In general, methanol feedstock for acetic acid production processes is pumped to the reactor from methanol storage/surge tanks using at least one high pressure pump, typically a set of high pressure pumps. It is suggested in the art that used methanol streams may be transferred from a scrubbing unit into the reactor. However, such an arrangement would appear to rely on the use of an additional high pressure pump or set of high pressure pumps; one pump or set of pumps on the base of a scrubbing unit to pump used methanol streams from the scrubbing unit to the reactor and a second pump or set of pumps on the discharge of a methanol storage/surge tank to pump fresh methanol to the reactor.

As used herein, reference to a "high pressure pump" or "high pressure pumps" are references to pumps with discharge head pressure substantially above atmospheric pressure, typically having a discharge head pressure of at least 20 barg, more typically at least 25 barg. High speed pump(s) may be employed as high pressure pump(s).

It would thus be desirable to provide an alternative method of scrubbing off-gas streams generated in production processes for the manufacture of acetic acid, and in particular off-gas streams generated in production processes for the manufacture of acetic acid by the carbonylation of methanol, which method avoids or at least mitigates the above-mentioned disadvantages.

Summary

In one aspect, the present disclosure provides a method of operating an off-gas scrubbing system in an acetic acid production unit which generates off-gas comprising methyl iodide, said production unit comprising a reactor, a light ends recovery section comprising a light ends column, an acetic acid scrubbing unit and a methanol scrubbing unit which method comprises:

(i) supplying off-gas and acetic acid to the acetic acid scrubbing unit and withdrawing off-gas therefrom;

(ii) supplying withdrawn off-gas and methanol to the methanol scrubbing unit and contacting the off-gas and methanol therein to produce scrubbed off-gas; and

(iii) withdrawing from the methanol scrubbing unit scrubbed off-gas;

wherein the acetic acid is supplied to the acetic acid scrubbing unit at a tick-over flow rate.

In another aspect, the present disclosure provides an apparatus for scrubbing off-gas generated in an acetic acid production unit which production unit comprises a reactor

for the production of acetic acid and a light ends recovery section comprising a light ends column wherein the apparatus comprises at least:

- an acetic acid scrubbing unit and a methanol scrubbing units coupled in series;
- the acetic acid scrubbing unit having a first inlet for receiving a supply of acetic acid, a second inlet for receiving off-gas, a first outlet for discharging off-gas and a second outlet for discharging a stream comprising acetic acid;

the methanol scrubbing unit having a first inlet and an additional inlet for receiving a supply of methanol, said first inlet being located in an upper portion of the scrubbing unit and the additional inlet being located in a lower portion of the scrubbing unit, a second inlet for receiving off-gas and connected to the first outlet of the acetic acid scrubbing unit, a first outlet for discharging off-gas and a second outlet for discharging a used methanol stream and said methanol scrubbing unit is operable to scrub received off-gas with methanol to remove methyl iodide therefrom; and the acetic acid scrubbing unit is configurable for operation at a tick-over flow rate of acetic acid.

Detailed Disclosure of Embodiments

The present invention provides a method of operating an off-gas scrubbing system in an acetic acid production unit which generates off-gas comprising methyl iodide, said production unit comprising a reactor, a light ends recovery section comprising a light ends column, an acetic acid scrubbing unit and a methanol scrubbing unit which method comprises:

(i) supplying off-gas and acetic acid to the acetic acid scrubbing unit and withdrawing off-gas therefrom;

(ii) supplying withdrawn off-gas and methanol to the methanol scrubbing unit and contacting the off-gas and methanol therein to produce scrubbed off-gas; and

(iii) withdrawing from the methanol scrubbing unit scrubbed off-gas,

wherein the acetic acid is supplied to the acetic acid scrubbing unit at a tick-over flow rate.

By 'tick-over' flow of acetic acid is meant throughout this specification and in the claims, a flow rate of acetic acid to the acetic acid scrubbing unit which is insufficient to reduce or substantially reduce the methyl iodide content of off-gas fed to the scrubbing unit, such that off-gas withdrawn from the acetic acid scrubbing unit has not been scrubbed