
The Euler theorem for molecular structure studies: cases of fullerene-like nanoparticles of carbon and inorganic compounds

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It is well known that molecular structures for the entire family of carbon molecules in the shape of convex polyhedra consisting only of hexagonal and pentagonal faces (fullerenes) can be precisely described on the basis of the Leonhard Euler's theorem on the relation between the numbers of faces, vertices and edges in polyhedra. We will demonstrate how to apply the generalized Euler relation for analysis of wide variety of fullerene-like structures of carbon (nanotori, schwarzites, quasi-spherical and polyhedral nano-onions, etc) and inorganic compounds (MoS₂, WS₂, Cz₂O). The analysis is discussed in a historical context and in comparison with the published experimental results.