A carbene (also known as a carbenoid) is a species that has a formally neutral carbon atom bearing two nonbonded valence electrons. A carbene has the following general structural formula.

\[ R^1\cdots C \cdots R^2 \]

R1 and R2 could be any ligand

eg:

\[ :CH_2 \quad \quad \quad :CCl_2 \]

A carbene could exist in two spin states: singlet carbene and triplet carbene. In a singlet carbene, the two nonbonded valence electrons in the electron-deficient carbon are in the same orbital, i.e., they are a lone pair.

![Singlet carbene diagram](image)

In a triplet carbene, the two nonbonded valence electrons in the electron-deficient carbon are in different orbitals. Since a triplet carbene has unpaired electrons, it is, by definition, a radical.

![Triplet carbene diagram](image)

see also carbene equivalent, nitrene

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**Contributors**

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