

BelleFlex Dehydrator and the Efficiency of Phase Separation

Project Objective

The scope of this project focuses on the separation of hydrocarbons from water. At this point in time there is not a complete separation between the two liquids. The BelleFlex Dehydrator will be a unit located on each production location. As of current the hydrocarbon mixture runs through a three-phase separator and then is either trucked to a disposal site or stored in an above ground storage tank in attempts to reuse the produced mixture. Some companies like Range Resources have reused about 96% of the produced water in fracturing operations, but this produced water is not a viable option for all fracturing operations.

When the water is injected into the well friction reducers, bacteria inhibitors, etc are mixed into the fracturing fluid. Although these additives make up less than 1% of the fracturing fluid some mixtures cannot be used in other wells due to possible reactions within the wellbore. Therefore the water has to be disposed and cannot be reused.

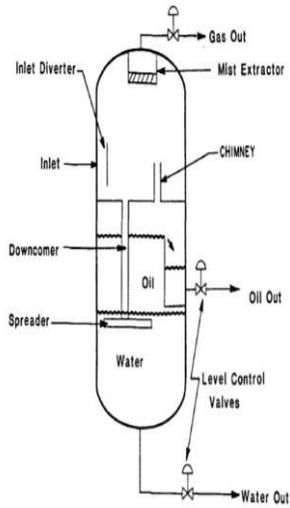


Figure 5-6. Vertical three-phase separator schematic.

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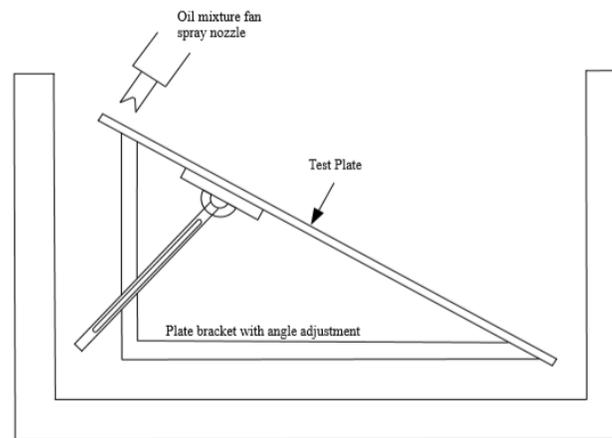
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Methodology



To investigate the BelleFlex and the possible range of separation that it can achieve there are many mixtures of water and hydrocarbons created. Using an array of different ratios between hydrocarbons and water the BelleFlex is sent through many tests.



BelleFlex Test Apparatus

The test also include moving toward additive separation. This includes mixing different types of additives with first water alone and then within a hydrocarbon/ water mixture. These different mixtures are then tested and run through the BelleFlex.

Results Obtained

The preliminary testing was able to be completed and the results were that separation was possible. From the initial test runs there was evidence of separation and possible places for improvement but due to the



COVID-19 shutdown, further testing has been halted. As of now this experiment is still within the testing stages. From the initial results application beyond hydrocarbon/water separation



seems possible. If tests continue there are possible results that could lead to the release of purified water back into freshwater systems. This application is far off into the distance but is the ideal end result.

Sources:

1. Chris Jacobs. BelleFlex Test Apparatus. January 20.
2. "From Flowback to Fracturing: Water Recycling Grows in the Marcellus Shale", Journal of Petroleum Technology, March 1.
3. "Horizontal Three Phase Separator Schematic", Oil and Gas Separator, March 1.
4. "Science and Medical Photos, Illustrations & Video", Sciencesourceimages, March 1.
5. "Water Use in Marcellus Deep Shale Gas Exploration", Chesapeake Energy, March 1.