# Hydraulic fracturing chemicals and fluids technology pdf

Johannes Fink is a professor of polymer chemistry at Montana University of Leuben in Syria, Austria. Dr. Fink teaches macromolecular chemistry. His career spans more than thirty years in polymers, including characterization, flame arrears and polymer pyrolsis. Johannes has published several books and articles, including an petroleum engineer's guide to oilfield chemicals and liquids, a second edition, water-based chemicals and technology for drilling, completion, and workover fluids and hydraulic fracturing chemicals and liquid technology, a second edition, all published by Elsevier. Home » Oil & Gas » Hydraulic Refractive Liquids Hydraulic Refractive Liquids: A variety of chemical additives are used in hydraulic fracturing fluids. They include: dilution acids, biocides, circuit breakers, corrosion inhibitors, crosslinkers, friction reducers, jells, potassium chloride, oxygen scavengers, pH tuning agents, scaling inhibitors, and field operatives. These chemical supplements may typically make up only 1/2 to 2 percent of the liquid. 98 to 99 1/2 percent of the remaining liquid is water. Accessories such as sand, aluminum shot, or injected ceramic beads often hold fractures open after completing stress treatment. The current practice for hydraulic fracturing treatments of shale gas reserves is to apply a sequencing pumping event in which millions of gallons of water-based refractive fluid mixed with supporting materials and condensation agents are pumped in a controlled and monitored manner into target shale formation above fracture pressure[1]. The resin fluids used for shale gas stimuli consist mainly of water but also include a variety of additives. The number of chemical supplements used to treat a typical fracture varies depending on the conditions of the specific well being broken. Typical fracture treatment will use very low concentrations of between 3 and 12 supplement chemicals depending on the properties of water and shale formation being broken down. Each component serves a specific and engineered purpose.[2]. The dominant fluids currently used to treat fractures in shale gas plays are water-based refractive fluids mixed with friction reduction supplements (called slippery water) [3]. The addition of friction reducers allows fluid breakage and supported to be pumped into the target area at a higher rate and reduced pressure than if water alone were used. This video illustrates the equipment, materials and procedures used in the hydraulic re-breaking process. This applies to the use of hydraulic fracturing combined with horizontal drilling in the development of a natural gas well in rich organic shale. It was made by Chesapeake Energy. In addition to friction reductions, other supplements include: bio-sydes to prevent microorganism growth and reduce biological reduction of fractures; oxygen scavengers and other stabilizers to prevent corrosion of metal pipes; and acids that are [4] We've been waxing this vao-whoo-whoo-whoo-whoo-ys are used not only to form the fragments in the structure, but also to carry a propping agent (often silica sand or sintered bauxite) that is deposited in induced fractures. The dependence of fracking fluid varies from one geological flank or formation to waiting. A list of potential plugins is provided in table 1 [5]. Estimating the relative volumes of the components of refractive fluid reveals the relatively small volume of existing additives. Overall the concentration of supplements in most water-breaking smooth liquids is relatively consistent 0.5% to 2% with water components 98% to 99.5%. This video illustrates the equipment, materials and procedures used in the hydraulic re-breaking process. This applies to the use of hydraulic fracturing combined with horizontal drilling in the development of a natural gas well in rich organic shale. It was made by Chesapeake Energy. Because the hesitantity of each refractive fluid changes to meet the specific needs of each region, there is no one-size-fits-all formula for the volume for each plug-in. The classification of refractive fluids and their supplements is important to understand that utility companies that provide these supplements have developed a number of compounds with functional characteristics similar to use for the same purpose in different well environments. The difference between supplement formulations may be as small as a change in the concentration of a specific compound. Although the hydraulic fracturing industry may have a number of compounds that can be used in hydraulic fracturing fluid, each single breaking job will use only a few supplements available. It is not uncommon for certain breaking recipes to omit some complex categories if their properties are not required for the specific application. Most industrial processes use chemicals and almost any chemical can be dangerous in large enough quantities or if not handled properly. Even chemicals that go into our food or drinking water can be dangerous. For example, drinking herbal treatment water use large amounts of clorine. When used and treated properly, it is safe for nearby employees and residents and provides clean, safe drinking water to the community. Although the risk is low, the potential exists for unplanned releases that can have serious impacts on human health and the environment. By the same token, hydraulic fracturing