Hach Biological Activity Reaction Tests (BARTs) Help Maximize Production Rates

Analysis of bacteria levels using Hach BARTs provides operators with rapid information about the potential impact of corrosion and bio-fouling that may be taking place as a result of microbial growth in water used to formulate the fracturing fluids. Having access to this critical information allows operators to react quickly to mitigate these harmful effects before they cause severe damage.

Overview

Bacteria are everpresent on a well pad and can have detrimental impacts on production rates of natural gas and oil wells. Many of the problems bacteria cause can be categorized under two broad headings: (1) corrosion and (2) bio-fouling.

Hach BARTs are semi-quantitative tests that allow determination of the presence and aggressiveness of certain bacteria in samples. The unique design of BARTs allows the growth of both aerobic and anaerobic bacteria. The procedure is simple enough for even inexperienced users - simply collect a 15 mL sample in the reaction tube, incubate at room temperature, and observe the tube for bacteria growth.

Corrosion

Corrosion refers to the pitting or metal degradation of the well pumps, casing and other metal components. Corrosion is often linked to sulfate reducing bacteria (SRB) due to the very reductive conditions which encourage the SRB to generate hydrogen sulfide (H_2S) gas. This gas is not only very stinky (“rotten egg” odor) but will also start the process of electrolytic corrosion, which can rapidly corrode steel. Acid Producing Bacteria (APB) are also an indicator of potential corrosion concerns. Acid producing bacteria indicate bacterial strains capable of acid production under the same very reductive conditions in which SRB operate. APB grow in waters which are not only reductive but also contain organic material that can become fermented with acidic products. The APB can begin to degrade organics with the release of short chain fatty acids that can also be corrosive. High levels of APB could signal a significant change in pH, which is driving many of the chemical reactions in the water and could indicate a much faster rate of corrosion.

Corrosion of the well can lead to expensive repairs, delays, and decreased production. While it is virtually impossible to “sterilize” a gas or oil well to keep bacteria from re-appearing, frequent preventative monitoring with BARTs can help operators understand the potential for and rate of corrosion long before the damage becomes permanent. Through early identification, appropriate treatment strategies for microbial control can be implemented and monitored for efficacy.

Bio-fouling

Bio-fouling refers to the build-up of bacteria that causes plugging, or restriction of flow within the well. In order to identify the potential risk for bio-fouling, operators need not determine the particular types of bacteria present, but rather the total aerobic bacteria. Heterotrophic aerobic bacteria (HAB) show a broad spectrum of bacterial types, indicating the total bacterial population present without regard to species. If a problem is detected (high levels are found), operators may conduct additional testing if needed to more precisely determine the nature of the microbial problem.

Slime forming bacteria (SLYM) can also be an indicator of concern for bio-fouling. SLYM function under different reduction-oxidation (redox) conditions but generally produce the thickest slime formations under aerobic (oxidative) conditions. These bacteria can cause engineering problems, as the slime formation can compromise the specifications of many systems. Primarily, the effects of the slime growth reduces hydraulic or thermal conductivity.

Increased bio-fouling within the well can block the flow of water, fracturing fluid, and oil or natural gas, leading to a decrease in production. Plugging occurs due to biofilm growth with subsequent encrustation and slime formations. As a result, many oil and gas wells begin to lose their production capacity long before the reserves around the well have become exhausted. Use of both *Heterotrophic Aerobic Bacteria (HAB)* and *Slime forming bacteria (SLYM)* BARTs can provide operators with valuable information to address these concerns.

The Goal: Effective Monitoring of Bacterial Growth

Hach BARTs allow effective, economical determination of bacteria levels by any operator, regardless of experience level. Understanding bacteria levels helps operators make critical decisions, such as addition of biocides. The ability to react quickly to changes in microbial growth provides confidence in the process and reduces threats to production.

For more information on Hach BARTs with step-wise procedures, as well as information on additional Hach products suited for Oil and Gas applications, visit www.hach.com/fracwater and click on “On-site Testing.”