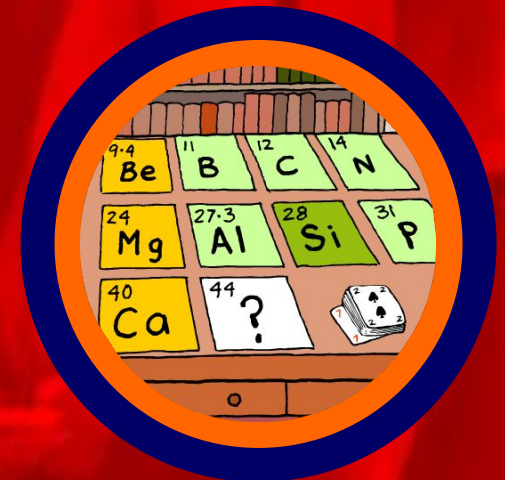

Periodic Classification of Elements



Johann Dobereiner



Dobereiner



1829 - His theory of **triads**



He noticed that certain elements in groups of 3 had similar physical & chemical properties with the atomic weight of the middle element being halfway between the other two.

He called such a group of elements a triad.



John Newlands



John Newlands

Law of octaves

He arranged the elements in order of increasing atomic weight

H	Li	Be	B	C	N	O
F	Na	Mg	Al	Si	P	S

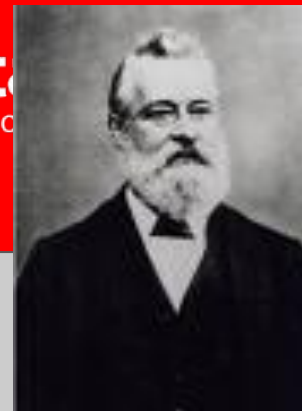
Newlands



Every **8th** known element had similar physical & chemical properties.



Newlands -1864



H
Li
Be
B
C
N
O
F
Na
Mg
Al
Si
P
S
Cl
K
Ca
Cr
Ti
Mn

Newland arranged all of the known elements in order of increasing atomic weight and he noticed the chemical and physical properties of the elements repeated with every 8th element.

Newlands Octaves

- The problem is that after Calcium the pattern starts to break down.
- Although Newland had the right idea, some of the elements hadn't been discovered yet and this caused elements to be forced into the wrong group!

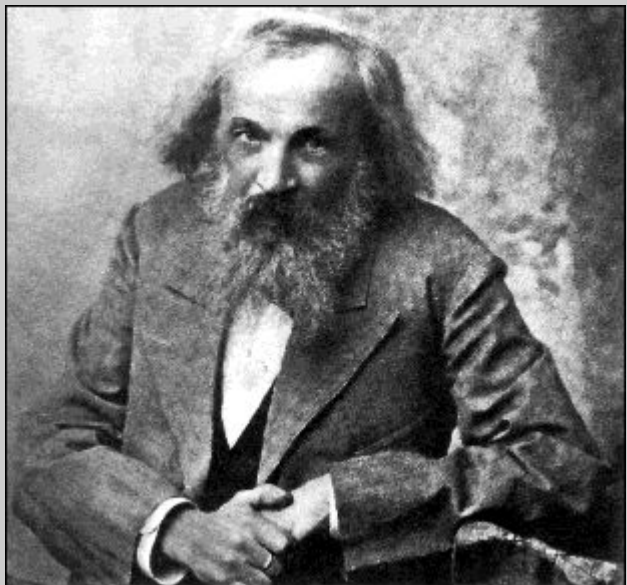
H	Li	Be	B	C	N	O
F	Na	Mg	Al	Si	P	S
Cl	K	Ca	Cr	Ti	Mn	Fe

Mendeleev's periodic table

Mendeleev created the first periodic table by grouping together elements in a certain way.



Dmitri Mendeleev



Mendeleev

1869 – He drew up the first periodic table of the known elements of his time by arranging the elements in order of **increasing atomic weight.**

He noticed repeating patterns which lead him to make very accurate predictions about undiscovered elements.

The differences in Mendeleev's table and the modern periodic table

1. Mendeleev's table was arranged in order of increasing atomic mass. Modern table is arranged in order of increasing atomic number.
2. In Mendeleev's table the noble gases are not included in the modern Table they are.
3. There are gaps in Mendeleev's table but there are none in the modern periodic table as they have been discovered..



State two ways in which Mendeleev's periodic table of the elements differs from that of Moseley.

Watch online



Dobereiner's Principle:

<https://www.youtube.com/watch?v=tQXHIIUoVO4>

Newland's Law of Octaves-

https://www.youtube.com/watch?v=q_k8T78pb0w

Mendeleev's Periodic table

<https://www.youtube.com/watch?v=gJ-1QOd4fUk>

Some Fun time when online



How to remember Periodic table:

<https://www.youtube.com/watch?v=91tewU31Fgg>

Some Imp Questions...

Choose the correct option and rewrite the statement.

a. The number of electrons in the outermost shell of alkali metals is

(i) 1 (ii) 2 (iii) 3 (iv) 7

Ans- The number of electrons in the outermost shell of alkali metals is **1**.

b. Alkaline earth metals have valency 2. This means that their position in the modern periodic table is in

(i) Group 2 (ii) Group 16 (iii) Period 2 (iv) d-block

Ans Alkaline earth metals have valency 2. This means that their position in the modern periodic table is in **group2**.

c. Molecular formula of the chloride of an element X is XCl. This compound is a solid having high melting point. Which of the following elements be present in the same group as X.

