



3 Tier Technologies Technical FAQ – H₂S

Why does H₂S form?

H₂S is created when the following conditions are present; limited and/or no oxygen is present (anaerobic), a very acidic environment, the presence of sulfate-reducing bacteria, and an ample supply of organic matter generally elemental Sulphur with free hydrogen. The biological activity of anaerobic sulfate-reducing bacteria generate usable energy under low-oxygen conditions by using sulfates (resp. elemental sulfur) to oxidize organic compounds or hydrogen; this produces hydrogen sulfide as a waste product which results in the formation of hydrogen sulfide and is released into the atmosphere as a gas. This gas mixes with moisture forms sulfuric acid. The sulfuric acid is very corrosive and attacks exposed concrete and accelerates the rusting/corrosion of any exposed metal H₂S or solutions containing H₂s come into contact with.

What condition causes the formation of H₂S?

In general terms, H₂S can form in any environment that possesses all of the following conditions; acidic, anaerobic, high Sulphur presence with organic matter, hydrogen, and sulfate reducing bacteria. When these conditions are present, the hydrolysis of anaerobic bacteria reduce the sulfate ion (SO₂) to sulfide (S²⁻) then join with hydrogen ions creating H₂S.

What takes place next?

The hydrogen sulfide separates, depending on pH, to dissolved hydrogen sulfide gas (H₂S), hydrosulfide ion (HS⁻) and sulfide ion (S²⁻). At a pH of 7, the mixture is approximately 50% H₂S and 50% HS⁻. At pH 6, the mixture is approximately, 90% dissolved hydrogen sulfide gas and 10% hydrosulfide ion.

Is H₂S corrosive or toxic?

The released H₂S mixes with moisture on the exposed surfaces of pipes, tanks, manholes, etc. above the waterline, and forms sulfuric acid. The pH, progressively falling, will allow acid tolerant species of aerobic bacteria to form on the surfaces as additional sulfuric acid is formed. This acid is highly corrosive on concrete and many other metal surfaces. Further, the buildup of H₂S gas in holding tanks or after agitation is highly toxic and can easily be lethal if left untreated at very low levels.

How 3 Tier Corrects H₂S in Oil & Water?

OIL-1000 for crude oil and PWT-1000 are 3 Tiers answer to H₂S elimination. Both products use a proprietary blend of PEB with a specially formulated amino acid/enzyme combination. These multi-function natural products not only eliminate existing H₂S, they also alter the environment making further H₂S development virtually impossible. Existing H₂S is treated by reversing the acidic cations by our alkali-based products that not only bind protons but fracture the sulfide/hydrogen bonds through highly effective oxidation of H₂S into elemental Sulphur and hydrogen which results in the reduction/elimination of existing H₂S. The products further alter the environment by increasing the Oxygen Redox Potential (ORP) which moves the environment from anaerobic to facultative and possibly aerobic, catalyze and oxidize organics while maintaining Sulphur and sulfates in an elemental forms, and naturally buffers the environment allowing for long term stability which eliminates any future development of H₂S.

