

# Nanoformulation of *Calcarea Carb* and *Ocimum sanctum*

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## Abstract

**Background:** Homeopathy is a two-century old factual system of healing. It was conceived by a German physician Samuel Hahnemann in 1796. The substance that reasons signs and symptoms of a disorder in healthy humans can cure alike symptoms in ill humans; this principle is known as *similia similibus curentur*, or "like cures like". The sources of homoeopathic medicines are herbs, animal or animal products, minerals, diseased tissues, healthy tissues and imponderables (energy sources) and are prepared through potentization, serial dilutions are performed with strong strokes at each step of dilution.

**Aim:** To investigate the nanoscience mechanisms of action of homeopathic medicine *Calcarea carb* ( $\text{CaCO}_3$ ) and *Tulsi* (*Ocimum sanctum*).

**Conclusion:** As per article "Homeopathy emerging as nanomedicine" homeopathy can be represented as nanomedicine with further research. During the violent strokes of potentization, information arising from the serially diluted starting-substance can be encrypt by nanoparticles present in the resulting homeopathic medicine. The size of the information encrypted on nanoparticles might differ with the degree of dilution. Homeopathic medicines exhibit healing effects, these nanoparticles might carry the information - which biological systems are able to identify - to the target. As numerous kinds of debris are recognized to have interaction with proteins and cells of the immune machine, homeopathy would possibly constitute a nanomedicine machine.

**Keywords:**  $\text{CaCO}_3$  • Nanoparticle • *Ocimum sanctum* • Nanomedicine

## Introduction

*Calcarea carbonica* is a homeopathic medicine created from the middle layer of shells. In chemical terms, *Calcarea carbonica* is adulterated calcium carbonate,  $\text{CaCO}_3$ . *Calcarea carbonica* ought to be prepared by a process called trituration. Triturated material is granulated until it is minimize to a fine powder. Calcium carbonate ( $\text{CaCO}_3$ ) has vast utilizations overdue to its availability, low cost, safety, biocompatibility, pH-sensitivity & slow biodegradability.  $\text{CaCO}_3$  nanoparticles have propitious potential as drug carriers targeting cancer tissues and cells. The pH-dependent properties, collaborating the potential to be functionalized with targeting agents give them the unique property that can be used for aimed delivery systems for anticancer drugs. The steady breakdown of  $\text{CaCO}_3$  matrices, these nanoparticles can be used as sustained release systems to hang on to drugs in cancer tissues for longer times after administration. The present state of  $\text{CaCO}_3$  nanoparticles as cancer drug delivery systems with focus on their special properties like acid-base sensitivity and bio-degradability has also been estimated [1].

*Calcarea carbonica* administration to Ehrlich's ascites carcinoma (EAC)- and Sarcoma-180 (S-180)-bearing Swiss albino mice resulted in 30-35% tumor cell apoptosis; it failed to induce any significant cell death in *ex vivo* conditions. These results produce us to examine whether *Calcarea carbonica* engaged the immuno-modulatory circuit in maintaining its anti-tumor effects. *Calcarea carbonica* prevented tumor-induced losing of effector T cell repertoire, reversed type-2 cytokine bias and lessened tumor-induced inhibition of T cell that spread

in tumor-bearing host. To accept the role of the immune system in *Calcarea carbonica*-induced cancer cell death, a battery of cancer cells were customs with *Calcarea carbonica*-primed T cells [2].

The metal upon singular treatment processes gets converted to a bio-assimilable and nontoxic form. Naga bhasma (lead sulphide ash), Swarnabhasma (gold ash probably in nano form), Kapardikabhasma (Kapardika ash probably in nano form) and Ba-pao-neu-hwang-san (a Chinese traditional ash) are examples of traditional herbo-metallic preparations contained metals and several herbal ingredients, used as oral medicines for treatment of diabetes, enlargement of spleen, diarrhea, skin diseases, regulating blood strain and aches. The nano-particles blend were surface alter by stearic acid. An important operating variable in the Span 80-Tween 80/toluene/water reverse micro-emulsion system, the  $\phi$ -value (water/surfactant molar ratio) was investigated. The material was identified by SEM, TEM, X-Ray Diffraction (XRD), FT-IR, UV-VIS and TGA/DTA techniques. The dimension of the nano-particles was set on by TEM as well as XRD data for various concentrations of surfactants. The results showed that the size of the nano-particles was influenced by the concentration of the surfactants in the micro-emulsion system. The XRD analysis at room temperature appeared single phase formation of calcite. The results of the UV-VIS spectrophotometry analysis indicated that the calcite ( $\text{CaCO}_3$ ) is an indirect gap material [(5.60 eV (30 wt.% surfactant), 5.40 eV (36 wt.% surfactant) and 5.36 eV (42 wt.% surfactant)] at room temperature. Particles have peculiar quality when their crystal sizes are reduced to submicron range with respect to equivalent bulk materials, including prominent optical properties, high specific surface area and chemical activity and superior barrier effects in polymer matrix [3].

