Honeywell UOP

PETROCHEMICALS

UOP Phenol Process

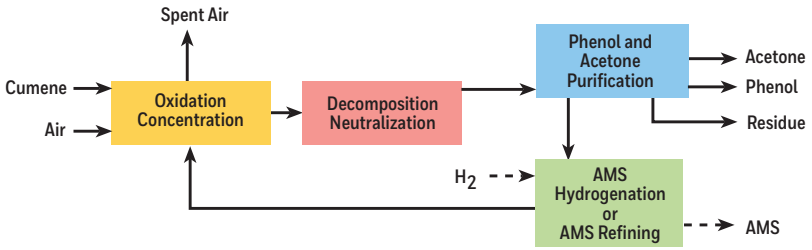
Process solutions for phenol production

Introduction

To compete in today's phenol and acetone markets, the producer needs the ability to supply consistently high-quality products with the most favorable investment and production economics. The UOP Phenol process fills that need with commercially proven technology for the cumene route to phenol and acetone, backed up by continuing improvements and service.

Cumene peroxidation is the preferred route to phenol, accounting for more than 90% of world production. The UOP Phenol process features low feedstock consumption (<1.31 Wt cumene/Wt phenol). High phenol and acetone product qualities are achieved through a combination of minimizing impurity formation and efficient purification techniques. An optimized design results in low investment cost along with low utility and chemicals consumption for a low variable cost of production. Design options for by-product alpha-methylstyrene (AMS) allow producers to select the best alternative for their market: hydrogenate AMS back to cumene, or refine AMS for sale. Low pressure/low temperature oxidation, no acetone recycle to the decomposition (cleavage) section, and simplified neutralization make the UOP Phenol process easier to operate.

UOP Phenol Process



For production of the cumene feedstock, UOP's Q-Max™ process provides the highest quality cumene along with low benzene and propylene consumption and low overall capital and production costs. The Q-Max process uses a commercially proven, highly selective and stable zeolitic catalyst which is also regenerable. Combining the Q-Max process with the UOP Phenol process results in numerous optimization benefits that can only be achieved by integrating the two processes. These include optimized equipment and utilities design and lower overall utility consumption.

Description

Key process steps in the UOP Phenol process:

- Liquid-phase oxidation of cumene to cumene hydroperoxide (CHP). A small amount of dimethylphenylcarbinol (DMPC) is also formed, but low-pressure, low-temperature oxidation results in very high selectivity to CHP.
- Concentration of CHP, recycling unreacted cumene back to oxidation.
- Decomposition of concentrated CHP to phenol and acetone, accompanied by dehydration of DMPC to AMS, catalyzed by mineral acid. Unique design features result in very high selectivity to phenol, acetone and AMS without using recycle acetone.
- The high overall yields from oxidation and decomposition combine to achieve <1.31 Wt cumene/Wt phenol.
- Neutralization of the decomposition catalyst.
- Recovery and purification of the acetone and phenol products, and rejection of a small amount of by-products as heavy residue.
- AMS can either be hydrogenated back to cumene for recycle to oxidation, or refined for sale. Typical Smart SM Revamp.



Commercially proven, easy-to-operate phenol technology supports your phenol and acetone production needs with low feedstock consumption, minimal impurities and low production costs.

UOP Phenol Process Product Quality

Phenol

Phenol purity (dry basis)	>99.99 Wt%
Water	<100 wt-ppm
Color	<3 (APHA-Hazen)
Appearance	Clear/colorless
Solidification point	40.9 °C
Total GC impurities (excluding MBF and cresols)	<20 wt-ppm
Total Carbonyls	<5 wt-ppm
2-MBF	<1 wt-ppm
Total Cresols	<20 wt-ppm

Acetone

Phenol purity (dry basis)	>99.97 Wt%
Water	<0.2 Wt%
Color	<3 (APHA-Hazen)
Appearance	Clear/colorless
Specific gravity	0.791-0.793
Permanganate fading test	>4 Hours
Total Aldehydes	<50 wt-ppm
Benzene	<3 wt-ppm

Commercial Experience

UOP is a leading supplier of technology to the phenol industry, providing over 40% of world licensed capacity since 2000. Honeywell also produces phenol at its facility in Philadelphia, PA, USA. UOP has been awarded twenty projects on fifteen process units worldwide and counting – both new and revamp projects. Phenol capacities range from 16,000 up to 300,000 MTA. The total combined phenol capacity of the units is more than 2,900,000 MTA.

For more information

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