Answer on Question #55017 – Chemistry – Inorganic Chemistry

Question:

Describe the clathrates of noble gases

Answer:

Chlatrate of noble gases is a substance which consists of noble gas atoms trapped by the lattice of water molecules. These substances are also known as inclusion compounds. For instance, they are formed upon freezing of water in presence of argon or krypton. Helium and Xenon don't form chlatrates with water because of size of atoms (Helium is too small and Xenon is too large to be included into the lattice cavity). Their general formula is $X.5.76H_2O$, where X = Ar, Xe.

In addition some chlatrates of nobel gases known for benzene-1,4-diol ($C_6H_4(OH)_2$):

$X.3C_6H_4(OH)_2$, where X = Ar, Xe, Kr.

These substances are not really compounds, because there are no chemical forces between nobel gas and the atoms of the lattice (cage).[1] Therefore, they dissociate into atoms of nobel gas and water(or another compound which forms the cage) upon heating:

$X.5.76H_2O \rightarrow X + 5.76\ H_2O$

[1] C. Chambers, A.K. Holliday, *Modern Inorganic Chemistry,* Butterworth & Co (Publishers) Ltd 1975.