Nano-particles of calcium carbonate have received much attention due to its widely used in the areas of polymers, paints, plastics, rubber etc. Calcium carbonate ( $\text{CaCO}_3$ ) nanoparticles (<100 nm) have shown many unique properties compared to regular  $\text{CaCO}_3$  particles (>3  $\mu\text{m}$ ). Thus, fine particles of  $\text{CaCO}_3$  with distinct morphology are used for specific applications. They studied the application of  $\text{CaCO}_3$  nano-particles as additives in lubricating oils and found that they exhibited good load-carrying capacity and friction-reducing properties. Due to the extensive ranging application of nano-sized calcium carbonate, strategy to synthesize calcium carbonate with particle size below 1  $\mu\text{m}$  has been an engrossing research topic. There are several methods for generating nano-sized calcium carbonate, among which the carbonation

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process to prepare precipitated calcium carbonate is a reasonable one [4].

## Experimental Section

### Materials & methods

CaCO<sub>3</sub> particles (99.95%) with an average size of 2 μm, Na<sub>2</sub>CO<sub>3</sub> (99.999%), middle layer of oyster shell, alcohol were all from Merck Company, Germany.

### Synthesis of nanocalcerea carb particles using homeopathic technique

In this study, the chemical preparation technique has been used to synthesize nano-sized calcerea carb. The structural and morphological properties of synthesized powder were characterized by XRD, SEM and TEM. The Thermal decomposition behavior of the powder was studied by TGA/DTA.

Three different sizes of surface modified nano-calcerea carb (CaCO<sub>3</sub>) particles were synthesized using reverse micro-emulsion technique, characterized by TEM and determined as 39, The X-Ray Diffraction (XRD) analysis at room temperature showed single phase formation of calcite. The particle size estimated were found to be ~40 nm (30 wt.% surfactant), ~33 nm (36 wt.% surfactant) and ~21 nm (42 wt.% surfactant), using Scherer's formula. Based on these observations, it may be concluded that by increasing the concentration of surfactants the water-surfactant molar ratio decreases and resulting in the decrease of the size of the synthesized nano-particles [5].

### Chemical symbol: CaCO<sub>3</sub>

**Common name:** Carbonate of lime; impure carbonate of lime.

**Synonyms:** Calcarea carbonate of Hahnemann; Calcium carbonate of Hahnemann; Oyster shell.

**Description:** it is a fine white micro-crystalline powder, tasteless and odorless, almost insoluble in water, becomes slightly soluble in water containing carbon dioxide.

**Hahnemannian technique of preparation:** The drug substance which was used by the Hahnemann was an impure carbonate of lime, as it exists in the oyster shell.

Clean, well-selected thick oyster shell is taken and broken into small pieces in a wedgewood or porcelain mortar. The inner snow white portions are carefully selected, next washed continuously with purified water, dried over a water bath and powdered to a fine state.

### Preparations:

Triturations: IX and upwards

Dilutions: decimal and centesimal scale.

The preparations are made as directed under Class VII in Homeopathic Pharmacy.

**Procedure:** Centesimal Scale: one part by weight of the medical substance to 99 parts by weight of sugar of milk gives the first trituration. All the following triturations are prepared with one grain of the preceding trituration to 99 grain of sugar of milk.

Decimal scale: one part by weight of medicinal substance to 9 parts by weight of sugar of milk, gives 1<sup>st</sup> trituration. All following triturations are prepared with one grain of the preceding trituration to 9 grain of sugar of milk [6].

## Results and Discussion

### XRD analysis

Typical powder X-Ray Diffraction (XRD) patterns of surface modified nano particles CaCO<sub>3</sub>. The lattice parameters calculated from the XRD patterns are a=4.813 Å and c=17.10 Å for all samples which are close to the values

reported by Roeges in 1994 [7,8]. The maximum deviation that occurred between the observed and calculated values of inters planar spacing remains below 0.1022.

