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Ammonia Liquor

Introduction

Man must feed nitrogen back into the soil or face a decrease in his supply of food. To feed nitrogen to the soil, ammonia is the most important raw material.

Ammonia is marketed in two forms, one as a anhydrous ammonia and other one as a ammonia liquor. Various percentages of ammonia liquor are available. But the most common is 25% ammonia liquor.

Properties of Ammonia

Ammonia liquor is a solution of ammonia and pure water of desired concentration. During dissolution of ammonia into water a heat of solution liberates which has to be removed. Its b. pt. is 33.35°C, freezing pt. 77.7°C, critical temperature 133.0°C, cr. pressure 1657 psi, sp. heat at 1 atm. 0°C. 0.5009.

Solubility in water, % by wt.

at 0°C	42.8%
at 20°C	33.1%
at 40°C	23.4%
at 60°C	14.1%

Uses and Applications

1. In the manufacture of acids and alkalies.
2. Weak solution of ammonia is used as a cleaning agent in hospitals and industries.
3. It is used to manufacture the explosives like T.N.T.
4. The largest consumption of ammonia is in the manufacture of fertilizers.
5. In food and beverage industries, it is used as a source of nitrogen in fermentation process.

It is also used in the following trades :

6. In the leather industry.
7. In the metallurgy.
8. In petroleum refining.

9. In pharmaceuticals preparation.
10. In pulp and paper industries.
11. In textiles industries.
12. In refrigeration.
13. In rubber industries.

Prospects of the Industry

Ammonia is one of the truly fundamental raw material. It is the starting point of nearly all military explosives. It is used in the manufacture of soda ash, nitric acid, nylon, plastics, lacquers, dyes, rubber and other products. With this information, it is clear that there is enough scope to start a new industry to manufacture ammonia.

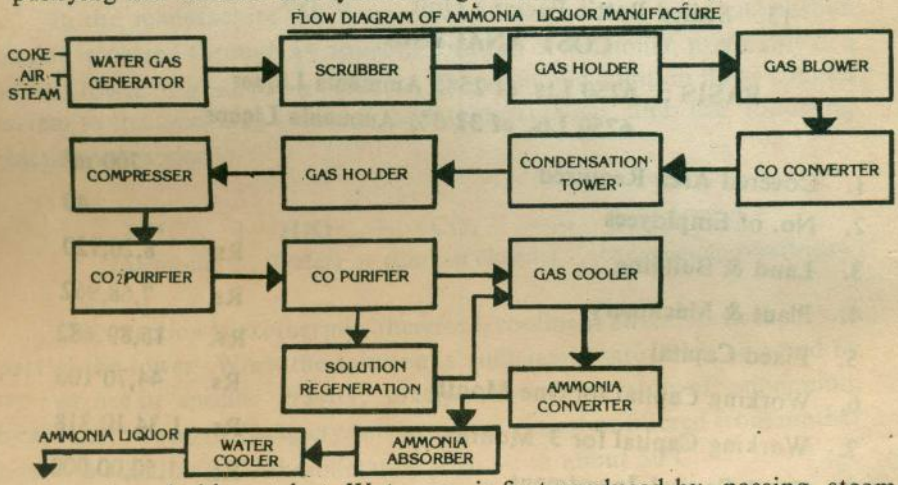
Process of Manufacture

1st Process

Ammonia from nitrogen and hydrogen gas and then production of ammonia liquor.

2nd Process (Process adopted)

The synthetic process consists of producing a mixture of nitrogen and hydrogen in the proportion of 3 parts of hydrogen to 1 part of nitrogen, purifying this mixture and synthesizing to ammonia under pressure in pre-



sence of a suitable catalyst. Water gas is first produced by passing steam on coke. The nitrogen required for ammonia synthesis is usually furnished by adding a sufficient quantity of the products of combustion from the blasting step to the gas stream. Water gas is further mixed with steam and passed through a catalyst in converter to convert CO to CO_2. Converted

gas is compressed to 25 atmosphere and passed through a CO_2-purifier to remove CO_2. The gas is then compressed to 200 atm. and passed through ammonical cuprous solution to remove unconverted CO gas.

Circulating gas, containing 3 parts nitrogen and 1 part hydrogen, is passed over a catalyst in the high-pressure converter. The ammonia so formed is absorbed by water spraying. The strength is adjusted by adding more water or re-circulating it through absorber.

List of Plant & Machinery

1.	Coke oven	1 No.
2.	Scrubber cooler	1 No.
3.	Gas Holders	2 Nos.
4.	CO converter	1 No.
5.	Gas Blower	2 Nos.
6.	Condensing tower	1 No.
7.	Compressors	3 Nos.
8.	CO_2 Purifier	1 No.
9.	CO Purifier	1 No.
10.	Ammonia converter	1 No.
11.	Storage Tanks	2 Nos.
12.	Boiler	1 No.
13.	Sealed Bottle Packing Unit	1 No.

COST ANALYSIS

BASIS : 6250 Lts. of 25% Ammonia Liquor
6250 Lts. of 32·5% Ammonia Liquor

1.	Covered Area Required		700 m²
2.	No. of Employees		40
3.	Land & Building	Rs.	8,20,720
4.	Plant & Machinery	Rs.	7,68,962
5.	Fixed Capital	Rs.	15,89,682
6.	Working Capital for One Month	Rs.	44,70'106
7.	Working Capital for 3 Months	Rs.	1,34,10,318
8.	Total Capital Investment	Rs.	1,50,00,000
9.	Cost of Production Per Annum	Rs.	5,66,19,954
10.	Receipt Per Annum	Rs.	7,61,26,104
11.	Profit Per Annum	Rs.	1,95,06,150
12.	Rate of Return		130%
13.	Break Even Point		23%