

APPLICATION NOTE

AMINE FOAMING IN NATURAL GAS AND SOUR GAS PROCESSING

Use of AGAR probes in this application provides three areas of benefit to the plant operator:

- ◆ Downstream operational problems due to amine foaming are prevented;
- ◆ Defoamer chemical feed rates are reduced; and
- ◆ Amine losses are minimized.

Natural gas in gas plants and sour gas in petroleum refineries is usually treated in an amine scrubber to remove hydrogen sulfide (H_2S). Usually, MEA or DEA is used and, under normal operating conditions, very little make up of the expensive amine is required to maintain a full amine system. The H_2S rich amine from the scrubber bottoms is regenerated and lean amine recycled back to the scrubber. System upsets occur due to running the system above capacity, entrained contaminants, and liquid slugging. These upsets can cause numerous problems, including the amine foaming out of the amine scrubber overhead with the gas stream. When this occurs, large make-up amine additions must be added to keep the system operating.

Foaming in the amine scrubber is controlled using specialized chemical defoamers that are injected into the sour gas upstream of the amine scrubber. When defoamers are used, they are either injected continuously to prevent a perceived constant problem, or injected on an as-needed basis once foaming is detected. In any case, defoamer is typically wasted, with the defoamer being overfed to prevent amine loss.

AGAR's patented energy absorption measurement systems offer a way to minimize amine loss and enable more efficient defoamer addition by their unique ability to detect amine foam in gas. Early foam detection using the AGAR ID-201 Interface Detector will alert operators to take corrective action,

and the probe's 4-20 mA output can even be used to directly control defoamer chemical injection.

The ID-201 foam detection probe is placed vertically in the amine scrubber above the lean amine inlet location but several inches below the demister in the gas outlet section. A second ID-201 is used in the bottom of the amine scrubber to detect a high rich amine liquid level. By design, the ID-201 probe depth is adjustable using the AGAR patented seal housing, so the optimum probe location can be determined.

A knockout drum on the amine scrubber overhead is sometimes employed to catch entrained amine and prevent downstream problems in processing the treated gas. Of course, if no knockout drum is used, all of the entrained amine in the treated gas will be lost. Detecting entrained amine loss in treated gas is typically by an operator's discovery of excess liquid in the knockout drum or by checking amine levels in the treated gas stream. The ID-201 is used to measure knockout drum liquid level so that the purge of amine can be precisely controlled.

Rich amine from amine scrubber bottoms usually goes to a flash tank that is in front of the amine regeneration system. The primary purpose of the flash tank is to remove entrained gas from the rich amine. However, over time a hydrocarbon layer accumulates in the flash tank and must be periodically purged from the vessel. Manual control of this purge results in a loss of expensive amine. Use of the ID-201 to measure the presence of the hydrocarbon layer will allow purging only when needed. This reduces amine loss, thus saving on make-up amine costs and the amount of amine in the waste oil system.

AGAR "Energy Absorption" probes are the most accurate concentration detection probes on the market today and are installed in plants and refineries throughout the world.