(i) Na (ii) Mg (iii) Al (iv) Si

Ans. Molecular formula of the chloride of an element X is XCl. This compound is a solid having high melting point. An element to be present in the same group as X is **Na**.

Some Imp Questions...

d. In which block of the modern periodic table are the nonmetals found?

(i) s-block (ii) p-block (iii) d-block (iv) f-block

Ans. In **p-block** of the modern periodic table are the nonmetals found.

Question

An element has its electron configuration as 2, 8, 2. Now answer the following question.

a. What is the atomic number of this element?- 12.

b. What is the group of this element?- second

c. To which period does this element belong?- third

d. With which of the following elements would this element resemble? (Atomic numbers are given in the brackets)

N(7), Be(4), Ar(18), Cl(17)- Be(2).

Some Imp Questions...

1. ${}_{1}\text{H}$, ${}_{7}\text{N}$, ${}_{20}\text{Ca}$, ${}_{16}\text{S}$, ${}_{4}\text{Be}$, ${}_{18}\text{Ar}$ Which of these elements belong to the second group?

b. ${}_{1}\text{H}$, ${}_{7}\text{N}$, ${}_{20}\text{Ca}$, ${}_{16}\text{S}$, ${}_{4}\text{Be}$, ${}_{18}\text{Ar}$

Electronic configuration of the following elements is:

${}_{1}\text{H} = 1$

${}_{7}\text{N} = 2,5$

${}_{20}\text{Ca} = 2,8,8,2$

${}_{16}\text{S} = 2,8,6$

${}_{4}\text{Be} = 2,2$

${}_{18}\text{Ar} = 2,8,8$

${}_{20}\text{Ca}$, ${}_{4}\text{Be}$ belong to second group because these elements have 2 electrons in its outermost shell.

Some Imp Questions...

$_{11}\text{Na}$, $_{15}\text{P}$, $_{17}\text{Cl}$, $_{14}\text{Si}$, $_{12}\text{Mg}$ Which of these has largest atoms?

Answer

e. $_{11}\text{Na}$, $_{15}\text{P}$, $_{17}\text{Cl}$, $_{14}\text{Si}$, $_{12}\text{Mg}$

Electronic configuration of the following elements is:

$_{11}\text{Na} = 2,8,1$

$_{15}\text{P} = 2,8,5$

$_{17}\text{Cl} = 2,8,7$

$_{14}\text{Si} = 2,8,4$

$_{12}\text{Mg} = 2,8,2$

$_{11}\text{Na}$ has largest size among these because according to the trend, atomic radius decreases as we move from left to right in a period of the periodic table. The atomic number of elements increases which means the number of protons and electrons in the atoms increases. Due to large positive charge on the nucleus, the electrons are pulled closer to the nucleus and the size of atom decreases.

Some Imp Questions...

${}_{19}\text{K}$, ${}_{3}\text{Li}$, ${}_{11}\text{Na}$, ${}_{4}\text{Be}$ Which of these atoms has smallest atomic radius?

Answer

f. ${}_{19}\text{K}$, ${}_{3}\text{Li}$, ${}_{11}\text{Na}$, ${}_{4}\text{Be}$

Electronic configuration of the following elements is:

${}_{19}\text{K} = 2,8,8,1$

${}_{3}\text{Li} = 2,1$

${}_{11}\text{Na} = 2,8,1$

${}_{4}\text{Be} = 2,2$

${}_{4}\text{Be}$ has smallest atomic radius because ${}_{19}\text{K}$, ${}_{3}\text{Li}$, ${}_{11}\text{Na}$ are present in same group 1 but Be is present in group 2. According to the trend, as we move from left to right atomic size of an atoms decreases. Due to large positive charge on the nucleus, the electrons are pulled closer to the nucleus and the size of atom decreases.

Some Imp Questions...

The period with electrons in the shells K, L and M.

Answer

a. The period with electrons in the shells K, L and M = 3 period.

b. The group with valency zero.

Answer

b. The group with valency zero = 18 group.

c. The family of nonmetals having valency one.

Answer

c. The family of nonmetals having valency one = Halogens.

d. The family of metals having valency one.

Answer

d. The family of metals having valency one = Alkali metals.

Some Imp Questions...

e. The family of metals having valency two.

Answer

e. The family of metals having valency two = Alkaline earth metals.

f. The metalloids in the second and third periods.

Answer

f. The metalloids in the second and third periods = Boron(second period), Silicon (third period)

g. Nonmetals in the third period.

Answer

g. Nonmetals in the third period = Sulphur, Chlorine

h. Two elements having valency 4.

Answer

h. Two elements having valency 4 = Carbon, Silicon

Some Imp Questions...

The atom having the smallest size = Hydrogen (H)

b. The atom having the smallest atomic mass = Hydrogen (H)

c. The most electronegative atom = Fluorine (F)

d. The noble gas with the smallest atomic radius = Helium (He)

e. The most reactive nonmetal = Fluorine (F)