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Glycol rate for chilling (EG) and contactor (TEG) systems

Hooman Tabaraei**Specialist Process Engineer (MIChemE, CEng)**[Unfollow Hooman](#)

Does anyone have come across to a practical reference for estimation of the required rate of glycol, EG, DEG or TEG, for absorbing water in order to meet the specified dew point of dried gas in glycol dehydration units. We're studying the performance of an existing glycol dehydration unit (EG chilling system), by considering all items which can influence on quality of the dried gas, such as rate of glycol, change of glycol to other types, and increase of glycol purity. Our study performed by PROMAX, and we found that the wetness percentage of the dried gas will not be affected considerably by increasing the rate of glycol, in compared with change of glycol or increase of glycol purity. I need a

practical relation between the dried gas dew point and circulation rate for both chilling system (EG) and contactor system (TEG). I've only found one brief paper from Dr. Moshfeghian who had compared the rate of glycol for both contactor (TEG) and chilling system (EG), but unfortunately I didn't see any correlations between glycol rate and required dew point of dried gas for both systems.

Thanks in advanced

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**Wilfredo Garcia****Process Specialist at Ecopetrol**

Wilfredo

Dear Hooman,

I would recommend you to have a look to the GPSA in the dehydration section. There you can find answers to your questions.

Cheers,

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**Hooman Tabaraei****Specialist Process Engineer (MIChemE, CEng)**

Hooman

Thanks Wilfredo for your suggestion, but as you may know GPSA only say about TEG dehydration unit, and I'm looking for EG circulation rate in chilling system.

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**Suresh Venkatesh****Senior Lead Engineer - Process**

Suresh

Hooman,

The gas dehydration process involved in a TEG contactor Unit & Chilling Unit (with EG) are different!

TEG contactor unit is absorption based.

In a gas chilling unit, the actual water extraction mechanism is condensation. An inhibitor (like EG) is added (only) to remove the free water formed (by gas cooling) & prevent freeze ups.

So the key item that you need to focus on in a chilling unit is - whether you are providing enough gas cooling to remove the required water content.

Inhibitor rate & concentration can be estimated from GPSA/ Hammerschmidt's equations. Other

useful references are JM Campbell & Francis Manning.

Hope this helps..

Regards/Suresh

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Reza Modanloo

Senior Process Engineer /Open to new opportunities

Top Contributor

Reza

Dear Hooman ,

as other friend said, the most popular and reputable reference for estimation of hydrate inhibitors rate is GPSA manual. Following i have some comment which might be useful for you:

1) according to GPA the criteria for selection of proper hydrate inhibitor is tempeatre.

for $T > -25$ try to use MEG and other glycols because of low rate of loss and some other advantages. but for $T < -25$ you have to use methanol instead

2) using hammer schmidt's equation you can calculate rate of any type of Glycols plus methanol which are common types of inhibitors.important thing is that you have to calculate rate of loss for Methanol but the loss rate for glycols is zero (every thing is explained in GPSA)

I hope what i said may help you.

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Vagif Gafarov

Sr. Process Engineer at KBR

Vagif

For TEG dehydration systems, the req'd dew point will depend on the purity of TEG and the rate of circulation - till it reaches some value. After then the circulation rate will not have very significant effect. If the dehydrating gas has pressure less than, say 20 barg (on the top of my head) then the TEG contactors become uneconomical. For this case you may consider gas chilling using, say propane as a refrigerant. The water removal/dehydration will depend on the propane temperature and effectiveness of your refrigerant loop as long as the achieved dew point is usually say 5 degC above the liquid refrigerant temperature in the chillers. The MEG will be added as the hydrate inhibitor only and will have to be recycled in a standard glycol reboiler.

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Hooman Tabaraei

Specialist Process Engineer (MIChemE, CEng)

Hooman

Hammerschmidt and Neilson correlations mentioned in GPSA, are used to estimate the required flow rate of hydrate inhibitor (such as MEOH, EG) as per specified depression of hydrate formation temperature in gas phase, while liquid phase includes only water and inhibitor. But in chilling system, liquid phase encompasses water, inhibitor and hydrocarbon components. So it seems application of mentioned equations in chilling system will be doubtful, and not reliable.

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Reza Modanloo

Senior Process Engineer /Open to new opportunities

Top Contributor

Reza

Dear Hooman,

condensate phase should not necessarily contain just water and inhibitor in hammer schmidt's method.no worries about that.look at the example 20-10 of GPSA that i have sent for you through linked in.it is clearly mentioned in this example that condensate phase includes hydrocarbons with density of 788 kg/m³ and molecular mass of 140

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Reza Modanloo

Senior Process Engineer /Open to new opportunities

Top Contributor

Reza

Dear Hooman,

i will send the example to your e-mail.please find it

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Hooman Tabaraei

Specialist Process Engineer (MIChemE, CEng)

Hooman

Dear Reza,

Term of X (inhibitor mass fraction) used in all correlations and graphs for depression of hydrate formation temperature related to Hammerschmidt and Nielson equations, mentioned in GPSA, are

estimated based on only two components, water and inhibitor, in liquid phase. For example, Fig 20-45 is used to convert methanol mole fraction to mass fraction in two-component liquid system. And in Eq. 20-4, only terms of X (MEOH wt%) and 1-X (water wt%) are observed, that means only two component assumed in liquid phase. As the mentioned correlations in above have been presented in GPSA without their basic assumptions, we need to be more conservative with their results.

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