Maximizing Earths Original Resources, L.L.C.
4610 S. 33rd Place • Phoenix, AZ 85040 • Phone: (480) 929-9194 • Fax: (480) 219-6875 • www.meor.net

TECHNICAL DATA SHEET

SULF-B-GONE II ™

Effective control of biogenic sulfide produced by SRB's (Sulfate Reducing Bacteria) in oil or gas field systems generally requires the use of poisonous biocides at high dose slugs for 4 hours. To control the growth and proliferation of SRB, the poison slugs are typically applied one to two times per week. Biocides are lethal to microorganisms and could be harmful to personnel and the environment. Sulf-B-Gone II™, from MEOR, offers the oil field industry an environmentally friendly alternative to traditional poison treatments.

The active ingredient in Sulf-B-Gone II™ is 9-10 anthroquinone and is a non-toxic, biodegradable chemical that shows no bioaccumulation in aquatic systems. Toxicity tests with 9-10 anthraquinone exposing fathead minnows to concentrations of anthroquinone over a 48-hour period gave an LC_{50} value of 3000ppm. Bio-concentration studies showed a BCF of 24 for fathead minnows, 25 to 50 for bluegill and 95 for daphnia indicating that the ability of this chemical to bio accumulate in aquatic organisms is very low. Typically BCF's less than 100 demonstrates low accumulation. There is also a 100% degradation of 100% anthraquinone with systems with BOD (Biological Oxygen Demand) present.

Sulf-B-Gone-II™ H_2S and Iron Sulfide Production

Sulf-B-Gone II™ is injected into flowing water streams, producing small particles of the sulfide inhibitor. These sub-micron Sulf-B-Gone II™ inhibitor particles coat the interior surfaces of pipelines and subsequently become incorporated into the established bacterial biofilm. Once incorporated into the biofilm, the particles partition into the bacterial cell membranes of SRB. The Sulf-B-Gone II™ particles effectively inhibit sulfide production in SRB by uncoupling the electron transfer process in the bacteria that is required for cellular respiration using sulfate. Sulfate reduction by SRB requires adenosine triphosphate (ATP), an energy source. The bacteria use this energy source to reduce sulfate to sulfide. ATP production occurs interior to the cell membrane of the bacteria. Adding anthraquinone to a SRB bacterial population short-circuits the electron flow through the cellular membrane. As a result, the proton transfer process that normally accompanies the electron flow is thrown out of balance. Because these protons are required for ATP production, this energy source is not produced and, as a result, sulfate cannot be reduced by the SRB. The resulting reactions of sulfide and hydrogen to produce H_2S and H_2S with soluble iron to produce Fe_xS_y are also effectively blocked.

Additional test results have shown that the SRB can, however, revert to an alternate source of energy, molecular hydrogen (H_2). It has been demonstrated that with increasing exposure to anthraquinone, hydrogen (H_2) consumption increased in SRB and ATP production decreased in the bacteria. Therefore, Sulf-B-Gone II™ specifically interferes with ATP synthesis, inhibiting sulfate respiration, but does not inhibit bacterial respiration by H_2. The SRB are still able to respire and are not harmfully affected by Sulf-B-Gone II™ exposure.

Maximizing Earths Original Resources, L.L.C.
4610 S. 33rd Place • Phoenix, AZ 85040 • Phone: (480) 929-9194 • Fax: (480) 219-6875 • www.meor.net

Sulf-B-Gone II™ Reduces Treatment Costs and Decreases Risks Associated with Toxic Biocides

It is believed that the insoluble and non-reactive Sulf-B-Gone II™ particles also provide a time-release treatment within the biofilm. The incorporated particles, therefore, serve as a continual source of sulfide inhibitor to the established SRB populations, maintaining and controlling SRB bacterial populations for extended periods of time compared to typical biocide treatments. This ultimately reduces the volume of chemical needed to treat systems for problems cause by SRB. Accordingly, the operator saves money from reduced treatment costs. In addition, risks associated with the use of toxic biocides are significantly decreased.

System treatment with Sulf-B-Gone II™ is based on surface area rather than water volume as with typical biocide applications. This feature makes Sulf-B-Gone II™ extremely economical in large-capacity water systems. For instance, programs using traditional biocides must apply increasingly high volumes of chemical in order to control bacteria as water production increases. However, the volume of Sulf-B-Gone II™ remains constant with large increases in water production. As with traditional biocides, periodic treatments are required to replace the incorporated Sulf-B-Gone II™ particles due to biodegradation of the chemical and dissolution into flowing untreated water. However, the intervals between applications are greatly extended due to the filming of the chemical and its inhibitory period once inside the SRB cells.