

Production of Nitric Acid

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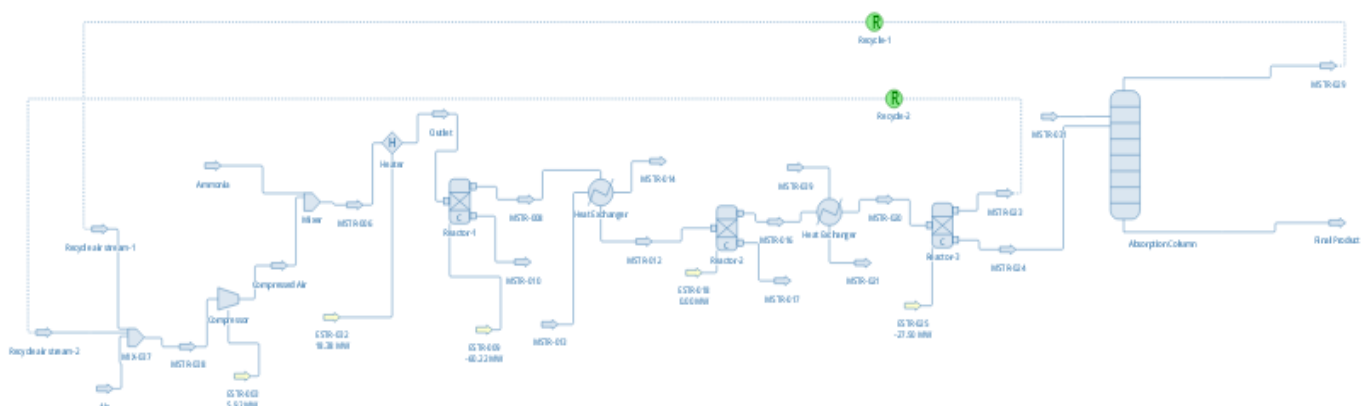
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Background & Description:

HNO₃ is a widely used chemical in chemical industry and has significant importance. One of the major processes used for nitric acid manufacturing is by oxidation of Ammonia, which is done in stages. Oxidations of NH₃ to NO and later to NO₂ are the key steps. Later, NO is absorbed into water where HNO₃ is formed and finally, the procedure of concentration is done. It is a catalytic process; platinum-rhodium catalyst is used. Temperature control at various stages is a controlling factor. Compressed air is mixed with anhydrous ammonia, keeping in mind that the pre heater and a steam heat recovery boiler-super heater are within the same reactor shell. The temperature set at the catalyst zone is at 800° C. All of the reactions involved are exothermic in nature, which eventually demands extraction of extra amount of heat for safety purposes. Thus, the product is sent through a heat recovery unit. Then, second stage of oxidation takes place at 40-50° C.

Lastly, absorption takes place which is 57-60% pure HNO₃ solution and can be sold loosely but is concentrated in accordance with the purpose of production. Majorly, it is done with the help of H₂SO₄ or with the help of Mg (NO₃)₂, which was a technique developed by Hercules Power Company in 1958. Usually, an intermediate range of 3-4 atm pressure is considered desirable for a good production but it can be fluctuated to 8 atm.

Master Property Table				
Object	Final Product	Ammonia	Air	
Temperature	22.00 (80.2)	25	25	°C
Pressure	1	3.5	1	atm
Mass Flow	0.00463478	0.2	0.01	kg/s
Molar Flow	18.14 (64.5)	1.17 (42.25)	0.345 (30.38)	mol/s



Result:

As stated from the table, with the help of the literature, the amount of nitric acid:

37.51 ton/ day.