an antibacterial effective amount of reducing ions, for example, by exchanging interlayer Na^+ ions for Fe^{2+} ions in montmorillonite (methods for accomplishing such exchanges have been described, for example, by Hofstetter et al., 2003); and (3) by reducing cations already present in a clay mineral structure to produce an antibacterial effective amount of a reducing agent, for example, by reducing Fe^{3+} to Fe^{2+} in the octahedral sheet of nontronite using methods that have been described by Stucki et al. (1984).

[0106] Applicants believe that the synthetic bactericidal compositions within the scope of the present invention are effective in topically treating infections and/or skin diseases caused by numerous types of bacteria, including antibiotic-resistant bacteria. Bactericidal compositions within the scope of the present invention were found to have various degrees of bactericidal effectiveness, killing in 24 hours up to 99% of colonies of *Staphylococci* [both *Staphylococci aureus* (MRSA) and *Staphylococci epidermidis], Escherichia coli, Salmonella typhimurium*, and *Pseudomonas aeruginosa.*

[0107] As previously stated, for optimal effectiveness in accordance with the present invention, the reducing agents must be well mixed and evenly dispersed throughout the clay, clay mineral, or material having clay-like property employed.

[0108] One having ordinary skill in the art will recognize the potential advantages of synthesizing and using a composition within the scope of the present invention over the use of natural antibacterial clays. Some advantages may include greater purity and optimization of properties for a targeted use—i.e., optimization of pyrite dissolution rate so as to kill a specific type of bacteria.

[0109] As previously disclosed, one skilled in the art will recognize that a bactericidal effective amount of a reducing agent may be added to any natural clay, regardless as to whether or not that natural clay has natural bactericidal properties, so as to be certain that a composition containing that natural clay is suitable for the purpose intended herein. Prior to the present invention, applicants contend that there was no motivation to add a reducing agent to a clay for the use described herein.

[0110] In addition, the results of applicants' research provides guidance, not previously available, but very long sought, regarding how to identify a natural clay that would be suitable for topically treating bacterial infections. That guidance being that natural clays containing therein a bactericidal amount of a reducing agent, such as pyrite or marcasite, may be suitable for this purpose.

[0111] Although specific reference to pyrite is often used as the reducing agent in describing the invention herein, one having ordinary skill in the art will recognize that it is applicants' intent that the description herein not be so limited. Specific reference in the description to pyrite is made for exemplary purposes only. The description applies to use of the other identified reducing agents as well.

[0112] While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the art that changes and modifications may be made without departing from this invention. Therefore, it is intended that the claims herein are to include all such obvious changes and modifications as fall within the true spirit and scope of this invention.

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