glycol stream having a reduced concentration of mercury of less than 50% of the non-volatile mercury in the rich glycol.

[009] In a third aspect, a method of removing mercury from a gas feed is provided, the method comprises the steps of: contacting the gas feed with an absorption solution in an absorber, the absorption solution comprising lean amine and a first complexing agent, wherein the absorption solution concurrently removes mercury and acid gases from the gas feed generating a rich amine solution containing mercury and acid gases and a treated gas stream containing water vapor and a reduced concentration of acid gases and a second concentration of mercury, and wherein the second concentration of mercury is less than 50% of the first concentration of mercury; contacting the treated gas stream with a glycol solution in a dehydrator, wherein the glycol solution contains a second complexing agent for the glycol solution to concurrently remove mercury and water vapor from the treated gas stream, generating a rich glycol containing non-volatile mercury and a dehydrated gas stream with a reduced concentration of water and a third concentration of mercury, wherein the third concentration of mercury is less than 50% of the second concentration of mercury.

[010] In yet another aspect, a method for removing mercury from a gas feed is provided. The method comprises: providing a gas feed containing a first concentration of volatile mercury and acid gases; contacting the gas feed in an absorber with an absorption solution comprising lean amine and a first complexing agent comprising volatile cations selected from ammonium polysulfide, amine polysulfides, and sulfanes, wherein the absorption solution concurrently removes mercury and non-volatile mercury and acid gases from the gas feed; generating a rich amine solution containing acid gases and at least 50% of the volatile mercury in the gas feed as non-volatile mercury and a treated gas stream with a second concentration of acid gases and mercury.

[010a] In another aspect, there is provided a method for removing a trace amount of mercury in a natural gas feed, comprising:

providing a gas feed containing a first concentration of volatile mercury and acid gases; and

contacting the gas feed in an absorber with an absorption solution comprising lean amine and a complexing agent, generating a treated gas stream with a reduced concentration of acid gases and mercury, wherein the absorption solution concurrently removes mercury and acid gases from the gas feed for a rich amine solution containing mercury and acid gases, wherein the complexing agent is selected from

ammonium polysulfide, amine polysulfides, calcium polysulfide, sulfanes, and mixtures thereof;

heating the rich amine solution containing acid gases and mercury in a solvent regeneration process employing at least a stripper and a reboiler, wherein at least a portion of the mercury is removed from the rich amine with acid gases as an overhead stream; and

treating the overhead stream containing mercury by adsorption in a mercury removal adsorbent bed.

DRAWINGS

[011] Figure 1 is a diagram illustrating an embodiment of a gas processing plant.

[012] Figure 2 is a diagram illustrating an embodiment of an amine unit.

DETAILED DESCRIPTION

[013] The following terms will be used throughout the specification and will have the following meanings unless otherwise indicated.