TECNICAS REUNIDAS

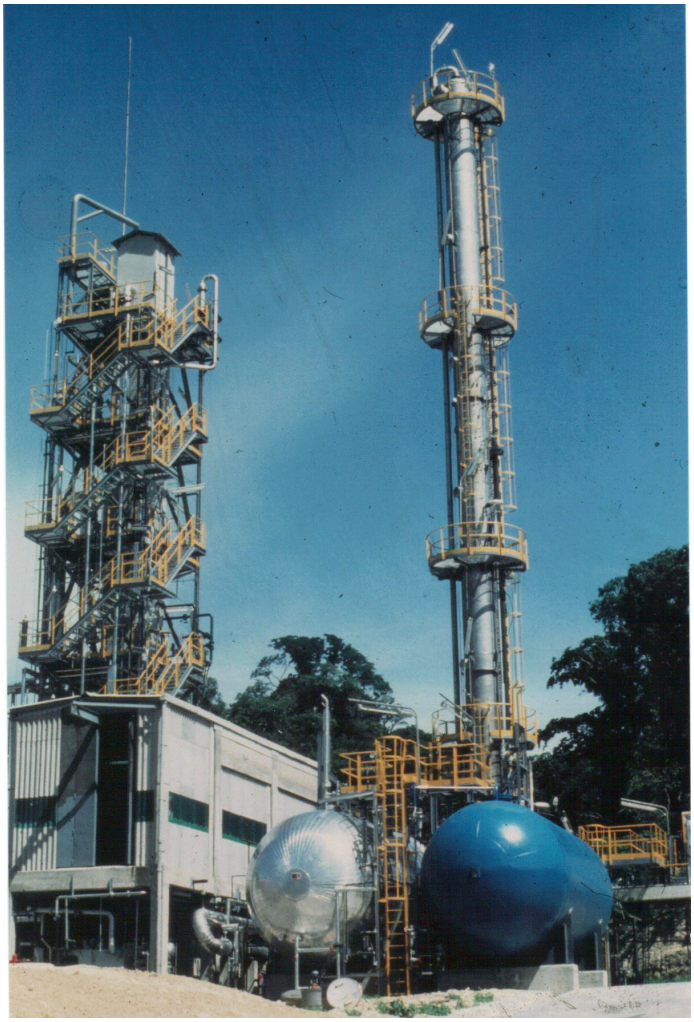
espindesa

CNA CONCENTRATED NITRIC ACID ($Mg(NO_3)_2$ Process)

Concentrated nitric acid (CNA) is used in the production of explosives and chemicals such as isocyanates and nitrobenzene.

The concentrated Nitric Acid can be obtained from weak Nitric Acid (57 - 60%) with an extractive distillation column as explained in this brochure.

ESPINDESA can integrate the production of Weak Acid and Concentrated Nitric Acid Processes.



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CNA CONCENTRATED NITRIC ACID ($Mg(NO_3)_2$ Process)

PROCESS DESCRIPTION

Concentrated Nitric Acid

The maximum boiling azeotrope of nitric acid and water (69 percent nitric acid) requires extractive distillation to produce concentrated nitric acid when starting with acid that is weaker than the azeotrope. Sulphuric acid has been used for this extractive distillation, but its use requires high maintenance costs. Magnesium nitrate is being used in several commercial plants in extractive distillation of nitric acid and was selected rather than other nitrate salts since it has the most favourable combination of physical properties. The weak nitric acid solution from battery limits is introduced of the Dehydrating Tower. This solution is concentrated to 98.5% NO_3H with diluted magnesium nitrate which is used as dehydrating agent.

The nitric acid vapors produced in the bottom of the column and leaving the top are condensed and cooled in the Condenser. The condensed product is a 98.5% wt nitric acid solution. A portion of this liquid is returned as reflux to the top of the column by means of the Acid Reflux and Product Pumps. The remainder acid product is sent to battery limits.

The concentrated magnesium nitrate solution used as dehydrating agent is continuously fed to the top of the Dehydrating Tower. This concentrated nitrate solution removes most of the diluting water of the weak nitric acid solution feed when they mix inside the tower. As the salt solution goes down the tower, its concentration in water increases.

Part of the salt solution collected in the bottom of the tower is sent to the Salt Concentrator Heater where a certain amount of water is evaporated. The concentrated solution formed in this evaporation is separated in the Salt Evaporator from where it is recirculated, as previously said, to the middle of the tower by means of the Concentrated Salt Pump.

The remaining portion of the liquid settled in the bottom of column is recycled to the Dehydrating Tower through the Dehydrating Tower Reboiler.

