



ISSN: 2350-0328

**International Journal of Advanced Research in Science,  
Engineering and Technology**

**Vol. 7, Issue 5, May 2020**

# **Reduction of Sour Gas Emissions from Low-Sulfur Natural Gas**

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**ABSTRACT:** In the process of processing low-sulfur natural gases there is a process of absorption of SO<sub>2</sub> and N<sub>2</sub>S gases from natural gas. Due to the high pressure during the absorption, light hydrocarbons in the purified gas are absorbed into the amine solution. Because the desorption process is carried out at low pressures and high temperatures, the temperature of the amine solution should be increased to 125.

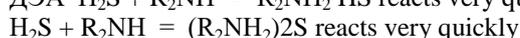
**KEY WORDS:** Low sulfur, hydrosulfide, sulfide, amine, desorption, desorber, use, watering, method, acceleration.

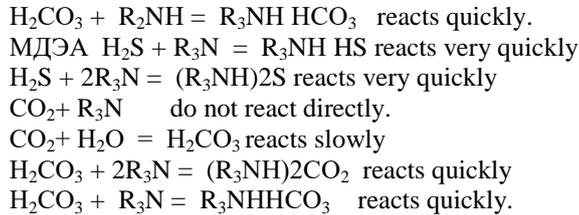
## **I. INTRODUCTION**

After separation of water vapor, gas condensate and mechanical compounds from natural gas, the natural gas contains light hydrocarbons, hydrogen sulfide, carbon (IV) -oxide. The absorber facility is used to extract light hydrocarbons, hydrogen sulfide, carbon (IV)-oxides from natural gas. Absorber is absorbed. It is observed that the gas phase is absorbed into the liquid phase, and the absorption of N<sub>2</sub>S and SO<sub>2</sub> in the natural gas is observed. In this process, the fluid is supplied to the absorber at a pressure of 20% higher than the gas pressure from three inlet zones. The process is continuous. For absorption of N<sub>2</sub>S and SO<sub>2</sub> amines it is necessary to form liquid and gas contact surfaces on absorbent plates. To make this process easier, we use wedge-shaped, hooded and plated plates. From amine solutions during absorption: monoethanolamine (MEA), diethanolamine (DEA), methylethanolamine (MDEA). MDEA produces higher productivity than other amines. A 40% solution of amine is used in the absorption process. After continuous absorption of N<sub>2</sub>S and SO<sub>2</sub> into MDEA, saturated amine is transferred to the desorption process. Desorption column is desorption process. The process is followed by the recovery of saturated amine solution. In general, 40% of the MDEA solution circulates through the system. The advantage of MDEA is that it absorbs less volume in the system than other amines during the absorption process, and the binding of N<sub>2</sub>S and SO<sub>2</sub> is better. The saturated MDEA accumulated at the bottom of the absorber goes through the pressure exchanger, the pressure dropper, and the pressure is lowered to 10 times and pumped to the expander. Here, expansive gases are released from the saturated MDEA. The content of exponential gas separated from low-sulfur natural gas depends on the composition of the processed natural gas.

## **II. METHODOLOGY**

In the process of processing low-sulfur natural gases, there is a process of absorption of SO<sub>2</sub> and N<sub>2</sub>S gases from natural gas. This process proceeds as follows. The following are the main reactions for DEA and MDEA with N<sub>2</sub>S and SO<sub>2</sub>:





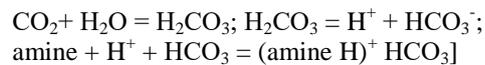
As shown in the equations, the secondary and tertiary amines in the formation of hydrosulfide or sulfide amines act in the same manner as N2S and belong to the class of reactions that pass very quickly; SO2 is influenced by secondary amine and produces R2NNSOOR2NH2-carbamate diethanolammonium, as well as (R2NN2) 2SO3-carbonate and R2NN2NSO3 - bicarbonate.

Both reactions are of the class of rapid reactions, but in the formation of carbonate and bicarbonate, the water-melting reaction of noldine SO2 is slow and forms carbonic acid (N2SO3). The reaction of carbamate is considered to be rapid until Amin is saturated with SO2 to a level of 0.5 mol / mol.

Amino carbamates are weak compounds; in alkaline environments, they are gradually separated and form bicarbonate:



The amine group (> N-) of MDEA does not have H + atoms. Therefore, it does not react directly to the formation of bicarbonate directly with SO2, and its interaction is manifested in the slow phase of carbonic acid formation:



The final product is bicarbonate and carbonates. Thus, the reaction rate of MDEA with N2S (very fast) and SO2 (slow) is much greater than their reaction rate with DEA.

