

Solids Precipitation Inhibitor 2402H

A solvent additive specifically formulated for workovers and stimulations of production and injector wells where asphaltene and paraffin deposits are a problem.

Overview

SPI 2402H is a concentrated blend of organic solvents, penetrants, and dispersants for prevention and dissolution of asphaltene and paraffin deposits. SPI 2402H is used for a variety of applications where these troublesome deposits cause plugging and reduced production. This multifunctional product provides superior deposit and sludge control compared to treatment programs using only solvents. It is most effective in areas where asphaltene precipitation is a problem and provides long-lasting results. The product performs especially well in heavy oil with a high asphaltene content.

Solids precipitation from reservoir crudes has been recognized as a serious detriment in numerous oil systems. Precipitation may result in insitu permeability reductions as well as contributing to serious plugging problems in production wells and surface facilities. SPI 2402H was specifically designed to eliminate or to reduce asphaltene and paraffin deposition problems.

The technology was developed as a joint venture by Rocanda Enterprises Ltd. and Buckman Laboratories of Canada, Ltd. for asphaltene inhibition. This new technology represents "state of the art" development on how to deal with asphaltene deposition and other related formation problems in both down hole and surface wells.

The principle of this technology is that the SPI 2400 molecule, when in contact with the oil prior to asphaltene precipitation, will simply not allow the asphaltene molecule to collapse into a solid particle, even when both temperature and pressure are reduced. In the event that precipitation has already occurred, SPI will solubilise and hold it in solution.

Both laboratory and field tests have proven that blends containing SPI 2402H are vastly superior in workover and stimulation applications when compared to straight solvents such as xylene and toluene. Blends containing SPI 2402H also carry two to three times more asphaltene in solution and are very strong dispersants and penetrants. These characteristics are very useful when tubulars or down hole pumps need to be cleaned. SPI 2402H is compatible with most aromatic solvents.

Another unique feature of SPI 2402H is its ability to prevent sludges from occurring and also to destroy the sludges after they occur. SPI 2402H also displays strong water wetting tendencies, maintaining a preferentially water wet environment.

SPI 2402H can be successfully applied to a whole range of reservoir brine salinities with no adverse effects on product performance. Non-ionic compounds are not significantly affected by the presence of water-soluble salts irrespective of their (salts) concentration.

Advantages

1. Resuspends asphaltenes by mimicking the natural resins of heavy oil
2. Inhibits Paraffin formation
3. Breaks water in oil emulsions and water blocks by reducing the interfacial tension that exists between the oil and water phases
4. Coats sand and clay solids and leaves the particles water wet
5. Significantly reduces oil viscosity and prevents sludging
6. Reduces operating costs by reducing the frequency of washes or stimulation.
7. A very effective penetrating and dispersing agent.

Field Applications

1. **Workover fluid**

The addition of SPI 2402H to solvents, depending on the application, will vary between 3% and 7% by volume of treatment. Add SPI 2402H to xylene, toluene, cutter stocks, condensates or untreated water and blend thoroughly prior to application. Use mobile pumping equipment for the application.

To reduce viscosity of heavy oil, add 10% by weight of SPI 2402H to a kerosene carrier fluid. Blending 7% by weight of this compound with 11-14 API lease crude reduces viscosity from 10,000 cps to 2,500 cps.

In some areas, condensate is used to reduce the viscosity of heavy oil in spite of its low flash point and potential for asphaltene precipitation upon contact with oil. To formulate a workover fluid with a higher flash point 42°C that will not precipitate asphaltenes after prolonged contact with heavy oil, add 10% by weight of SPI 2402H to a kerosene carrier fluid.

SPI 2402H reduces flashing of condensate/solvent that is mixed with oil at higher temperatures. For example, adding 250 ppm of SPI 2402H to a mixture of 70% crude oil and 30% condensate at 45 psig and -7°C can reduce flashing of C1, C2, C3, C4, C5, and C6 by 50%-75%.

