In WO 94/29421, chelating agents are disclosed that are environmentally friendly. However, the manufacturing process disclosed in WO 94/29421 does not exclude certain undesired impurities, for example nitrilotriacetate ("NTA"), and it requires the use of hydrocyanic acid or cyanides.

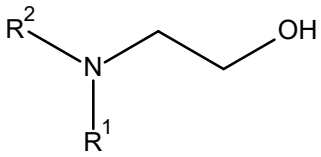
In WO 2012/159952, a process for the manufacture of certain N-bearing carboxylic acids is disclosed that avoids the formation of NTA. The alkoxylation step is convenient and followed by a catalytic oxidative dehydrogenation in the presence of alkali metal hydroxide. However, the alkoxylation step may lead to the formation of ethylene glycol that is subsequently easily converted to oxalic acid. Oxalates are undesired in many of the subsequent applications of carboxylic acids, especially in automatic dishwashing applications.

JP53077009A (JPA1978077009) refers to a process for manufacturing an aminocarboxylic acid, using an (undoted) platinum catalyst on a support.
JP 2000 063338 A discloses a process for manufacturing sodium N-methylglycine (sodium sarcosinate), using gold (Au) as active metal.
US 6046356 describes a process for preparing aqueous solutions of betaines; the experimental evidence is restricted to the use of palladium or platinum on a support as active metals at temperatures in the range from 70° to 80° C.

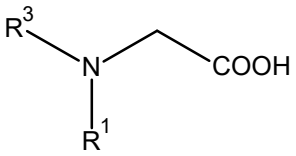
It was therefore the objective of the present disclosure to provide N-bearing carboxylic acids that do not contain the above discussed undesired impurities. It was further an objective to provide a process that avoids the disadvantages described above. Furthermore, it was an objective to provide N-bearing carboxylic acids with sufficient purity.

Accordingly, the process defined at the outset has been found, hereinafter also defined as inventive process or as process according to the present disclosure.

In one aspect, there is provided a process for the synthesis of compounds with the general formula (II) or their respective alkali metal salts by oxidation of compounds of general formula (I) with oxygen



(I)

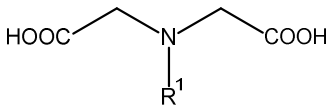


(II)

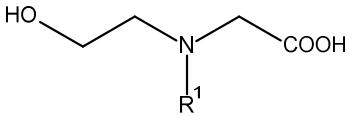
in the presence of a heterogeneous catalyst containing a metal of group 10 of the periodic table of the elements,

wherein R^1 and R^2 and R^3 are same or different and selected from H and C_1-C_6-alkyl, non-substituted or substituted with one or more moieties selected from COOH and O-R^4 with R^4 being selected from H and C_1-C_4-alkyl, wherein the catalytically active metal is Pt and wherein at least one promotor selected from Cd, Tl, Pb and Bi is present in the heterogeneous catalyst, and wherein the oxidation is carried out at a temperature in the range of from -10 to +40°C.

In another aspect, there is provided a mixture that comprises compounds according to general formulae (II a) and (II b)



(II a)



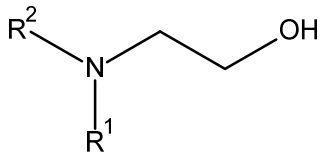
(II b)

or their respective alkali metal salts, in a molar ratio in the range of from 2 to 15% by weight glycolic acid, referring to the sum of compounds according to general formulae (II a) and (II b), and less than 0.1% by weight of oxalic acid, or their respective alkali metal salts,

wherein R^1 is selected from H and C_1-C_6-alkyl, non-substituted or substituted with one or more moieties selected from COOH and O-R^4, with R^4 being selected from H and C_1-C_4-alkyl

and wherein the percentages refer to the respective sodium salts.

The inventive process starts off from a compound according to general formula (I)



(I)