



CARBON CAPTURE AND STORAGE USING A SPECIALTY AMINE TO REDUCE THE GREEN HOUSE GAS EMISSIONS

The carbon capture and storage (CCS) or the carbon sequestration is recognized as a potential solution for a long term mitigation of the CO₂ emissions.

Today there are various proven technologies for the CO₂ capture. However, the long term effect of the CO₂ storage into the ground or any other geological formations are still under consideration and trial-studies are underway worldwide.

The oil and gas industry is one of the main producers and users of CO₂. It is well known that the CO₂ is injected into depleting reservoirs in order to enhance the recovery of the oil.

In Ammonia and Urea Plants, the CO₂ produced by the reforming process and the CO₂ recovered from the flue gas are fed together to the urea synthesis section as a feedstock. This maximizes the urea production, reduces the CO₂ emissions, and minimizes the reconstruction.

Amines have been used today successfully in various industrial applications and are the most common products for the CO₂ removal from the various gas streams, which contain CO₂.

There are several amines tested, generic or specialties, available from various vendors. The

choice of the most suitable amine depends on the gas composition, the product specifications and the operating costs.

The amine unit operating costs depend on the circulation of the amine, the energy needed for regenerating the amine, the cooling duty and the amine losses.

A typical feed gas composition of a power plant will contain Oxygen (O₂) at least about 5% (vol) and even more. There will be also other components like N₂, CO₂, H₂S, NO_x, SO_x, etc.

The presence of O₂ in the feed gas will cause the oxidative degradation of the amine leading to the formation of the Heat Stable Salts (HSS). The formation of the HSS in the amine used will have a negative effect on the operation of the unit, the quality of the amine and will attack the metallic surfaces of the equipment, especially the ones operating at elevated temperatures.

The removal of the HSS can be accomplished by adding units using Ion-Exchange resins or Electro Dialysis or by Thermal Reclamation.

AMINES & PLASTICIZERS LTD., in Mumbai-India, has developed a Specialty Amine, the AMINOSOL FGS™, which shows excellent resistance to oxygen degradation and minimum formation of HSS.

General Process Description:

The flue gas blower feeds flue gas from the plant stack to the conventional Amine Process Unit.

After cooling the flue gas to a temperature of 45 deg C or lower, the flue gas is fed into the bottom section of the absorber having a packing material inside it.

As the flue gas passes up through the packing material, the AMINOSOL FGS™ Specialty Solvent flows down onto the packing material allowing the solvent to selectively capture the CO₂ from the gas.

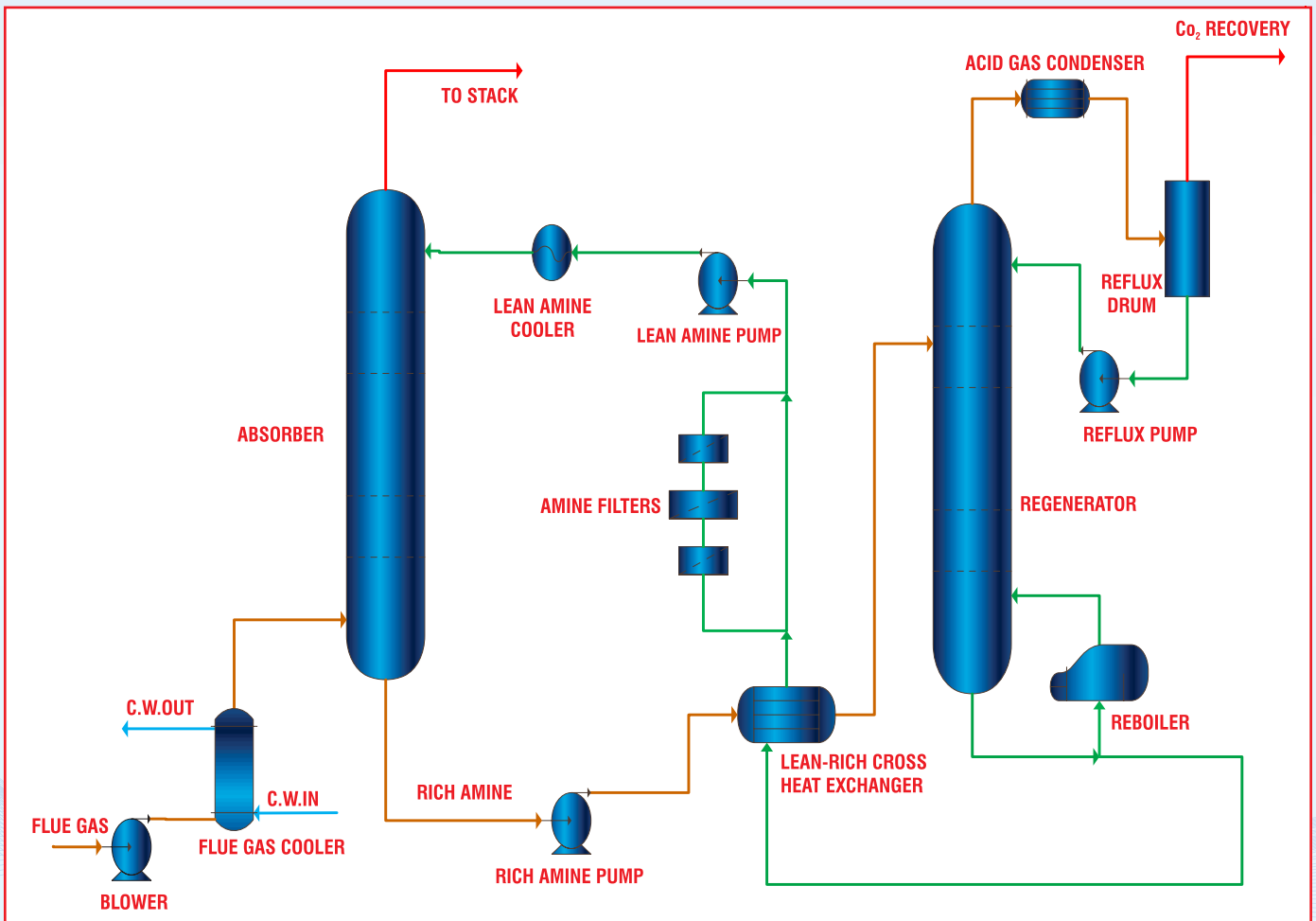
The AMINOSOL FGS™ Specialty Solvent with the captured CO₂, that is, the Rich Amine

