reaction between methane and H_2S occurs by means of a pulsed plasma with corona discharge. Since this application does not describe any examples of synthesis, it may appear difficult to imagine a process for the large-scale industrial synthesis of methyl mercaptan with this technology. Moreover, this process requires the synthesis of H_2S if the latter is not available.

[0015] For its part, patent application EP0649837 proposes a process for the synthesis of methyl mercaptan by catalytic hydrogenolysis, with transition metal sulfides, of dimethyl disulfide with hydrogen. Although this process is efficient, it requires relatively high temperatures of the order of 200°C to obtain industrially advantageous levels of productivity.

[0016] Those skilled in the art also know that it is possible to prepare methyl mercaptan by acidification of an aqueous solution of sodium methyl mercaptide (CH_3SNa). This method has the major drawback of producing large amounts of salts, such as sodium chloride or sodium sulfate, depending on whether hydrochloric acid or sulfuric acid is used. These saline aqueous solutions are often very difficult to treat and the traces of foul-smelling products which remain mean that this method cannot be readily envisaged on the industrial scale.

[0017] The processes for synthesising mercaptans higher than methyl mercaptan also have numerous drawbacks. Thus, the substitution of alcohols with hydrogen sulfide requires high temperatures, and often pressures, and leads to undesired by-products of olefin, ether and sulfide type.

[0018] The catalytic or photochemical addition of hydrogen sulfide onto unsaturated compounds often occurs under slightly milder conditions than above, but also leads to numerous by-products formed by isomerisation of the starting material, by non-regioselective addition or by double addition which gives sulfides. Finally, the substitution of halogenated derivatives gives rise to processes which generate large amounts of effluents and saline waste which are not easily reconcilable with industrial processes.

[0019] The subject of the present disclosure is to propose a novel process for preparing mercaptans, in particular methyl mercaptan, which does not have the drawbacks described in the processes known from the prior art laid out above.

[0019a] In an aspect, there is provided a process for the preparation of a mercaptan of formula R-SH, comprising at least the steps of:

a) preparation of a mixture comprising:

1) a disulfide of formula R-S-S-R',

2) a catalytic amount of amino acid bearing a thiol group or of a thiol-group-containing peptide,

3) a catalytic amount of an enzyme catalysing the reduction of the disulfide bridge created between two equivalents of said amino acid bearing a thiol group or of said thiol-group-containing peptide,

4) a catalytic amount of an enzyme catalysing the reduction of hydrogen,

5) a catalytic amount of a cofactor common to the two enzymes catalysing the reduction and the dehydrogenation,

b) addition of hydrogen with a catalytic amount of hydrogen dehydrogenase enzyme,

c) carrying out the enzymatic reaction,

d) recovery of the mercaptan of formula R-SH and the mercaptan of formula R'-SH,

e) optional separation and optional purification of the mercaptan of formula R-SH and/or of the mercaptan of formula R'-SH.

[0019b] In another aspect, there is provided the use of an aqueous solution of enzymatic complex comprising an amino acid bearing a thiol function or a peptide bearing a thiol function, for the synthesis of a mercaptan from a disulfide.

[0019c] In another aspect, there is provided a mixture comprising:

1) a disulfide of formula R-S-S-R',

2) a catalytic amount of amino acid bearing a thiol group or of a thiol-group-containing peptide,

3) a catalytic amount of an enzyme catalysing the reduction of the disulfide bridge created between two equivalents of said amino acid bearing a thiol group or of said thiol-group-containing peptide,

4) optionally a catalytic amount of an enzyme catalysing the reduction of hydrogen,

5) a catalytic amount of a cofactor common to the two enzymes catalysing the reduction and the dehydrogenation,

6) and optionally hydrogen,

where R and R' are as defined above.