Introduction

Caprolactam (C₆H₁₁NO) is the raw material for Nylon-6 plastics and fiber engineering.

Caprolactam is a chemical compound consisting of carbon, nitrogen, oxygen and hydrogen. It is made by using either cyclohexane or phenol. When caprolactam is at temperatures above its melting point, it becomes a colorless liquid.

Cyclohexanone (CH₂)₅CO, an intermediate of caprolactam, is an organic ketone and has the appearance of clear water.

Application

Conventional caprolactam technology is based on the key intermediate cyclohexanone, which is usually produced by the oxidation of cyclohexane, but can also be made from phenol or toluene.

Separately, hydroxylamine sulfate is manufactured by the oxidation of ammonia to nitrous oxide. This is followed by hydrogenation in the presence of sulfuric acid. Then, the hydroxylamine sulfate is reacted with the cyclohexanone to produce cyclohexanone oxime. This is followed by a Beckmann rearrangement, using oleum to yield caprolactam.

Instrumentation and installation

The K-Patents Process Refractometer PR-43-GP is used to measure the concentration of aqueous caprolactam solution after the initial extraction to control and maintain high extraction efficiency.

The K-Patents refractometer is also used for evaporation process control. The K-Patents refractometer is mounted in the outlet of the evaporator. It provides a signal to a controller to regulate the concentration value by varying the inlet flow rate through the evaporators. If the concentration value increases, the inlet regulating valve increases the product flow rate through the evaporators, thereby bringing the concentration back to the required value.
### Instrumentation Description

K-Patents Process Refractometer PR-43-GP is a general industrial refractometer for pipes and vessel installations. The PR-43-GP can be installed with 2, 3 and 4 inch flange and 3 inch Sandvik L coupling process connections and a variety of flow cells for pipe sizes of 1 inch and larger.

### User Interface

Selectable multichannel MI, compact CI or a web-based WI user interface options allow the user to select the most preferred way to access and use the refractometer measurement and diagnostics data.

### Measurement range

Refractive Index (nD) 1.3200 – 1.5300, corresponding to 0-100 % by weight.