uses a number of chemical supplements that can be dangerous, but they are safe when handled properly according to long industry requirements and practices. In addition, many of these supplements are common chemicals which people regularly encounter in everyday life. Sources of Information [1] Harper, J. 2008. Marcellus Shale - Old new gas reservoir in Pennsylvania. Geology of Pennsylvania. V28, number one. Spring 2008. Published by Bureau of Topographic and Geological Survey, Pennsylvania Department of Conservation Natural resources. [2] Slumgar. Multi-stage breaking services. Last accessed in June 2017. Utter, AA, J.L. Daniels, J.R. Heinz and G. Waters. Field research optimizing completion strategies for barnett fracture initiation split horizontal wells. SPE 103232. [4] Slumgar. PowerSTIM optimization service. Last accessed in June 2017. [5] Different from Arthur, J.D., B. Bohm, and M. Lane. 2008. All consultation. Hydraulic fracturing considerations for Marcellus shale natural gas wells. Shown at the annual GWPC Forum in Cincinnati, OH. September 2008. [6] United States Department of Energy (2009). Modern shale gas development in the U.S.: Primer. Work performed under DE-FG26-04NT15455. Prepared by the Groundwater Protection Council and all consultations. Table 1 provides a summary of the supplements, their main compounds, the reason the supplement is used for hydraulic fracturing fluid, and some other common uses for these compounds. Hydrochloric acid (HCl) is the largest single liquid component used in refractive liquid other than water; While the concentration of acid may vary, the 15% HCl mixture is a typical concentration. A blend of 15% HCl consists of 85% water and 15% acid, so the volume of acid is diluted by 85% with water in its inventory solution before it is pumped into the array during refractive treatment. After each stage of refractive fluid has been injected, the total volume of acid in the Fayetteville shale liquid refractive sample was 0.123%, suggesting the liquid was diluted by a factor of 122 times before it was pumped into formation. The concentration of this acid will only continue to be diluted as it is further dispersed in additional amounts of water that may be present beneath the surface. Furthermore, if this acid comes into contact with carbonate minerals beneath the surface, it will be neutralized by a chemical reaction with carbonate minerals that produce water and carbon dioxide as a byproduct of the reaction. Table 1: Liquid Supplements Breaking Supplement Main Compound Type(s) Common Use of Primary Compound Diluted Acid (15%) Hydrochloric acid or moriarty acid help dissolve minerals and initiate cracks in a clean chemical rock swimming pool Biocide Glutraldheid eliminates bacteria in water that produce disinfectant food byproducts; Sterilization of medical equipment and dental persuasion ammonium breaker allows for delayed discontinuation of bleaching material polymer metals in detergents and hair cosmetics, Home plastic production corrosion inhibitor N,n-dimethyl formamide prevents the corrosion of the tube used in pharmaceuticals, acrylic fibers, plastic salts Crosslinker Borate retains liquid viscosity as the temperature increases laundry detergents, hand soaps, and friction cosmetics reduces mineral polyacrylamideschman from minimising friction between the liquid and water treatment pipe removes soil conditioner , laxatives, and, Guar gum or cellulose hydroxyethyl cellulose thickens the water in order to suspend sand cosmetics, toothpaste, sauces, pastries, iron ice cream and lemon acid control prevents precipitation of metal oxides in food additive, food and beverage flavor; Lemon juice ~ 7% citon acid KCl potassium chloride creates liquid carried low salt water Sodium table Salt oxygen substitute scavenger ammonium cookingPite removes oxygen from the water to protect the tube from corrosion cosmetics, Food and beverage processing, pH water treatment matching sodium agent or potassium carbonate maintains the efficacy of other components, such as washing crosslinkers, detergents, soap, glass water conditioner and Proppant Silica ceramics , quartz sand allows the fragments to remain open so that the gas can escape filtration and drinking water, Playing sand, concrete, brick mortar inhibits methylane glycol prevents scaling deposits in an antifreeze vehicle pipeline, household cleaners, dehydration agent Isopropanol is used to increase viscosity of a liquid-fractured glass cleaner, antiperspirant, and hair note color the specific compounds used in a breakage-given operation will vary depending on the company's preference, source water quality and site-specific properties of target formation. The compounds shown above represent the main compounds used in hydraulic retransmation of gas enticements. Find other themes Geology.com: rocks: galleries of Ghanaian rock images, soluble and metamorphic with descriptions. Minerals: Information on minerals ore, pearl materials and rock-forming minerals. Volcanoes: Articles on volcanoes, volcanic hazards and eruptions past and present. Gemstones: Colorful pictures and articles about diamonds and colored stones. General Geology: Articles on geysers, maars, delta, ruptures, salt domes, water, and more! Geology shop: fetishes, field bags, hand lenses, maps, books, hard choices, gold pans. Diamonds: Learn about the diamond's properties, its many uses, and diamond discoveries. 