

---

**Question 59: What challenges have you faced from processing crudes that contain elevated levels of wax crystal modifiers or flow improver chemicals?**

**DION** (GE Water & Process Technologies)

This is a complex question. There are many different chemical families that can be employed as either wax crystal modifiers or flow improvers. Flow improvers can be dragging reducers or pour point depressants. I recommend empirically measuring its impact. For instance, if the concern is the additives' impact on desalter operations, then the additive can be easily tested in a laboratory desalter simulator. The emulsification tendency of the crude can be measured with and without the additive. All specialty chemical suppliers should have desalter simulators, most of which are portable. The testing can be conducted in the refinery's laboratory, if desired.

# Wax Crystal Modifiers and Flow Improvers

## Wax Crystal Modifiers

- Multiple types of chemistries
- Depending on chemical family, may negatively impact demulsification
- Check with your chemical supplier
- Empirically test impact in laboratory

## Flow Improvers

- Pour Point Depressants
  - Generally improve demulsification
- Drag Reducers
  - High MW and susceptible to shear
  - Have not seen negative impact when fed at low dosages ~ 5 ppm

In general, the most common types of pour point depressants will be complementary or synergistic to demulsification. There are too many different chemical families that can be employed to make a general

---

statement about whether wax crystal modifiers are synergistic or antagonistic to demulsification. It can be empirically determined. Drag reducers are very high molecular weight molecules. They are sensitive to shear and break into smaller molecules when they pass through pumps. The larger molecules that are not sheared should act similar to an asphaltene. In one refinery, we saw a situation where a drag reducer was overfed. The excess drag reducer precipitated in their raw crude tanks. When the tank was opened for corrosion inspection, they found a five- or six-inch thick deposit of an elastic, sticky material that had to be cut with shovels to get it out of the tank.

**DION** (GE Water & Process Technologies)

Wax crystal modifiers are typically amine oxides, amides or sulfonates. They are utilized to keep paraffins dispersed and reduce wax deposition. Flow improvers generally fall into two categories; pour point depressants and drag reducers. They are typically stearates, vinyl acetate copolymers, polyacrylates or polymeric alpha olefins. Pour point depressants typically promote the formation of compact, three dimensional crystals as the crude oil cools. The compact crystals decrease the pour point of the oil and improve low temperature flow properties. Flow improver chemicals are typically extremely large molecular weight materials. Like asphaltenes, they can precipitate to an oil/water interface and stabilize emulsions. There have been no noticeable desalter performance issues at dose rates of approximately 5 ppm. When dose rates are roughly 15 ppm to 25 ppm, desalter upsets may occur. In at least one refinery, a six inch layer of sticky elastic, caulk-like material has been observed on the bottom of the tanks and believed to be due to flow improver chemicals. In general, pour point depressants can improve emulsion resolution, while on the other hand paraffin inhibitors may have a deleterious effect. The exact effect would require either more specific information on the chemistry or empirical testing results.

**BASHAM** (Marathon Petroleum Corporation)

We have run crudes with flow improver at Marathon Petroleum Company's Catlettsburg refinery for four to five years now with no known issues on our crude units.

**DENNIS HAYNES** (Nalco Energy Services)

In the past, there were some types of these chemistries in oil production that were reported to have problems on oil-water separation in desalting at the refinery; however, in recent history, improvements seem to have been made, and the products we have been asked to review for other companies have not shown adverse impacts regarding emulsification. If there is an indication that a new product is being used, evaluation on downstream impacts is recommended.

**SAM LORDO** (Nalco Energy Services) There have been a few reports of impacts on the amps/volts

---

from crudes treated with pour point depressants. The impact was minor but noticeable in that additional power-draw was observable.

Print as PDF:

Tags

[Amines](#)

[Crudes](#)

[Desalting](#)

[Process](#)

[Tankage](#)

Year

2012