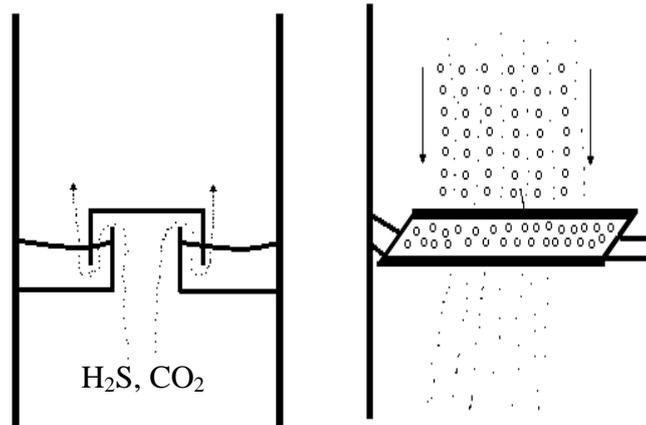
The difference in the reaction rates of amines with H2S and CO2 is that when the amines are absorbed by H2S, the mass transfer resistance is reflected in the gas phase and in the liquid phase when CO2 is absorbed. In this case, sulfur is used to select the sailor from the mixture with the CO2. The solution pressure is 25% more than the gas supplied. The MDEA solution is transformed to saturated solution after ingesting H2S and CO2. As the MDEA solution is continuously absorbed, it is removed from the saturated amine solution by desorption by removing H2S and CO2 from the amine solution and then transferred to the absorbing process. To carry out the desorption process, the saturated amine solution goes through the following steps.

1. Due to the high pressure during the absorption, light hydrocarbons in the purified gas are absorbed into the amine solution. In the next step, the pressure of the amine solution is lowered and light hydrocarbon gases are released from the amino solution due to the dispersion of amine solution in the large separator.

2. Because the desorption process is carried out at low pressures and high temperatures, the amine solution temperature should be raised to 125. Due to the high content of amine solution in the general system, the temperature is gradually increased. In this process, heat exchangers are used.

Desorption is carried out on a desorber device. Desorber amine solution passes through S-shaped plates and enters the heaters. Here the amine solution is raised to 125-127 and goes to the bottom of the desorber. At a temperature of 125-127, saturated amine is boiled, and H2S and CO2 are released.

Industrial gases emitted from the devices used in such processes known as sour gas structural percent of them will be as follows.



**III. RESULTS**

During the processing of low-sulfur natural gas from the sour gas content.

Light hydrocarbon gases .....	1.02 %
CO <sub>2</sub> .....	90.8-91.8%
H <sub>2</sub> S.....	3.0-3.2 %
water.....	4%

Appearing in the process of processing high-sulfur natural gas and sour gas content.

Light hydrocarbon gases .....	1 %
CO <sub>2</sub> .....	41 %
H <sub>2</sub> S.....	53%
water.....	4 %

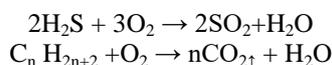
**IV. CONCLUSION**

The sour gas, which is excreted from the desorption process, passes through the desorber plate of the desorber and forms 100-105 from the top of the desorber. When the sour gas exits the desorber, a spray fluid is sprayed with a pump to lower the temperature. The sour gas coming out of Desorber is passed through a refrigeration unit with a rotary motion and reduced to 90 degrees. The temperature is then lowered to 65-70 in a water cooler. The phlegma is then extracted from the sludge gas in the separator of phlegma. Sour gas comes out of the separator and burns on low pressure torches.

When sulfur compounds contain 0.1-1% in the processed natural gas, such gases are called low sulfur gases. The processing of sulfur gases, produced by such gases, is burned on low pressure torches as the sulfur extraction does not cover its cost.

When sulfur compounds are in the range of 1-3% or more in the processed natural gas, such gases are called sulfur gases. Sulfur is produced by the processing of sour gases, which are separated from such gases.

Sour gas, which is separated from low-sulfur natural gas, causes flammable environmental damage when burned in a torch.



SO<sub>2</sub> and CO<sub>2</sub> increase in the atmosphere when sour gas is burned. These gases are extremely harmful to living things. adsorbtion sour gases with small amounts of alkalis without burning them would be useful if absorbed by a suction device or by a small amount of sialite adsorption and retaining SO<sub>2</sub> and SO<sub>2</sub>. We would have prevented air pollution and the exhaustion of various gases.



ISSN: 2350-0328

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