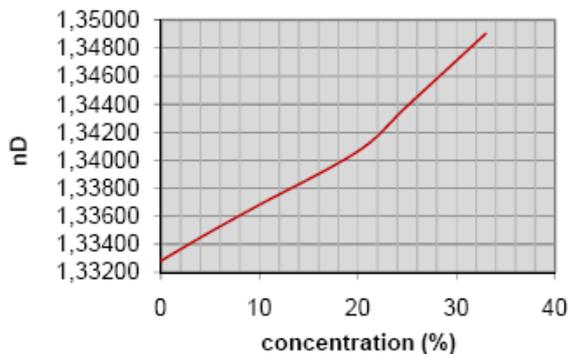


## LIQUID AMMONIA NH<sub>3</sub>, AMMONIUM HYDROXIDE NH<sub>4</sub>OH

### Typical end products

Liquid ammonia, ammonium hydroxide

Chemical curve: Ammonium hydroxide R.I.per Conc% b.w. at Ref. Temp. of 20°C



### Introduction

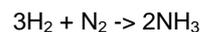
Ammonia (NH<sub>3</sub>) is a colorless gas, which can easily be dissolved in water. The concentration of ammonia in water is usually 25%. Ammonium hydroxide (NH<sub>4</sub>OH) is formed during the liquefaction.

### Application

Ammonia is mainly produced with the Haber process. The raw material is natural gas or fuel oil (naphtha), which produces hydrogen for the steam reforming process. Nitrogen is extracted from air.

The process is divided into five steps. Sulfur removal, steam reformation, CO-conversion, purifying and ammonia synthesis.

After the sulfur removal, steam is added to the raw gas to obtain CO. Next, it is reacted with water in the CO-converter, which creates H<sub>2</sub> and CO<sub>2</sub>. Then, the purified hydrogen/nitrogen gas enters the ammonia synthesis stage, where the reaction



occurs at 300 bars (4350 psi) and 500°C (932°F).

Following the ammonia reactor, the gas is cooled and liquefied in a high pressure separator (HPS). The impurities in the dissolved ammonia liquid evaporate in a low pressure separator (LPS).

### Installation

The K-Patents Process Refractometer, PR-23-GP measures the concentration of liquid ammonia after

the dilution. Final concentration of ammonia is typically around 25% with measurement taken at ambient temperature.

The refractometer can be calibrated either to read NH<sub>3</sub> (ammonia-in-water) or NH<sub>4</sub>OH (ammonium hydroxide) in water.

The PR-23-GP automatically controls dilution ensuring correct concentration levels in the final product. In certain cases steam prism wash is recommended.

<b>Instrumentation</b>	<b>Description</b>
	<p>K-Patents Process Refractometer PR-23-GP is an industrial refractometer for large pipe sizes and tanks, cookers, crystallizers and kettles. Installation through a flange or clamp connection.</p>
Automatic prism wash:	<p><b>Prism wash with steam (optional):</b> The components of a steam wash system are a sensor with integral steam nozzle mounted at the sensor head, a shut-off valve for steam line and an indicating transmitter equipped with relays to drive the wash valves.</p>
Measurement range:	Refractive Index (nD) 1.3200 – 1.5300, corresponding to 0-100 % by weight.