CLAIMS

1. A catalyst for the reaction of formaldehyde or a suitable source thereof with a carboxylic acid or ester to produce an ethylenically unsaturated carboxylic acid or ester, preferably α, ß ethylenically unsaturated carboxylic acids or ester, wherein the catalyst comprises a metal oxide having at least two types of metal cations, M^1 and M^2, wherein M^1 is at least one metal selected from group 3 or 4 in the 4^{th} to 6^{th} periods of the periodic table, group 13 in the 3^{rd} to 5^{th} periods of the periodic table, or the remaining elements in the lanthanide series (namely, scandium, yttrium, the lanthanide elements, titanium, zirconium, hafnium; aluminium, gallium, indium) and M^2 is at least one metal selected from group 5 in the 5^{th} or 6^{th} periods of the periodic table or group 15 in the 4^{th} or 5^{th} periods of the periodic table (namely, niobium, tantalum, arsenic and antimony) and optionally, M^3 or M^4, wherein M^3 is selected from groups 1 and 2 of the periodic table and M^4 is selected from group 14 of the periodic table,

wherein the ratio M^1:M^2 is in the range 10:1 to 1:10,

and wherein the metal oxide catalyst compound of the invention does not include other metal types above a level 0.1 mol% other than the types M^1, M^2 and optionally M^3 and/or M^4.

2. A catalyst according to claim 1, wherein M^1 is selected from the 4^{th}-6^{th} periods of the periodic table.

3. A catalyst according to claim 1 or 2, wherein M^1 are cations in the 3+ oxidation state.

4. A catalyst according to any of claims 1-3, wherein M^2 are cations in the +5 oxidation state.

5. A catalyst according to any of claims ~~1-4~~ 1, 3 and 4, wherein the combinations of metal oxides for use in the present invention may be selected from the list consisting of:- Al\Sb oxide; Ti\Sb oxide; Ga\Sb oxide; In\Sb oxide; Al\Nb oxide; Zr\Nb oxide; Ga\Nb oxide; Y\Nb oxide; La\Nb oxide; Al\Ta oxide; La\Ta oxide; and Al\Sb\Nb oxide which oxides are either unsupported or supported on a suitable support, for example, alumina, silica, silicon nitride, colloidal silica, titania or aluminium phosphate.

6. A catalyst according to any of claims 1-5, wherein further metals or metal cations of the type M^3 and/or M^4 may also be present in the mixed metal oxide.

~~7. A catalyst according to claim 6, wherein the M^3 metals include metals from groups 1 and 2 of the periodic table.~~

~~8. A catalyst according to claim 6 or 7, wherein suitable M^4 metals include metals from group 14 of the periodic table.~~

~~97~~. A catalyst according to any of claims 1-~~86~~, wherein the formula for the metal oxide is $M^1_nM^2_mM^3_qM^4_rO_p$ wherein M^1 is a cation, preferably, a 3+ cation and M^2 is a cation, preferably, a 5+ cation, n, m and p may be a positive integer or decimal number and q and r may be a positive integer or decimal number or zero.

~~108~~. A catalyst according to any of claims 1-~~86~~, wherein a binder is used and forms up to 50 wt% of the catalyst.

~~119~~. A process to produce an ethylenically unsaturated carboxylic acid or ester, preferably α, ß ethylenically unsaturated carboxylic acids or ester, comprising the steps of reacting formaldehyde or a suitable source thereof with a carboxylic acid or ester, optionally in the presence of an alcohol, in the presence of a catalyst according to any of claims 1-~~108~~.

~~1210~~. A process for the production of ethylenically unsaturated carboxylic acids or esters according to claim ~~109~~, wherein the carboxylic acid or ester reactant of the present invention is of formula R^3-CH_2-$COOR^4$ wherein R^4 is either hydrogen or an alkyl group and R^3 is either hydrogen, an alkyl or aryl group.

~~1311~~. A process for the production of ethylenically unsaturated carboxylic acids or esters according to claim ~~109~~ or ~~1110~~, wherein the ethylenically unsaturated acid or ester produced by the process of

the invention is selected from methacrylic acid, acrylic acid, methyl methacrylate, ethyl acrylate or butyl acrylate, more preferably, it is an ethylenically unsaturated ester, most preferably, methyl methacrylate.

~~14~~12. Use of the catalyst of any of claims 1-~~10~~8 as a producer of low levels of dimethyl ether (DME) and/or toluene in the reaction of formaldehyde or a suitable source thereof with a carboxylic acid or ester, optionally in the presence of an alcohol.

~~15~~13. Use of the catalyst of any of claims 1-~~10~~8 as a provider of improved selectivity and/or activity in the reaction of formaldehyde or a suitable source thereof with a carboxylic acid or ester, optionally in the presence of an alcohol.