even more preferably in the range of from 78 wt.% to 97.5 wt.%, even more preferably in the range of from 79 wt.% to 95 wt.%, yet more preferably in the range of from 80 wt.% to 90 wt.% water, based on the total weight of the first aqueous phase, and

ii. not more than 35 wt.%, preferably in the range of from 0.1 wt.% to 35 wt.%, preferably in the range of from 0.2 wt.% to 30 wt.%, more preferably in the range of from 1 wt.% to 25 wt.%, yet more preferably in the range of from 1.5 wt.% to 24 wt.%, more preferably in the range of from 2 wt.% to 23 wt.%, even more preferably in the range of from 2.5 wt.% to 22 wt.%, even more preferably in the range of from 5 wt.% to 21 wt.%, yet more preferably in the range of from 10 wt.% to 20 wt.% of at least one organic compound, based on the total weight of the first aqueous phase,

wherein the sum of the weight amounts of i. and ii. is 100 wt.%;

a4) separation and optionally purification of at least a part of the methacrylic acid from the crude organic phase comprising methacrylic acid; and further comprising a process step aa4) of separating a high boiler phase from the crude organic phase;

a5) optionally, esterification of at least a part of the methacrylic acid obtained in step a4);

b) separation of at least a part of the water comprised in the first aqueous phase obtained in step a3) from at least a part of at least one component ii. to obtain a second aqueous phase and an organic phase, wherein the organic phase comprises at least one component ii., and wherein the second aqueous phase is depleted in at least one component ii. compared to the first aqueous phase;

c) optionally, separation of at least a part of at least one organic compound from the second aqueous phase obtained in process step b) to obtain a third aqueous phase;

d) optionally, separation of at least a part of at least one component ii from the organic phase obtained in process step b).

A contribution to solving the above objects is also made by a process for treatment of an aqueous phase comprising at least one organic compound, comprising process steps:

a) provision of a first aqueous phase comprising components

i. at least 65 wt.%, preferably in the range of from 65 wt.% to 99.9 wt.%, more preferably in the range of from 70 wt.% to 99.8 wt.% water, yet more preferably in the range of from 75 wt.% to 99 wt.%, more preferably in the range of from 76 wt.% to 98.5 wt.%, more preferably in the range of from 77 wt.% to 98 wt.%, even more preferably in the range of from 78 wt.% to 97.5 wt.%, even more

Claims

1. A process for preparation of at least one of methacrylic acid and a methacrylic acid ester, comprising process steps:

a1) gas phase oxidation of at least one C_4 compound to obtain a reaction phase comprising methacrylic acid;

a2) quenching of the reaction phase to obtain a crude aqueous phase comprising methacrylic acid;

a3) extraction of at least a part of the methacrylic acid from the crude aqueous phase comprising methacrylic acid into an organic solvent to obtain a crude organic phase comprising methacrylic acid and a first aqueous phase, wherein the first aqueous phase comprises components

i. at least 65 wt.%, preferably in the range of from 65 wt.% to 99.9 wt.%, more preferably in the range of from 70 wt.% to 99.8 wt.% water, yet more preferably in the range of from 75 wt.% to 99 wt.%, more preferably in the range of from 76 wt.% to 98.5 wt.%, more preferably in the range of from 77 wt.% to 98 wt.%, even more preferably in the range of from 78 wt.% to 97.5 wt.%, even more preferably in the range of from 79 wt.% to 95 wt.%, yet more preferably in the range of from 80 wt.% to 90 wt.% water, based on the total weight of the first aqueous phase, and

ii. not more than 35 wt.%, preferably in the range of from 0.1 wt.% to 35 wt.%, preferably in the range of from 0.2 wt.% to 30 wt.%, more preferably in the range of from 1 wt.% to 25 wt.%, yet more preferably in the range of from 1.5 wt.% to 24 wt.%, more preferably in the range of from 2 wt.% to 23 wt.%, even more preferably in the range of from 2.5 wt.% to 22 wt.%, even more preferably in the range of from 5 wt.% to 21 wt.%, yet more preferably in the range of from 10 wt.% to 20 wt.% of at least one organic compound, based on the total weight of the first aqueous phase,

wherein the sum of the weight amounts of i. and ii. is 100 wt.%;

a4) separation and optionally purification of at least a part of the methacrylic acid from the crude organic phase comprising methacrylic acid; and further comprising a process step aa4) of separating a high boiler phase from the crude organic phase;

a5) optionally, esterification of at least a part of the methacrylic acid obtained in step a4);

b) separation of at least a part of the water comprised in the first aqueous phase obtained in step a3) from at least a part of at least one component ii. to obtain a second aqueous phase and an organic phase, wherein the organic phase comprises at least one component ii., and wherein the second aqueous phase is depleted in at least one component ii. compared to the first aqueous phase;

c) optionally, separation of at least a part of at least one organic compound from the second aqueous phase obtained in process step b) to obtain a third aqueous phase;

d) optionally, separation of at least a part of at least one component ii from the organic phase obtained in process step b).

