Typically, the hydrotreatment reactions are exothermal, and therefore it is possible to optimize the energy consumption of the process, by heat exchange between feed and effluent. If ammonia and halides are present a problem in this respect is however that in a feed/effluent heat exchanger feed temperatures below 270°C may result in cold zones in the heat exchanger, where e.g. ammonium chloride may precipitate.

According to the present invention a halides removal washing system is described, which is able to absorb halides from a process gas stream with a wash water injected into the process gas stream by means of an injector pipe and -nozzle.

WO 2015/050635 relates to a process for removing sulfur and halides from a hydrocarbon stream by hydrotreatment. The document is silent on the presence of nitrogen in the intermediate stream, and contrary to the present disclosure it explicitly recommends recuperation of heat from the hydrotreated product by heat exchange with chilled water, which is highly likely to cause precipitation of salts, if nitrogen was present.

BRIEF SUMMARY

In an aspect of the present disclosure, there is provided a halides removal washing system comprising: a process gas duct for process gas comprising hydrocarbons and halides; an injector pipe extending into the process gas duct, said injector pipe having a wash water inlet in a first end of the injector pipe arranged outside the process gas duct and a wash water outlet with an injector nozzle in a second end of the injector pipe adapted to spray the wash water into the process gas in the process gas duct downstream of the injector nozzle, wherein mixing of the wash water and the process gas results in washout of hydrochloric acid (HCl) at a level above 99.9%; and an anti-precipitation means

comprising a heat insulation liner arranged around at least a part of the injector pipe which extends into the process gas duct, and an injector purge channel arranged around the injector nozzle and adapted to provide a relative hot injector purge fluid as compared to the temperature of the wash water, wherein the process gas duct has an anti-corrosion liner arranged on the inside surface of the process gas duct downstream of the injector nozzle, and wherein the halides removal washing system prevents precipitation of ammonium chloride (NH_4Cl).

In another aspect of the present disclosure, there is provided a use of a halides removal washing system disclosed herein in a hydrotreatment process.

The halides removal washing system of the present disclosure comprises a process gas duct suited for conduction of a process gas comprising halides. The system also comprises an injector pipe extending into the process gas duct. The injector pipe has a wash water inlet in a first end arranged outside the process gas duct and a wash water outlet with an injector nozzle in a second end of the injector pipe arranged within the process gas duct. The injector nozzle is adapted to spray the wash water into the process gas in the process gas duct downstream of the injector nozzle to absorb halides from the process gas.

CLAIMS

1. A halides removal washing system comprising

a process gas duct for process gas comprising hydrocarbons and halides;

an injector pipe extending into the process gas duct, said injector pipe having a wash water inlet in a first end of the injector pipe arranged outside the process gas duct and a wash water outlet with an injector nozzle in a second end of the injector pipe adapted to spray the wash water into the process gas in the process gas duct downstream of the injector nozzle, wherein mixing of the wash water and the process gas results in washout of hydrochloric acid (HCl) at a level above 99.9%; and

an anti-precipitation means comprising a heat insulation liner arranged around at least a part of the injector pipe which extends into the process gas duct, and an injector purge channel arranged around the injector nozzle and adapted to provide a relative hot injector purge fluid as compared to the temperature of the wash water,

wherein the process gas duct has an anti-corrosion liner arranged on the inside surface of the process gas duct downstream of the injector nozzle, and

wherein the halides removal washing system prevents precipitation of ammonium chloride (NH_4Cl).

2. The halides removal washing system according to claim 1, wherein the anti-precipitation means further comprises electrical heating wiring.

3. The halides removal washing system according to claim 1 or 2, wherein the anti-corrosion liner is arranged with a gap between the inside surface of the process gas duct and the anti-corrosion liner allowing for a duct purge fluid between the anti-corrosion liner and the process gas duct.

4. The halides removal washing system according to claim 3, wherein the gap is from 0.2 – 50 mm between the inside surface of the process gas duct and the anti-corrosion liner.

5. The halides removal washing system according to claim 3 or 4, further comprising a sealing between the anti-corrosion liner and the process gas duct and a duct purge fluid connection to the process gas duct downstream of the injector nozzle adapted to purge fluid into the gap between the anti-corrosion liner and the process gas duct.

6. The halides removal washing system according to any of the claims 3, 4 or 5, comprising a duct purge fluid consumption monitoring system adapted to provide an alarm output if the duct purge fluid consumption exceeds a pre-set value.

7. The halides removal washing system according to any of the preceding claims, further comprising at least one fluid mixer element arranged within the process gas duct downstream the injector nozzle.

8. The halides removal washing system according to any of the preceding claims, further comprising a plurality of injector pipes and a plurality of injector nozzles.

9. The halides removal washing system according to any of the preceding claims, comprising:

a common process gas duct upstream the injector nozzles; and a plurality of process gas ducts downstream each of the injector nozzles.

10. Use of a halides removal washing system according to any of the preceding claims in a hydrotreatment process.