

# Diamondoid Molecules

By:

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## Abstract

Diamondoids have been of great interest in recent years due to their role in nanotechnology, drug-delivery and medicine. In this review paper we introduce at first the cage nature of diamondoid molecules (polymantanes, adamantologues), the variety of their crystalline lattice structures, the nature of their structural isomers, their stereoisomers, and their other molecular specificities are presented. The carbon-carbon framework of diamondoids constitutes the fundamental repeating unit in the diamond lattice structure. It is demonstrated that diamondoids are very stable compounds.

The unique physicochemical properties of diamondoids due to their exceptional atomic arrangements including their melting points, molar enthalpies, molar entropies, molar heat capacities, vapor pressures and other phase transitions and solubilities data are reported and analyzed.

The Lewis acid-catalyzed rearrangement of hydrocarbons to synthesize lower diamondoids is presented and its limitations for the synthesis of higher diamondoids are discussed.

The natural occurrence of diamondoids in petroleum fluids and how they come to be present in such fluids is introduced. Field experiences of phase transitions and depositions as well as techniques for separation, detection and measurement of diamondoids from petroleum fluids is presented and discussed..

It is demonstrated that due to their six or more linking groups diamondoids have found major applications as templates and as molecular building blocks in polymers synthesis, nanotechnology, drug delivery, drug targeting, DNA directed assembly, DNA-amino acid nanostructure formation and in host-guest chemistry.