[0015] Today, therefore, there is a need for a process for synthesis of DMDS by reaction of sulphur with methyl mercaptan that does not exhibit the drawbacks encountered in the known processes, thus being more environmentally friendly and less eco-toxic, but also safer, while preserving the high yields and selectivities, or even with yields and selectivities which are improved relative to those of the known processes, while being a process which is operated as economically as possible.

[0016] It has now been found that it is possible to remove the aforementioned drawbacks, entirely or at least partly, by virtue of the process for preparing dimethyl disulphide (DMDS) in accordance with the present ~~invention~~disclosure, which is detailed in the description hereinafter. The process of the present ~~invention~~ disclosure makes it possible more particularly to resolve a large number of the drawbacks in the processes based on reactions (1) and (2) as described above.

[0017] Accordingly, in a first aspect, the present ~~invention~~ disclosure provides a process for preparing dimethyl disulphide, batchwise or continuously, preferably continuously, said process comprising at least the following steps:

a) reaction of at least one hydrocarbon charge in the presence of hydrogen sulphide (H_2S) and optionally of sulphur (S) to form carbon disulphide (CS_2) and hydrogen (H_2),

b) hydrogenation reaction of said carbon disulphide (CS_2) in the presence of said hydrogen (H_2), both obtained in step a), to form methyl mercaptan (CH_3SH), hydrogen sulphide (H_2S) and optionally hydrogen (H_2),

c) optionally, but preferably, recycling said hydrogen sulphide (H_2S) formed in step b) to step a),

d) reaction of the methyl mercaptan formed in step b) with sulphur to form dimethyl disulphide and hydrogen sulphide,

e) optionally recycling into step a) of the hydrogen sulphide formed in step d), and

f) recovery of the dimethyl disulphide.

[0018] This process has the very great advantage of consuming the hydrogen sulphide (H_2S) which is produced during the reaction, and in some cases even doing so stoichiometrically as indicated later on below, hence meaning that all the hydrogen sulphide consumed in the process ~~of the invention~~as defined above is produced by said process. Therefore, the process ~~of the invention~~as defined above avoids any addition, and even in some cases any removal, of hydrogen sulphide (H_2S) in excess, or else avoids the additional synthesis of hydrogen sulphide (H_2S), as is sometimes required with the known processes of the prior art.

[0019] Moreover, the process ~~of the present invention~~ as defined above is a process which is simple to perform, is of low eco-toxicity and is economical. The process ~~of the invention~~ as defined above also makes it possible to obtain a high yield and a high selectivity in terms of DMDS. In the present description, unless otherwise stated, the percentages referred to are percentages by weight.

[0020] The process according to the invention is a process of three consecutive reaction steps (steps a), b) and d) above), without any need for the intermediates obtained in each step to be purified. Schematically, the first step of the process (step a) is a reaction, carried out preferably at high temperature, between a hydrocarbon charge (illustrated here: methane) and hydrogen sulphide (H_2S) in accordance with reaction (5):

$$CH_4 + 2\,H_2S \rightarrow CS_2 + 4\,H_2 \qquad (5)$$

[0021] In the second step (step b)), the carbon disulphide formed in step a) is subjected to catalytic hydrogenation with the hydrogen likewise formed in step a), in accordance with reaction (6):

$$CS_2 + 4\,H_2 \rightarrow CH_3SH + H_2S + H_2 \qquad (6)$$

[0022] This succession of two reaction steps is notable in that the number of mols of methyl mercaptan formed is identical to the number of mols of methane consumed, and that step a) (reaction 5) requires twice as many mols of hydrogen sulphide as formed in step b) (reaction 6).

[0023] In one especially advantageous embodiment of the present invention, the hydrogen sulphide formed in step b) is recycled into step a) according to step c). In this embodiment, it is seen that all of the hydrogen sulphide formed may therefore be re-used in step a), avoiding the storage of said hydrogen sulphide formed.

[0024] In another embodiment, the sulphurized hydrogen (or hydrogen sulphide) formed at the end of step b) may not be recycled into step a), and may be recovered for subsequent use – for example, may be passed into the step e) of recycling of the hydrogen sulphide formed after the reaction of the sulphur with methyl mercaptan.

[0025] As indicated above, the amount of hydrogen sulphide produced in step b) (reaction (6) above) is not sufficient in molar amount for the implementation of reaction (5) in step a), and a further amount of hydrogen sulphide must be supplied in order for step a) to be conducted. This further amount may originate, for example, from the hydrogen sulphide which is formed after the reaction of the sulphur with methyl mercaptan and which may be recycled according to step e).

[0026] As a variant, consideration may also be given to synthesizing the missing amount of hydrogen sulphide, especially from the hydrogen formed in step b) reacted with sulphur