Remove Hydrogen Sulfide from Natural Gas, and Gain a Hydrogen Fuel By-product

A Schematic Diagram Showing An Exemplary System Operable For Continuous Removal Of H2S And Sulfur From Sour Gas, Wherein The System Provides Production Of Gaseous Hydrogen.

Purify natural gas by removing toxic and corrosive hydrogen sulfide, creating usable fuel with methods that also produce valuable hydrogen fuel as a by-product; or cut conventional energy requirements for contaminant removal.

Advantages

Hydrogen sulfide (H2S) is a common contaminant in natural gas wells, landfill gases, and other industrial operations. Approximately one-third of U.S. natural gas resources are considered low quality gas, unfit for pipeline shipment. Conventional processes suffer from several technical issues such as chelate loss, solution loss, and complex reactor design – rendering them inefficient. Unlike conventional methods suffering from slow reaction rates, low efficiency, and the need for complex reactors and high costs, new procedures can remove H2S with the bonus of lower energy requirements or profitable by-products like elemental sulfur or hydrogen fuel.

Technical Details

Researchers at UCF have discovered two new closed-loop methods of removing hydrogen sulfide from natural gas (to concentrations of less than 2 ppm), with elemental sulfur as the by-product. Method A produces sulfur and hydrogen gas (a potentially useful fuel), while the production of water in method B enables a lower energy input requirement. Since air is used in method B, a more compact reactor can be fabricated, with lower energy requirements. Both methods provide a high efficiency, low cost, closed-loop technique for the removal of hydrogen sulfide from sour gas. Either can emerge as a more favorable option than the other based on the relative profitability of energy inputs (i.e., electricity) or by-products (i.e., sulfur or hydrogen).

Benefits

• Operates at ambient temperature
• Easy start up and shut down procedures
• Closed-loop
• Profitable by-products
• Low energy requirement
• Optionally solar-powered

Applications

• Natural gas decontamination

Technology #32358
• US Patent 8,647,497 B2

Inventors

Cunping Huang, Ph.D. • Franklyn Smith • Clovis Linkous, Ph.D. • Karthikeyan Ramasamy • Ali Raissi, Ph.D. • Nazim Muradov, Ph.D.