one secondary and/or at least tertiary amine is used, and as secondary amine, inter alia, 2,2,6,6-tetramethylpiperidine is listed. Here also, owing to relatively small CO_2 uptakes, relatively large mass flow rates of absorption medium need to be pumped in the process, which also must be regenerated again in the desorber. In addition, there is the risk that precipitation can occur after the absorption.

The Institut Francais du Petrole, in the publications US 2009/0199709, FR 2900841 and US 2007/0286783, describes an absorption medium which comprises, inter alia, 4-amino-2,2,6,6-tetramethylpiperidine and/or 1,2,2,6,6-pentamethyl-4-piperidine as amine. The 4-amino-2,2,6,6-tetramethylpiperidine can also be added as activator to the absorption medium. Here, the same disadvantages result as have already been indicated for WO 2010/089257.

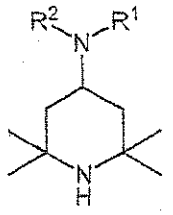
The object of the present invention was therefore to provide an improved and thereby more economic process.

Summary

In a first aspect, there is provided a process for absorption of an acid gas from a gas mixture by contacting the gas mixture with an absorption medium,

characterized in that

an absorption medium is used which comprises at least water as solvent and at least one amine (A) of formula (I)



(I)

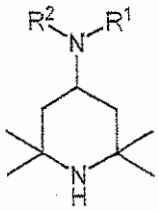
where R^1 = aliphatic radical having 2 to 6 carbon atoms and having at least one amino group,

R^2 = hydrogen, a C_{1-4} alkyl group or a radical R^1.

In a second aspect, there is provided an amine-containing absorption medium,

characterized in that

it comprises at least water as solvent, at least one amine (A) of formula (I)

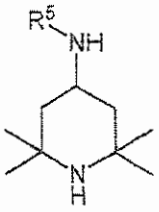


(I)

where R^1 = aliphatic radical having 2 to 6 carbon atoms and having at least one amino group,

R^2 = hydrogen, a C_{1-4} alkyl group or a radical R^1

and additionally a further amine (B) of formula (III)



(III)

where R^5 = C_{1-6} alkyl group, preferably butyl group.

In a third aspect, there is provided a device for separating off acid gases from a gas mixture, said device comprising an absorption unit, a desorption unit and a circulating absorption medium, characterized in that said device comprises an absorption medium as defined above.

Surprisingly, a process has been found for absorption of acid gases from a gas mixture by contacting the gas mixture with an absorption medium, which is characterized in that the absorption medium comprises an amine (A) of the formula (I). The absorption medium according to the invention is distinguished from processes according to the prior art by its improved capacity for binding acid gases, in particular CO_2, so that overall a higher CO_2 uptake can be achieved. This offers the opportunity that the plant components in the process according to the invention may be dimensioned smaller. Thus for example, pumps, containers, pipes and absorption or desorption columns having a smaller diameter can be used in the process according to the invention. Owing to the properties of the absorption medium according to the invention, smaller amounts of absorption medium can also be used in the process according to the invention. Therefore, the buffer tank components can also be dimensioned smaller. Owing to the reduced amounts of absorption medium used, the energy consumption can also be reduced, since less energy is necessary for the process step of desorption.

In addition, the energy to be applied for elimination of the absorbed CO_2 is lower than according to the prior art. Furthermore, a synergist effect could be observed completely unexpectedly when an absorption medium is used which comprises both an amine (A) of formula (I) and an amine (B) of formula (III). The CO_2 uptake measured in this case is greater than the arithmetic