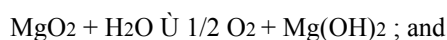


Oxygen Release Compound, ORC®

Basic Theory on the Disposition of Compounds

Basic Chemistry

Oxygen Release Compound (ORC®), is a proprietary formulation of magnesium peroxide. ORC is "oxygenated magnesia" which gives up the oxygen upon contact with water. Magnesium peroxide is converted to magnesium hydroxide (Mg(OH)₂) as oxygen is released. This also is the fate of the magnesium oxide which simply hydrates to form the hydroxide. The reactions are:



Therefore, the uniform endpoint of ORC, from both compounds, is magnesium hydroxide. The safety of this material is easily conveyed by the fact that a suspension of magnesium hydroxide in water is ordinary Milk of Magnesia.

Free Magnesium

Levels of free magnesium coming from ORC or magnesium hydroxide are not a problem. Both magnesium peroxide and magnesium hydroxide are virtually insoluble ($K_{sp} = 1.8 \times 10^{-11}$). Additionally, because ORC is contained in a filter sock, the magnesium is contained and removable. Small particles of a few microns in diameter could leave the sock and be carried a limited distance in the sub-surface, before becoming part of the soil matrix. The compounds are simple minerals. Microorganisms can metabolize these compounds using their internal organic acids to solubilize them.

Free Phosphate

ORC contains up to three percent of food grade potassium phosphate. The phosphate is specifically KH₂PO₄, also known as monopotassium phosphate or MKP and/or K₂HPO₄, which is dipotassium phosphate or DKP. The concentration cited is intimately bound to the crystalline structure of magnesium peroxide. Some may eventually be released since the potassium phosphates are water soluble.

Even though a portion will remain with the spent product, to be conservative we may assume it will all be released. If this is the case one has to evaluate the total volume of water that will solubilize the extant phosphate, in order to derive a concentration that could permeate the aquifer. It can be easily shown that the amounts fall below 1 ppm in the immediate vicinity of the source well.

Qualitatively, several points should be made with respect to the benign nature of the phosphates in question. First, they are ingestible and harmless; they are used as meat moisturizers and in baby food. Regenesi uses a food-grade product for the extra purity. It is not imperative that it be food-grade pure to be safe - as the lesser grades are sold as fertilizer. Furthermore, the phosphates are invariably going to be metabolized by any of the sub-surface microorganisms, aerobic or anaerobic, as it is a basic nutrient that is essential to life. Its ultimate fate in living organisms, from microbes to mammals, is that it will become part of the ubiquitous array of biochemicals that contain phosphate.

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