### TEM characterizations

The size and morphology of coated and surface modified nanoparticles analyzed by TEM are presented in Figure 1. These images reveal that most of the coated CaCO<sub>3</sub> nanoparticles are quasi-spherical and have rough surface. Many aggregates can be seen. The nanoparticles have strong tendency to form agglomerates due to their high surface energy which is a result of the small particle size [9]. Because of the aggregate nature of these nano-particles, it is difficult to determine the primary particle size precisely. The primary particles size was determined by measuring the size of randomly chosen particles of 39 nm (30 wt.% surfactant). The results are in accordance with the value calculated from the X-ray diffraction (Figures 1-3).

Homeopathically-made nanoparticles would commence adaptive changes in an organisms a complex adaptive system (CAS). Manufacturing parameters inclusive of dilution adjust sizes, shapes and floor expenses of nanoparticles, thereby inflicting variations in physico-chemical houses and organic results. Based on floor area, size, shape and charge, nanoparticles adsorb a complicated sample of serum proteins, forming a protein corona on touch that constitutes a completely unique organic identity.

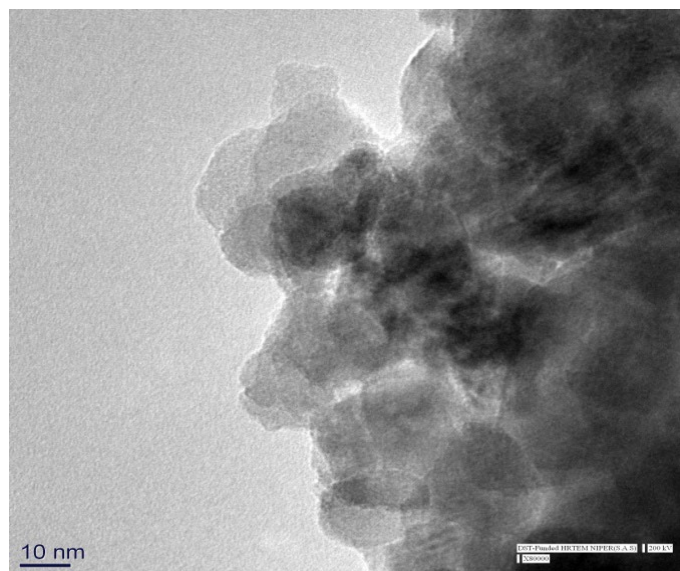


Figure 1. Transmission Electron microscopy of the calceria carb nanoparticles.

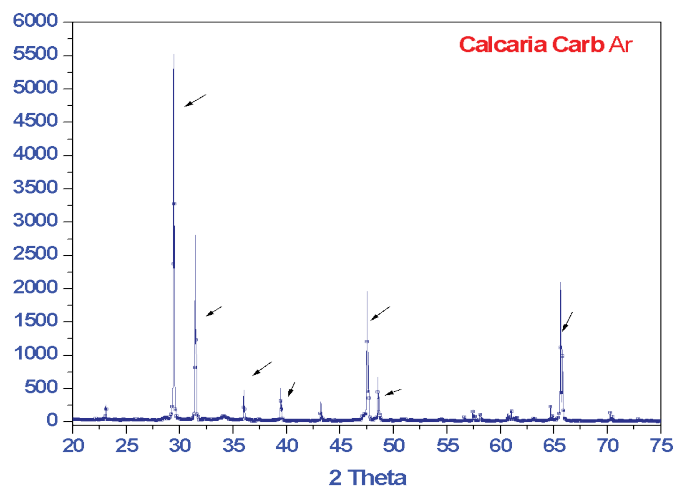


Figure 2. Energy-dispersive X- ray (EDX) analysis of the selected area using carbon coated copper grid for homeopathic medicine Calcarea carb 15cH showing high silicon content.

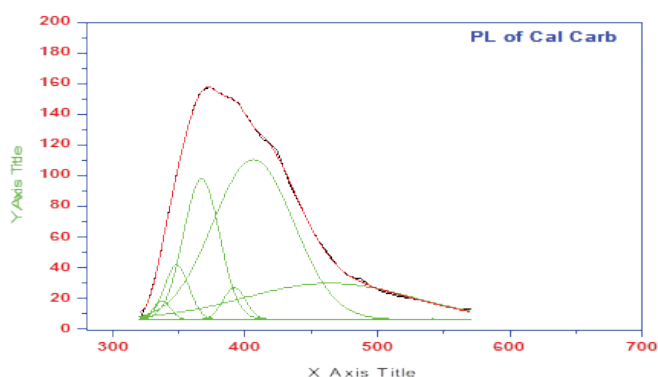


Figure 3. PL of Calcarea carbonica.

