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Preparation of MgO and CaO nanoparticles for neutralization of mustard chemical warfare

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Nano-sized metal oxides are absorbents of pollutants. They react with toxic chemical. Magnesium oxide nanoparticles are used in dehalogenation of industrial wastes. MgO nanocrystals are used as catalyst in many chemical reactions.

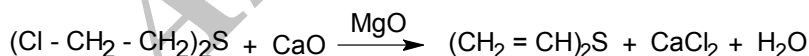
In this research work we prepared MgO nanoparticles by ultrasound assisted hydrolysis of $Mg(OCH_3)_2$ in the presence of toluene. Commercially available $Mg(OCH_3)_2$ was used. The hydroxide gel was dried, and then calcined at $500^\circ C$ for 4h, and nanosized MgO was collected.

CaO nanoparticles were produced as the same procedure as MgO nanoparticles.

Mustard chemical warfare was prepared by the reaction of between ethylene and sulfur chloride according the following chemical equation:



MgO and CaO nanoparticles are exposed to the air for a short period of time in order to become partially hydrated. Mustard chemical warfare and the mixture of partially hydrated MgO and CaO nanoparticles were transferred to a 500 ml. flask. Mustard and nanoparticles were shaken in the flask for 10 minutes. Mustard chemical warfare was neutralized according the following chemical reaction:



MgO and CaO nanoparticles neutralize mustard chemical warfare at room temperature, and converts it to divinyl sulfide.

Reference:

- [1] Yang, Y. C.; Baker, J. A.; Ward, J. R., Chem. Rev. 1992, 92, 1729-1743
- [2] Yang, Y. C. Chem. Ind. 1995, 334-337
- [3] Ekerdt, J.G.; Klabunde, K. J.; Shapley, J. R., J. Phys. Chem. 1988, 92, 6182-6188.
- [4] Klabunde, K. J.; Stark, J.; Koper, O., J. Phys. Chem. 1996, 100, 12142-12153.
- [5] Stark, J. V.; Park, D. G.; Klabunde, K. J., J. Chem. Mater. 1996, 8, 1904-1912.