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**Question 66: Some refiners are considering substituting potassium hydroxide for sodium hydroxide as a desalted crude treatment to lower overhead chlorides. What is the impact of this change on coker operation and other downstream units? What are the advantages and disadvantages?**

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

They are both alkali metals. Potassium hydroxide should, in theory, act like sodium hydroxide. The effect should be similar with regard to reducing the overhead chlorides in the desalted crude or, similarly, in metal-catalyzed fouling. Potassium hydroxide does have the potential to be used as a tracer; for instance, it can be injected in the desalted crude. The bottoms and heavy gas oil fractions can be analyzed for potassium to determine the disposition of adding an alkali metal to the desalted crude. Potassium hydroxide is typically more expensive than sodium.

# Potassium Hydroxide

- *Alkali Metal like sodium*
- *Effects should be similar to sodium hydroxide*
  - *Overhead chloride reduction*
  - *Metal catalyzed fouling*
- *May be beneficial as tracer to quantify metal impacts downstream*
- *Typically more expensive than sodium hydroxide*



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

Potassium is an alkali metal just like sodium. Its ability to reduce the overhead chlorides is expected to be comparable to that of sodium. Just like sodium, it will contribute to metal catalyzed polymerization in downstream units. There is no known advantage to using potassium other than the fact that it can be used similar to a tracer to quantify the impact of metal hydroxide addition to downstream units. Potassium hydroxide is typically more expensive than sodium hydroxide. While there are no common potassium specifications for finished fuels, its potential negative impact in the fuel should be similar to that of sodium.

**BASHAM** (Marathon Petroleum Corporation) Potassium hydroxide is more expensive than sodium hydroxide. It is expected that the potassium ion will catalyze the cracking reaction and promote coking in the same manner as the sodium ion. Therefore, we do not see an advantage in using potassium hydroxide.

**LEE** (BP Products North America)

Sodium chloride is a very stable chloride and has a very high temperature for hydrolysis. We are not sure that there is any benefit from using potassium chloride as a base to control the overhead chlorides. We think that sodium will catalyze coke formation in the vacuum and coker heaters at concentrations of over 15 ppm. We think that potassium will do the same thing. Sodium is a poison for the downstream hydroprocessing units and so is potassium. We are not sure there is any benefit here.

**ANDREW SLOLEY** (CH2M HILL)

Potassium hydroxide has a lower potential to induce stress corrosion cracking than sodium hydroxide. Little direct experience is available to quantify this. However, test work targeted at syngas systems showed significantly increased temperatures were required for stress corrosion cracking to occur. This may be a benefit for the crude unit between the desalter and the crude tower.

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Year

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