The Salt Evaporator drum is provided with an U tube heater to avoid freezing during shutdowns. The attached drawing shows the critical operation zones for magnesium nitrate. The water vapors produced in the Salt Evaporator during the salt concentration operation are condensed in the Salt Concentrator Condenser and drained to Battery Limits.

The uncondensed gases leaving the dehydrating Tower Condenser pass through the Gas-Liquid Separator and, jointly with the non condensed vapors from the Salt Concentrator Condenser, are aspired by the Vacuum Pumps used to produce vacuum in the Dehydrating Tower and in the Salt Concentrator Condenser.

Salt Preparation Unit

Magnesium nitrate solution must be periodically filtered in a Salt Filter to remove residues produced during the nitric acid concentration operation.

All the salt solution hold-up should be emptied to one of the Storage Salt Tanks prior to the filtering operation.

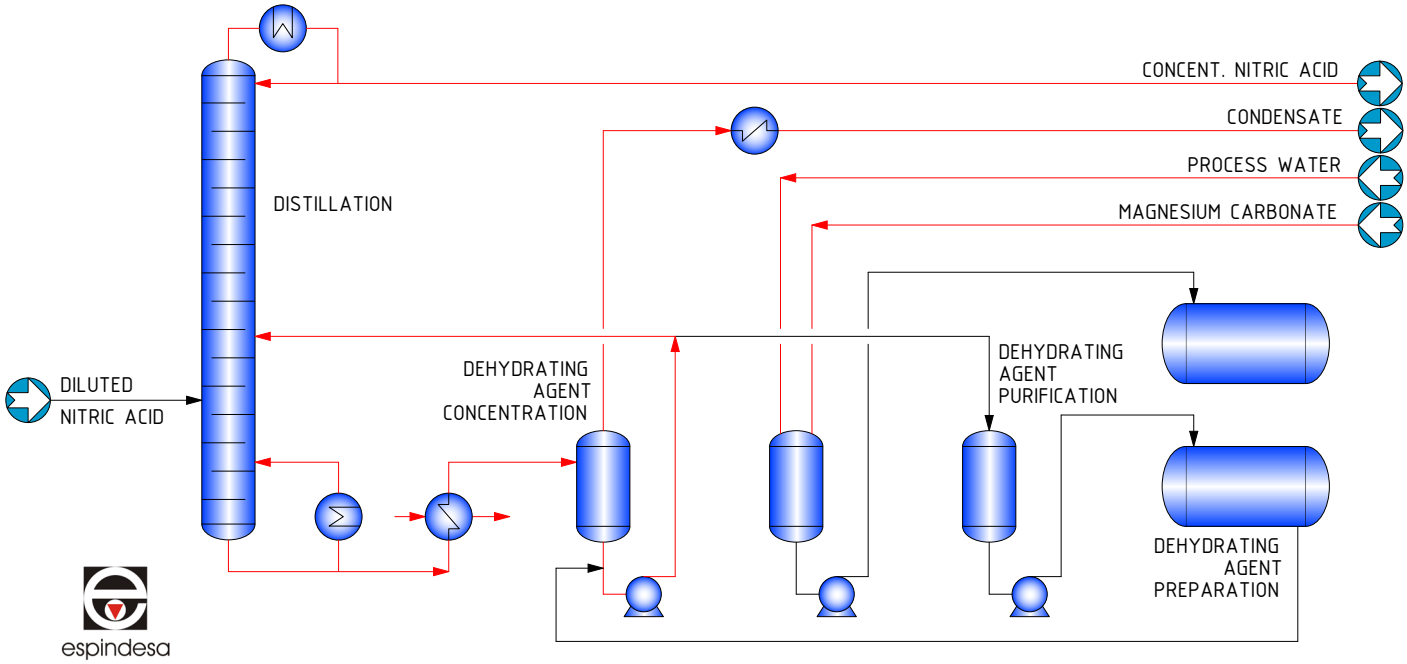
The filtration of the magnesium nitrate solution should be done after dilution with water to 30/36% to avoid salt freezing (Diluted salt solution is pumped by means of the Diluted Salt Pump to the Precoat Mix Tank where precoat agent is added to the first salt charge. This first precoat charge is recalculated with the Filter Feed Pump through the Salt Filter).

Meanwhile, circuit and equipment should be made up with clean magnesium nitrate solution salt, by means of the Dilute Salt Pump, with product from the Salt Storage Tank that should be previously filled with clean salt solution.

Consumption figures (per ton of product /calc. as 100% HNO3/)

Raw Materials		
	Weak Nitric Acid	1005 kg
	Auxiliary Magnesium Carbonat	0.6 kg
Utilities		
	MP Steam	2375 kg
	LP Steam	70 kg
	Cooling Water	95 m³
	Electric Power	16.3 kWh

PROCESS FLOW DIAGRAM



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