Researchers in every form of nonlinear adaptive phenomenon, SR, TDS/oscillation and hormesis, have independently postulated that the frame perceives the environmental agent or stressor as a danger or threat to survival. The organic and behavioral responses might replicate the adaptive efforts of the organism to throw off or keep away from present day threats or prepare for destiny threats from the identical or a cross-tailored agent or stressor. Nature makes use of those phenomena in dwelling structures to optimize possibilities of survival with inside the face of environmental modifications and challenge. For the nanoparticles in HMs to provoke adaptive extra dewithin side the organism, the supply material's houses need to be salient as a threat sign for the particular organic records and adaptive capability of that person recipient.

Nano scale varieties of substances are extra bio to be had and stronger at a decrease dose. Different styles and sizes of nanoparticles with unique floor costs will exert unique results thru whole lot of mechanisms. These mechanisms might encompass traditional ligand-receptor interactions in addition to electromagnetic, optical and quantum mechanical houses. The more than one variable that has an effect on NP production tactics will in the end have an effect on the character and first-class of the particular sign records that a given dose of HM can speak to the frame. Serum protein patterns, sickness associated organic mediators and the nonlinear dynamical kingdom of the organism on the time of administration, might all make a contribution to the emergent results of the treatment dose at the person. Subtle variations in NP size form and floor houses will modify organic results [10].

The crudeness of the 200-year-vintage homeopathic production strategies for grinding, milling and agitating HM re-assets produces many abnormal sizes, shapes, floor roughness with defects and floor nanopatterning of nanoparticles. This structural crudeness on the nano scale might also additionally emerge as a scientific benefit for HMs over present day, round homogeneous NPs as exogenous threat indicators to provoke organic adaptation. Increased roughness and irregularity of nanoparticle surfaces confers more floor vicinity and will increase the chance that the frame will apprehend homeopathic NPs as over-seas threat indicators or novel organic threats from the environment.

Nano science research display that such particle irregularities, floor roughness and defects generate more floor vicinity and organic sign houses for the mobileular threat detection pathways than do the extra uniform debris made with present daystate-of-the-art nanotechnology strategies. For example, nanoparticles mimicking the hard floor topography of viruses (which can be inherently nano-sized) are taken up higher than with the aid of using cells than are NPs with extra everyday surfaces. Arrays of non-equal NPs also area bleto dependable SR amplification in version structures.

On the alternative hand, those irregularities in the course of homeopathic production might also additionally hold to make it tough for researchers to reliably reproduce results in experimental settings. Evaluating information of producing parameters within side the laboratory putting might also additionally enhance the chance of replications. However, problem in reproducibility is likewise an indicator of nanomaterials in general. It can be the case that the mechanisms underlying the problem in reproducibility can become parable for HMs and NPs [11-13].

In conclusion, residing structures are able to detecting, reacting and adapting to reputedly small nano scale threats that usher in the opportunity of a next large onslaught from the equal agent or stressor. The interplay of nanostructures in HM with the organism as a nonlinear dynamical adaptive gadget offers a workable and integrative medical basis for the way of small indicators of homeopathy can provoke the huge significance recovery tactics that clinicians report.

The target, however, is not likely to be nearby due to the fact homeopathy is rated a holistic remedy assumed to paintings by using the immune system. It is really well worth to statement that numerous kinds of silica are acknowledged to engage with proteins and cells of the immune system. As homeopathic drugs would possibly have each the "size" of the records of the diluted away starting-substance and the companies had to deliver these records - which organic structures are capable of identify - to the target, they will qualify as nanomedicine. Consequently, the nature, composition and floor functions of the crystalline material found in homeopathic drugs in comparison to controls have paramount importance. These should be similarly investigated, whilst preserving a watch additionally on viable electromagnetic emission. This research calls for appropriate trends within side the fields of substances [14,15].

## Conclusion

Homeopathic drugs are very often utilized in medical exercise located now no longer to be "nothing", however exhibited excessive nanoparticle contents. The "size" of statistics is probably associated with the dilution diploma of drugs. Under such feasible conditions, homeopathy qualifies as a nanomedicine gadget now no longer requiring excessive technology. For affirmation and similarly elaboration purposes, new studies in substances and interfacial water are required.

## Acknowledgement

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## Conflict of Interest

No conflict of interest.

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