified some groups having three elements each. So he called these groups 'triads'.
- Döbereiner showed that when the three elements in a triad were written in the order of increasing atomic masses; the atomic mass of the middle element was roughly the average of the atomic masses of the other two elements.

Group A element	Atomic mass	Group B element	Atomic mass	Group C elements	Atomic mass
N	14.0	Ca	40.1	Cl	35. 5
P	31.0	Sr	87.6	Br	79.9
As	74.9	Ba	137.3	I	126.9

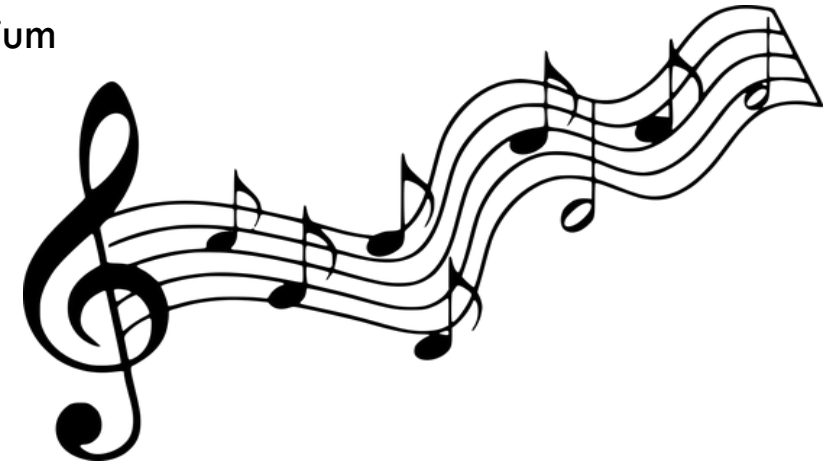
Take the triad consisting of lithium (Li), sodium (Na) and potassium (K) with the respective atomic masses 6.9, 23.0 and 39.0.

What is the average of the atomic masses of Li and K ?

- You will find that groups B and C form Döbereiner triads.
- Döbereiner could identify only three triads from the elements known at that time
- Hence, this system of classification into triads was not found to be useful.

Newlands' Law of Octaves

- The attempts of Döbereiner encouraged other chemists to correlate the properties of elements with their atomic masses.
- In 1866, John Newlands, an English scientist, arranged the then known elements in the order of increasing atomic masses.
- He started with the element having the lowest atomic mass (hydrogen) and ended at thorium which was the 56^{th} element.
- He found that every eighth element had properties similar to that of the first.
- He compared this to the octaves found in music.
- Therefore, he called it the 'Law of Octaves'. It is known as 'Newlands' Law of Octaves'.
- In Newlands' Octaves, the properties of lithium and sodium were found to be the same.
- Sodium is the eighth element after lithium.
- Similarly, beryllium and magnesium resemble each other.



sa (do)	re (re)	ga (mi)	ma (fa)	pa (so)	da (la)	ni (ti)
H	Li	Be	B	C	N	O
F	Na	Mg	Al	Si	P	S
Cl	K	Ca	Cr	Ti	Mn	Fe
Co and Ni	Cu	Zn	Y	In	As	Se
Br	Rb	Sr	Ce and La	Zr	—	—

- It was found that the Law of Octaves was applicable only upto calcium, as after calcium every eighth element did not possess properties similar to that of the first.
- It was assumed by Newlands that only 56 elements existed in nature and no more elements would be discovered in the future.
- But, later on, several new elements were discovered, whose properties did not fit into the Law of Octaves.
- In order to fit elements into his Table, Newlands adjusted two elements in the same slot, but also put some unlike elements under the same note.
- Note that cobalt and nickel are in the same slot and these are placed in the same column as fluorine, chlorine and bromine which have very different properties than these elements. Iron, which resembles cobalt and nickel in properties, has been placed far away from these elements.
- With the discovery of noble gases, the Law of Octaves became irrelevant.
- Thus, Newlands' Law of Octaves worked well with lighter elements only.