Argon →

(1) Argon is used in filling electric bulbs.

(2) It is used in discharge tube for illumination purposes.

(3) It is chiefly used in welding and other operations which require absence of nitrogen as well as a non oxidising atmosphere.

Kr and Xe → Kr and Xe are also used in filling electric bulbs. Modern researches have shown that these gases are superior to Argon for this purpose.

Rn → Radon has not found any important industrial operation. However, it has been used in the treatment of Cancer. It is also getting some importance in radioactive research.

COMPOUNDS OF Noble Gases : →

The noble gases have most stable s^2p^6 outer shell electronic configuration. Due to this these gases ordinarily do not take part in a chemical reaction. Previously noble gases were assumed to be completely inert ~~gases~~ but modern researches have proved that some heavier noble gases undergo into chemical combination.

Compounds Known before 1962 → Before 1962 a very few chemical compounds of noble gases were known. Some of them has been discussed here.

Hydrates → Hydrates are formed by compressing the gases with water. When noble gases are

Uses of Noble gases → There are several ap... of Noble gases.

Application of Helium →

(i) Helium is used in filling air ship... weather balloons. Although it is twice heavy ... (ii) Helium - oxygen mixtures are used ... respiration in deep sea divings instead ... of air because Helium is much less solu... in blood than nitrogen under high pres...

(iii) Helium has a number of Scientific ... It is used in producing very low tem...

(iv) Helium is used to provide an inert atmosphere in several metallurgical ope... i.e. in the preparation of reactive metal titanium. In the preparation of Mg ...

Application of Neon →

(i) It produces a beautiful orange ... glow when an electric current is p... through it. Under a low pressure 2 cm... This glow is visible even in mist ... for this reason, Neon lights are us... as beacon lights for air pilots. Neon is now extensively used in ... advertising by coloured lights and in fluorescent tubes.

(ii) It has a remarkable property of ... exceedingly high currents when a volt... of the order of 200 volts is applied. It is therefore used in safety devi... for protecting electrical instrument... such as voltameters, relays, ~~rectifiers~~ ...

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The hydrates and deuterates of heavier gases are much more stable. Thus, Xe. $6H_2O$ is the most stable hydrate.

Clathrates or Cage Compounds :→

Noble gases form a number of Compounds in which the gases are trapped within the Cavities of Crystal lattices of certain Organic and inorganic Substances.

Such Compounds are known as Clathrate. These are also Called Cage Compounds.

When quinol (Q-dihydroxy Ben... is allowed to Crystallise form its Solution in water in the presence of heavier noble gas under a pressure of 10 to 40 atmosphere, the atoms of the noble gases get trapped within the lattice of quinol Crystal.

In the other words, the Crystal obtained are not of the quinol but of a Clathrate Compound of the noble gas with quinol. The Crystals are quite stable and can preserve for several years.

However, when heated or dissolved the gas escapes and quinol remains behind as such.

Similarly when water is allowed to freeze in the presence of Argon, Krypton or Xenon, under high pressure, the atoms of the noble gases get trapped in the crystal structure of ice, yilding Clathrate Compounds. —

Compounds discovered after 1962: →

Bartlett in 1962, found that oxygen gas reacts with PtF_6 to give a solid compound of the formula O_2PtF_6. The X-ray examination showed that compound actually consisted of O_2^+ and PtF_6^- ions and could be represented as $O_2^+PtF_6^-$. Since ionisation energy of xenon (250 K-cal) is quite close to that of the oxygen (314 K-cal) it occured to Bartlett that the reaction between xenon and PtF_6 should also be tried. He actually found that reaction occured fairly readily even at room temperature yielding a red solid compound having the composition $XePtF_6$. This was the first real compound of any noble gases.

Ionisation energy of Xe and Kr is comparable with normal non-metals such as Cl, O, N etc. Xenon therefore forms a large number of compounds with ~~Xenon~~ oxygen and fluorine. Krypton comes next. Xe and Kr can combine with strongly electronegative elements.

Xenon combines directly with fluorine. Its compound with oxygen are obtained from fluorides.

Xenon chloride is known but not stable. Only one compound with nitrogen is not but highly unstable.

Some stable compounds of xenon are given here in table.