Photolysis and thermolysis of diazirines have been widely used to produce carbene. And, diazirines have recently been acted as photoaffinity reagents to investigate the organization in the area of biological chemistry. Presently, three elementary processes are known in the photolysis of diazirines, the production of carbene, the production of a diazo compound, and the rearrangement in the exited state (RIES) of diazirine. On the other hand, it has been reported that C₆₀ fullerenes react with carbene to yield methanofullerene and with diazomethane to fulleroid. These differences might be useful in differentiating whether carbene or diazo compound is involved as the reactive intermediate. In the context, we have carried out the photolysis and the thermolysis of several diazirines in the presence of C₆₀. We also performed calculations on the energetics of the thermolysis of diazirines.

Our study indicated that C₆₀ can be used as a probe to distinguish carbene and diazo compound during the photolysis and the thermolysis of diazirines by determining the isomeric ratio of the formed methanofullerene and fulleroid. This C₆₀ probe method can show not only the partitioning of carbene/diazo, but also the rearrangement process of diazirines.

References