

# **TDC Part I**

## **Inorganic Chemistry**



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**TOPIC:- Group 18 (Physical properties)**

## Group 18

The elements in Group 18, long designated as the “inert” or “rare” gases, no longer satisfy these labels. They are known to form chemical compounds and are rather abundant. They are better referred to as “noble” gases due to their reluctance to react under normal conditions. This group comprises of helium, neon, argon, krypton, xenon and radon. Apart from radon, which is radioactive, the others are present in the atmosphere.

Helium has two electrons, which forms a complete shell  $1s^2$ . The others have a complete octet of electrons and the configuration is  $ns^2 np^6$ . This configuration is very stable and is related to their un-reactivity. These elements have an electrons affinity of nearly zero and very high ionization energy. Under normal conditions these elements have very little tendency to gain or lose electrons.

Important properties of noble gases are summarized in Table 31.

**Table 31: Physical properties of the Noble Gases**

Property	He	Ne	Ar	Kr	Xe	Rn
Atomic Number	2	10	18	36	54	86
Electronic Configuration	$1s^2$	$[\text{He}]2s^2 2p^6$	$[\text{Ne}]3s^2 3p^6$	$[\text{Ar}]3d^{10} 4s^2 4p^6$	$[\text{Kr}]4d^{10} 5s^2 5p^6$	$[\text{Xe}]4f^{14} 5d^{10} 6s^2 6p^6$
Vander Waal's radius (pm)	-	131	174	189	210	215
Ionization Energy ( $\text{KJmol}^{-1}$ )	2372	2081	1521	1351	1170	1037
Melting Point ( $^{\circ}\text{C}$ )	-	-248.6	-189.4	-157.2	-111.8	-71.0
Boiling Point ( $^{\circ}\text{C}$ )	-268.9	-246.1	-185.9	-153.4	-108.1	18.1

### Physical Properties

The elements exist as colourless, monoatomic gases. Individual atoms are held by weak van der waals forces, hence melting points and boiling points are very low. In fact the boiling point of helium is the lowest of any element.