2. **Stimulation fluid for production and injector wells**

To remove formulation damage caused by asphaltene deposits, add 15% by weight of SPI 2402H to an aromatic solvent like xylene or toluene. Spot the treatment compound at the formation face and into the near well bore region. Use 0.75 – 1.5 m³ of the treatment compound per meter of perforations prior to returning the well to production.

Because SPI 2402H is water dispersible, formation water can also be used for stimulation treatments. To treat 11-13 API crude, add 15% by weight of SPI 2402H to water. For 14 API or higher crude oil, add 10% by weight of SPI 2402H. Use mobile pumping equipment for the application.

3. **Acidizing**

Some crude oils will form an insoluble sludge when contacted with HCl. Asphaltenes are the primary ingredients of sludge, but resins, paraffins, hydrocarbons, fines, and clays are also present. Once formed, this sludge is extremely difficult to remove. SPI 2402H prevents sludge from occurring when the oil is treated prior to acidizing.

Treatments using only solvent have not been effective in these applications. For use as a spearhead treatment prior to acidizing to reduce sludging or as a post acid treatment to dissolve formed sludge, add 15% by weight of SPI 2402H to an aromatic solvent like xylene or toluene. Blend thoroughly prior to application until a single phase is achieved.

For use as an anti-sludge agent while acidizing, add 10% by weight of SPI 2402H to 15% HCl to prevent sludge from occurring.

4. **Slop Oils**

Add 5% by weight of SPI 2402H to gas-oil. Mix 1%-5% of this compound with slop oil prior to treatment. By reducing oil/water interfacial tension and changing solids wettability from oil-wet to water-wet, this compound can improve the productivity of centrifuge equipment and significantly increase clean oil sales.

5. **Paraffin Inhibition**

SPI 2402H can inhibit paraffin deposition when asphaltenes are the nucleating material that causes paraffin crystals to agglomerate. SPI 2402H acts like an artificial resin to keep asphaltenes in suspension so they cannot react with paraffin to form deposits.

6. **Treating tank bottom deposits**

Add 500 to 2,000 ppm (depending on the application) of SPI 2402H to a carrier fluid such as light oil, reformate or diesel.

Therefore, the inclusion of SPI 2402H in your program can dramatically improve recovery and significantly reduce operating costs.

Carrier fluids for SPI 2402H

Depending on the application, different carrier fluids should be used. The selection of the carrier fluid or diluent depends to a large degree on the properties of the formation to be treated e.g. permeability, sandstone versus limestone, etc. The carrier fluid can vary from kerosene for heavy oil to xylene for light crude or gas wells with high residual oil. Xylene or aromatic reformat blends are also used to alleviate post-acidizing sludge with very good results.

Product Characteristics

Density at 25 ^o C	0.88 g/mL
Approximate volume per kg	1136 mL
Flash point (TCC)	31 ^o C
Pour Point	<-40 ^o C
pH (100 ppm)	Same as pH of water in which dispersed

Packaging and Handling

SPI 2402H is a liquid packaged in non-returnable drums or semi-bulk containers. Materials suitable for storing and handling the product include ferrous metals, Penton, Polypropylene, molded nylon and Teflon.

In concentrated form, SPI 2402H can have an adverse affect on rubber, polyvinyl chloride, acrylics and certain other plastics.

Improper handling of this product can be injurious to workers. Observe all safety precautions shown on the label and in the Material Safety Data Sheet.

Recommendations given in this bulletin are based on tests believed to be reliable. However, the use of the product is beyond the control of Buckman Laboratories, and no guarantees, expressed or implied, are made as to the effects of such or the results to be obtained if not used in accordance with directions or established safe practice. The buyer must assume all responsibility, including injury or damage, resulting from misuse of the product as such, or in combination with other material. This bulletin is not to be taken as a license to operate under or recommendation to infringe any patent.

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