solution, is collected in the bottom section of the absorber.

The Rich Amine solution is then pumped, through the Lean-Rich Amine cross heat exchanger and fed into the stripper.

The CO₂ Rich Amine is counter currently contacted with an upward stream of steam produced in the reboiler.

This steam strips the CO₂ from the CO₂-Rich Amine solution yielding CO₂ with a high purity. At the final stage, the stripped Lean Solution is cooled down and reintroduced into the absorber through the heat exchanger and cooler.



AMINOSOL FGS™ IN A CONVENTIONAL AMINE PROCESS UNIT



The AMINOSOL FGS™ Specialty Solvent used in a conventional Amine Process Unit offers the following advantages over other generic or specialty amines:

1. Low regeneration energy
2. Low solvent circulation rate
3. High CO₂ loading
4. Low Degradation
5. Low Solvent loss
6. Minimum oxidative degradation and HSS formation in the presence of high levels of O₂ in the feed gas.

Technical Services :

Amines and Plasticizers Ltd (APL), continue to develop new, higher performance specialty solvents for the CO₂ capture.

APL works with end-users and engineering companies meeting their products and support needs for grass-roots designs and make-up requirements. APL has a dedicated team of Engineers and Chemists who provide on-line and on-site assistance to customers.

APL provides ongoing amine units Computer Simulation Support, Technical and

Analytical services support to all users of APL products.

APL's Amine Process Simulator (APL - APS) has been proven to predict accurately the performance of solvents in numerous process schemes, de-bottlenecking, revamps and solvent conversions.

APL assists in planning and preparing the amine unit start-up, optimizing its performance and monitoring the condition of the amine solution which is used.

Other Specialty Amines Manufactured by APL-India

AMINOSOL

AMINOSOL-HST 01 to 03

AMINOSOL-G

AMINOSOL-SP

AMINOSOL-CST

ACTIVSOLV HYBRID & PHYSICAL SOLVENTS

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For more information on APL products Contact :

HEAD OFFICE

AMINES & PLASTICIZERS LTD.

“D” Building, Shivsagar Estate,

Dr. Annie Besant Road,

Worli, Mumbai – 400 018 India

Phone : +91 22 2493 5282 / 87 / 88

Fax : +91 22 2493 8162

E-mail : gastreating@amines.com / amines@vsnl.com

Website: <http://www.amines.com>

PLANT

AMINES & PLASTICIZERS LTD.

Thane Belapur Road, Turbhe,

Navi Mumbai-400705 India

Phone: +91-22-2768 1321 / 42 / 50

Fax: : +91-22-2768 1332 / 2761 6497



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Notice : The information provided is intended as a guide to using APL's Specialty Amine solvents. The information and recommendations herein are accurate and reliable to the best of APL's knowledge. The products and technology mentioned are reasonably fit for the purposes so recommended. However, as use conditions are not within its control, APL does not warrant results from use of such products, technology, or other information except those stated expressly under contract. Information provided in this guide considered proprietary to APL.