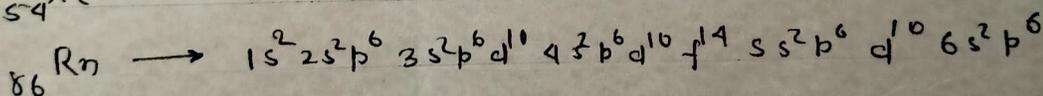
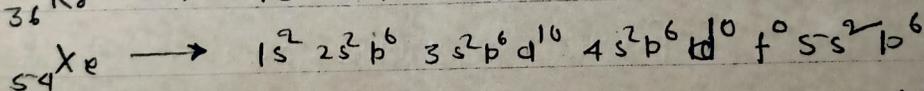
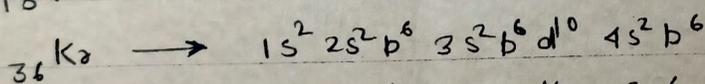
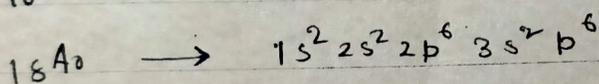
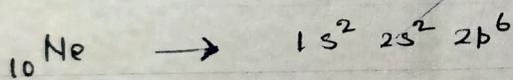


Elements of '0' group.

Noble gases: →

Introduction: → Noble gas comprises of helium, Neon, Argon, Krypton, Xenon and Radium. All these gases except Radium are present in atmosphere except Radium. Radium results from disintegration of radium and radioactive at self.

The At. No of these elements are 2, 10, 18, 36, 54 and 86. The electronic configuration of these gases are given below.



From electronic configuration it is evident that all element except He have $ns^2 p^6$ outer electronic configuration, i.e. have do not consist valence electron due to this they are unable to react with other element or they are chemically inert, But modern ^{researcher} ^{researches} have proved that some inert gases also forms chemical compounds. Fluorides of Xenon among them are very important. Now, it is not reasonable to call these gases "inert", Now these gases are called noble gases. —

Position in Periodic table :->

Mendeleev had not left any blank space for the noble gases in his periodic table. Although he had left some space for several other elements which were not known at that time. The reason was that he could not imagine about the inert elements.

Ramsay, the discoverer of these gases, introduced a new group of these elements. This group is called Zero group.

Taking into view the atomic number of these elements, the Zero group is placed after the 7th group and before the first group i.e. between the most electronegative halogens and the most electropositive alkali metals.

Position of Noble gases w.r. to At. No.

Electronegative Halogens monovalent	Noble gases Zero valent	Electropositive alkali metals monovalent
F = 9	He = 2	Li = 3
Cl = 17	Ne = 10	Na = 11
Br = 35	Ar = 18	K = 19
I = 53	Kr = 36	Rb = 37
At = 85	Xe = 54	Cs = 55
	Rn = 86	Fr = 87

Occurrence → Noble gases occur in minute proportion in Atmosphere, Rn is obtained in radio-active disintegration of radium and it is radio active itself.

Helium being lighter of all the rare gases is found in the outer zone of Atmosphere.

Helium also occurs in

(i) **Natural gas** → Helium occurs up to 7% in certain natural hydrocarbon gases, out from the wells of U.S.A.

(ii) **Minerals** → In small quantities, it occurs in a variety of minerals such as cleveite, monazite, Pitchblend.

(iii) **Sun's Atmosphere** → It is believed that helium is present in large amount in sun's atmosphere.

History of discovery of Noble gases →

Helium → In 1868 Lockyer observed a bright yellow line near D_1 and D_2 lines of Sodium in a solar spectrum during a total eclipse. This line could not be attributed to any known element at that time. Lockyer called it D_3 line and concluded that this is due to the presence of a new element in the sun. He called this element 'Helium' (in Greek Helios meaning sun). 20 years later, Hillbrand observed that Uranium minerals like cleveite and monazite

gave off, on heating, a gas which he supposed to be nitrogen. He called it nitrogen which had been discovered by Lavoisier in 1781. Ramsay was thus the first to find Helium on the earth.

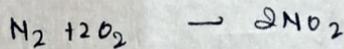
Discovery of Argon, Neon, and Krypton

The history of discovery of these gases starts with the experiment of Cavendish.

He passed electric sparks in a mixture

of dry air from CO_2 in excess of oxygen.

His idea was to complete conversion of N_2 into NO_2 by the reaction.



He observed the results

Nitrogen dioxide (NO_2) and the unused

Oxygen in Potassium Pentasulphide. There should

have been no residual gas left. But he found

that $\frac{1}{120}$ th of the volume of the original

volume was not soluble. Cavendish considered

conceived this small volume to be unreacted

nitrogen and left the experiment as such. The

real explanation came about 100 years later.

In 1894, i.e. after 109 years

of Cavendish experiment, Lord Rayleigh found

that density of Nitrogen obtained from atmosphere

is greater than that of the density prepared

in laboratory. The difference in density is

very minute. Several investigators observed

this discrepancy, but they neglected it.

Rayleigh took this discrepancy carefully

and repeated his experiment several times

and each time he found the same result.

On the basis of his observations, he concluded
that nitrogen obtained from atmosphere contains
some heavier elements other than nitrogen.

Royce then worked in
collaboration with Ramsay. He improved
the earlier experiments of Cavendish. They
showed that residual gas left after the
complete conversion of H_2 into Nitrogen dioxide was
heavier than nitrogen. Its V.D. was found
to be $20\frac{1}{2}$ as against V.D. of Hydrogen
gas, where as V.D. of Nitrogen or hydrogen
is 14.

The residual gas was also examined
spectroscopically and found to be unknown gas.
This gas was found to be chemically inert
and it was called Argon.

Ramsay and Travers

Argon, to be, in reality, a mixture
of a number of similar constituents gases.
Ramsay and Travers convinced them that
this was actually so. They continued their
work for several years during which they
carefully and repeatedly distilled the
liquefied argon gas. The first fraction
was found to contain a new element -
which they named Neon. Its spectrum
established its identity as a rare element.