



Coalescer column benefits oilfield operators

The coalescer column – a simple, inexpensive and environmentally friendly technology to remove water from produced oil – is being developed by Saskatchewan researchers.

When oil is produced from the ground, it doesn't emerge as pure oil. Mixed with it are small droplets of water and particles of sand and clay. Before they can ship the oil through pipelines to refineries, oil producers have to purify the oil at centralized locations known as batteries. The conventional treatment is to heat up the oil and add chemicals called demulsifiers. Heating the oil lowers its viscosity and allows the solid particles to settle to the bottom of the tank from where they can be disposed. But the water has to be removed too. The demulsifiers interact with natural chemicals on the surface of the water droplets, destabilizing those surfaces. Then when two small droplets collide, as they will more frequently at lower viscosity, they coalesce into a larger droplet which will then also fall to the bottom of the tank for disposal.

The conventional treatment has been effective for more than 80 years. So why change? There is a two-fold payback from reducing the heat and demulsifying chemicals in oil treatment. A typical heavy oil battery might heat the oil up to 130° C in a pressurized vessel. Operators usually generate this energy by burning natural gas. Annually, a typical heavy oil battery uses the same amount of natural gas in this step as it takes to heat 930 average Saskatchewan households, producing substantial amounts of greenhouse gas. Secondly, although most demulsifiers used to treat the oil are fairly benign for the environment, they are expensive. A typical heavy oil battery might spend over a million dollars on demulsifiers annually. And these costs are rising. Within the last five years, the concentration of demulsifier used to treat a typical heavy oil has risen by 25 to 50 per cent for many reasons. Thus, cost and increased awareness of the importance of

reducing greenhouse gas production is driving alternative treatment methods.

One of these methods is a simple device called a coalescer column. The column is basically a pipe filled with a packing with particular surface and packing properties. Many types of packing have been tested, from fibreglass to coal, but the most helpful has been a pretreated rock packing. Each rock granule is coated with water. During operation, the water droplets in the oil adhere to the water film on the surface of the rocks and coalesce to form even larger droplets for easier removal.

Although preliminary, the research on coalescer columns has produced extremely promising results. Of the more than

100 experiments done by Saskatchewan researchers, all but one test improved water removal with a coalescer column. Laboratory studies showed that the method could facilitate substantial reductions in both demulsifier and heat. On an annual basis, a heavy oil treating battery with a coalescer column could reduce its treating temperature by 60° C – the same amount of energy needed to heat 430 Saskatchewan households. Now it's time to



test this new technology in the oilfields.

Oil producers in Western Canada have the most to gain. Heavy oil makes up a third of Saskatchewan's oil reserves and is more costly to treat than light or medium oil. It requires heating to higher temperatures, and the addition of stronger concentrations of demulsifying chemicals. Thus coalescer column technology could provide substantial savings to heavy oil producers. With growing emphasis on greenhouse gas reduction, it could be a treatment whose time has come.

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