- A methacrolein providing unit (F3), wherein the methacrolein is obtained by the reaction of propionaldehyde with a C_1 extending agent, which feeds in the gas phase oxidation unit (A1)
- a quench unit (A2),
- a first extraction unit (A3),
- a first separation unit (A4),
- optionally, a first esterification unit (A4),
- a second separation unit (B),
- optionally, a third separation unit (C),
- optionally, a fourth separation unit (D),

wherein the first separation unit is a thermal separation unit comprising at least one bottom outlet in the lower third thereof, the at least one bottom outlet being in fluid-conducting communication with at least one inlet of the second separation unit (B) and wherein the methacrolein to be oxidized in the gas phase oxidation unit (A1) is a combined stream of methacrolein obtained from at least two different reactions with at least two different starting materials, whereby a first methacrolein was obtained by the heterogeneously catalysed gas phase oxidation of isobutylene or tert-butyl alcohol or isobutylaldehyde or a mixture of two or more thereof, and a second methacrolein was obtained by the reaction of propionaldehyde with a C_1 extending agent.

In detail a contribution to solving the above objects is made by 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) separation of at least a part of the methacrylic acid from the crude aqueous phase comprising methacrylic acid to obtain at least one crude methacrylic acid-comprising phase

a4) separation and optionally purification of at least a part of the methacrylic acid from the crude methacrylic acid-comprising; phase obtained in process step a3) by means of a thermal separation process,

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

wherein the first separation unit is a thermal separation unit comprising at least one bottom outlet in the lower third thereof, the at least one bottom outlet being in fluid-conducting communication with at least one inlet of the second separation unit (B) and wherein the methacrolein to be oxidized in the gas phase oxidation unit (A1) is a combined stream of methacrolein obtained from at least two different reactions with at least two different starting materials, whereby a first methacrolein was obtained by the heterogeneously catalysed gas phase oxidation of isobutylene or tert-butyl alcohol or isobutylaldehyde or a mixture of two or more thereof, and a second methacrolein was obtained by the reaction of propionaldehyde with a C_1 extending agent.

16. A device according to claim 15, wherein the methacrolein of the first methacrolein providing unit (A1) is obtained by the heterogeneously catalysed gas phase oxidation of isobutylene or tert-butyl alcohol or isobutylaldehyde or a mixture of two or more thereof and/or the methacrolein of the second methacrolein providing unit (F3) is obtained by the reaction of propionaldehyde with formaldehyde.

17. A device according to claims 15 or 16, wherein the methacrolein providing unit (F3) feeds in the second stage of a two stage gas phase oxidation unit (A1).