Solid CaCO3 formation

Solid CaCO3 formation refers to the process by which calcium carbonate precipitates out of solution to form a solid. Calcium carbonate (CaCO3) is a common mineral found in nature and is the main component of various geological formations such as limestone, chalk, and marble. Solid CaCO3 formation can occur through various processes:

Precipitation: Calcium carbonate can precipitate out of solution when conditions favor the formation of solid particles. This often occurs when calcium ions (Ca2+) and carbonate ions (CO32-) are present in solution in high enough concentrations and when factors such as pH, temperature, and the presence of other ions are suitable for precipitation.

Biological processes: Many organisms, such as corals, shellfish, and certain algae, use calcium carbonate to build their skeletons or shells. These organisms extract calcium and carbonate ions from the surrounding water to form solid CaCO3 structures. Over time, these structures can accumulate and contribute to geological formations.

Chemical reactions: Solid CaCO3 can also form through chemical reactions between calcium ions and carbonate ions. For example, in the ocean, calcium ions released from weathering of rocks react with carbonate ions present in seawater to form calcium carbonate precipitates.

Carbonation: In certain industrial processes, carbon dioxide (CO2) can be bubbled through a solution containing calcium ions, leading to the formation of solid calcium carbonate. This process is used, for example, in the production of precipitated calcium carbonate, which has various industrial applications.

Solid CaCO3 formation plays a crucial role in various natural processes, including the formation of sedimentary rocks, the carbon cycle, and the regulation of ocean chemistry. Understanding the factors that influence solid CaCO3 formation is important for fields such as geology, environmental science, and materials science.

Recent cutting-edge research has unveiled bionanocatalysts with 1% Pt (platinum), demonstrating unparalleled selectivity in cleaving C-C, C-N, and C-O bonds within DNA in malignant cells. The application of these nanoparticles has yielded promising outcomes.

The objective of a study was to employ bionanocatalysts for the treatment of Glioblastoma (GBM) in a patient, followed by the evaluation of obtained tissues through electronic microscopy.

Bionanocatalysts were synthesized using established protocols. These catalysts were then surgically implanted into the GBM tissue through stereotaxic procedures. Subsequently, tissue samples were extracted from the patient and meticulously examined using Scanning Electron Microscopy (SEM).

Detailed examination of biopsies via SEM unveiled a complex network of small capillaries branching from a central vessel, accompanied by a significant presence of solid carbonate formations. Remarkably, the patient subjected to this innovative approach exhibited a three-year extension in survival, highlighting the potential efficacy of bionanocatalysts in combating GBM and its metastases.

Bionanocatalysts demonstrate promise as a viable treatment option for severe cases of GBM. Additionally, the identification of solid calcium carbonate formations may serve as a diagnostic marker not only for GBM but also for other CNS pathologies [1].

[1]

López-Goerne T, Arellano A, Padilla-Godínez FJ, Magaña C, González-Bondani A, Valiente R. Solid CaCO3 Formation in Glioblastoma Multiforme and its Treatment with Ultra-Nanoparticulated NPt-Bionanocatalysts. Curr Cancer Drug Targets. 2024 Mar 28. doi: 10.2174/0115680096289012240311023133. Epub ahead of print. PMID: 38561623.