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C60 behaves chemically like an electron deficientalkene, since it has sp2carbon atoms but tends to avoid double bonds in the pentagonal rings, whichcauses poor electron delocalisation throughout the molecule. This means that C60behaves chemically like an electron deficient alkene and can take placein addition reaction; like the addition of the O-Os-O unit across 2 fused six-memberedrings 1. addition reactions to metal atoms and ions have been ofparticular interest. The fullerene C60 offers a range of bondingmodes to metal ions, although there's no evidence to show whether a metal atomcould become part of the cage structure.

Buckminsterfullerene has an icosahedral symmetry closed cagestructure and is made up of 60 trivalent sp2carbon atoms that form finite cages with 20 hexagons and 12 non-adjacentpentagons. This structure of C60 cannot be directly confirmed byX-ray crystallography because although the molecules stack readily enough, theyrotate at room temperature due to their nearly spherical symmetry. Theresultant disorder means that the atomic positions can't be shown in a X-raycrystallography spectrum 1. Instead, the structure was confirmed byobserving the structure of the first fullerene derivative synthesised – C60(OsO4)1.

This derivative has also been used to determine the ratio of 13C: 12Cwithin C60(OsO4) when the C60 has beenpartially enriched with 13C. Taking a13C NMR spectrum of C60by itself would only give a single peak and show no coupling 1. This changed in 1990, when Krätschmer, Huffman, et al. managed to produce C60 in macroscopic quantities by producing an arcacross two graphite electrodes at about 3500oC under a low pressureof He gas. In the mass spectra taken of the soot, aside from C60 andits fragment ions, the existence of C70, the second most abundantall-carbon molecule after C60, was also discovered.

Aside from the Krätschmer-Huffmanmethod for synthesising fullerenes there are other methods such as burning the graphitein a furnace, using negative ion/desorption chemical ionisation techniques, using a benzene flame, etc. 2 However, the Krätschmer-Huffmanmethod is still the most commonly used. Pure C60 was isolated fromthe soot later in 1990 by column chromatography. The process has been refinedto provide a higher yield of C60 by using two separate stepsFirstly, all Fullerenes are extracted from the soot using a Soxhlet extractorwith a solvent like Toluene; after that C60 was isolated from theother fullerenes like C70 via column chromatography 2. A new allotrope of carbon called Buckminsterfullerene C60was first discovered in 1985 by Kroto, Smalley, et al. who recognised its existencewhen they observed an unusually intense 720 m/e peak in the mass spectra ofsoot produced when graphite was vaporised into a soot by a laser in a Heatmosphere.

Due to this discovery, Curl, Kroto and Smalley were awarded the1996 Nobel Prize in Chemistry. The scientific community was eager to investigatethe structure and properties of the molecule further; however, they were unableto as C60 had only been found in microscopic quantities.