~~2. A process for treatment of an aqueous phase comprising at least one organic compound, comprising process steps:~~

~~a) provision of a first aqueous phase comprising components~~

~~i. at least 65 wt.%, preferably in the range of from 65 wt.% to 99.9 wt.%, more preferably in the range of from 70 wt.% to 99.8 wt.% water, yet more preferably in the range of from 75 wt.% to 99 wt.%, more preferably in the range of from 76 wt.% to 98.5 wt.%, more preferably in the range of from 77 wt.% to 98 wt.%, even more preferably in the range of from 78 wt.% to 97.5 wt.%, even more preferably in the range of from 79 wt.% to 95 wt.%, yet more preferably in the range of from 80 wt.% to 90 wt.% water, based on the total weight of the first aqueous phase, and~~

~~ii. not more than 35 wt.%, preferably in the range of from 0.1 wt.% to 35 wt.%, preferably in the range of from 0.2 wt.% to 30 wt.%, more preferably in the range of from 1 wt.% to 25 wt.%, yet more preferably in the range of from 1.5 wt.% to 24 wt.%, more preferably in the range of from 2 wt.% to 23 wt.%, even more preferably in the range of from 2.5 wt.% to 22 wt.%, even more preferably in the range of from 5 wt.% to 21 wt.%, yet more preferably in the range of from 10 wt.% to 20 wt.% of at least one organic compound, based on the total weight of the first aqueous phase;~~

~~wherein the sum of the weight amounts of i. and ii. is 100 wt.%,~~

~~b) separation of at least a part of the water comprised in the first aqueous phase provided in process step a) from at least a part of at least one component ii. to obtain a second aqueous phase and an organic phase, wherein the organic phase comprises at least one component ii., and wherein the second aqueous phase is depleted in at least one component ii. compared to the first aqueous phase;~~

~~c) optionally, separation of at least a part of at least one organic compound from the second aqueous phase obtained in process step b) to obtain a third aqueous phase;~~

~~d) optionally, separation of at least a part of at least one component ii from the organic phase obtained in process step b).~~

~~3. The process according to claim 1, wherein process step a4) comprises process step~~

~~aa4) separation of a high boiler phase from the crude organic phase.~~

24. The process according to claim 13, wherein at least a part of the high boiler phase is introduced to the first aqueous phase obtained in process step a3) or provided in process step a).

35. The process according to any one of the preceding claims, wherein the separation in process step b) comprises the process steps:

b1a) extraction of at least a part of the first aqueous phase obtained in process step a3) or provided in process step a) with an extraction agent to form the second aqueous phase and an extraction phase comprising at least one component ii.;

b1b) at least partial separation of the second aqueous phase from the extraction phase;

46. The process according to claim 53, wherein the separation in process step d) comprises the process steps

d1a) separation of at least a part of the extraction agent from the extraction phase to obtain an extract comprising at least one component ii.;

d1b) optionally, separation of at least a part of at least one component ii. from the extract.

57. The process according to claim 35 or claim 46, wherein the third aqueous phase comprises not more than 3.0 wt.%, preferably not more than 2.8 wt.%, more preferably not more than 2.5 wt.%, yet more preferably not more than 2.2 wt.%, more preferably not more than 2.0 wt.%, based on the total weight of the third aqueous phase, of organic compounds other than the extraction agent used in process step b1a).

68. The process according to claim 57, wherein the third aqueous phase comprises not more than 5000 ppm, preferably not more than 4000 ppm, more preferably not more than 3000 ppm, preferably in the range of from 1500 to 2500 ppm, more preferably in the range of from 1800 to 2200, most preferably not more than 2000 ppm, based on the total weight of the third aqueous phase, of organic compound.

79. The process according to any one of the preceding claims, wherein the third aqueous phase is subjected to at least one of being conducted to at least one biological purification treatment, being used as process water, and being conducted to at least one of process steps a1) and a2).

810. The process according to any one of the preceding claims, wherein the at least one component ii. separated in process step d) is a mixture of at least two components ii. and wherein in a further process step

f) at least one component ii. is at least partially separated from this mixture.

911. The process according to any one of the preceding claims, wherein the at least one organic compound of component ii. is at least one organic compound selected from carboxylic acids, aldehydes and ketones.

1012. The process according to any one of the preceding claims, wherein the at least one component ii. is or comprises at least one of acetic acid, acrylic acid, propionic acid and methacrylic acid.

1113. The process according to any one of the preceding claims, wherein the at least one component ii. separated in at least one of process steps d) and f) is or comprises methacrylic acid and at least a part of this methacrylic acid is added to the crude aqueous phase obtained in process step a2) or to the crude organic phase obtained in process step a3).

1214. The process according to any one of the preceding claims, wherein the at least one component ii. separated in at least one of process steps d) and f) or at least a part of the first aqueous phase obtained in process step a3) is subjected to a process step

g) esterification to obtain an ester phase comprising at least one ester.

1315. The process according to claim 1214, wherein the ester phase comprises at least two esters.

1416. The process according to claim 1214 or claim 1315, further comprising the process steps

h) at least partial separation of at least one ester from the ester phase;

j) optionally, purification of the at least one ester separated in process step h).

15~~17~~. The process according to any one of claims 12~~14~~ to 14~~16~~, wherein at least a part of the at least one ester obtained in at least one of steps g), h) and j) is used as extraction agent in process step b1a).

16~~18~~. The process according to any one of claims 12~~14~~ to 15~~17~~, wherein the at least one ester is based on a C_1 – C_4 carboxylic acid and a C_1 – C_4 alcohol.

17~~19~~. The process according to any one of the preceding claims, further comprising the step

aa1) splitting of methyl tert-butyl ether to obtain at least one C_4 compound and methanol,

wherein at least a part of the at least one C_4 compound is supplied as feed to the gas phase oxidation of at least one of process steps a1).

18~~20~~. The process according to claim 17~~19~~, wherein the methanol obtained in process step aa1) is supplied to process step g).