Claims:

1. A process for the co-production of acetic acid and dimethyl ether comprising the step of contacting methyl acetate and methanol in the presence of a catalyst comprising a crystalline zeolite having a FER framework type wherein ~~the crystallites have~~said zeolite has crystallites having a dimension ~~in the c-axis~~ of about 500 ~~nanometres (nm)~~nm or less in the c-axis.

2. A ~~zeolite~~process according to claim 1 wherein the crystallites have a dimension in the c-axis of about 350 nm or less.

~~3. A zeolite according to claim 2 wherein the crystallites have a dimension in the c-axis of about 50 nm to about 350 nm.~~

43. A ~~zeolite~~process according to claim 1 or claim 2 wherein the crystallites have a dimension in the c-axis of about 250 nm or less.

~~5~~4. A ~~zeolite~~process according to claim 43 wherein at least 70% of the crystallites have a dimension in the c-axis of about 250 nm or less.

~~6. A zeolite according to claim 5 wherein the crystallites have a dimension in the c-axis of about 50 nm to about 250 nm.~~

~~7. A zeolite according to any one of the preceding claims wherein the crystallites have an oblong-like morphology.~~

~~8~~5. A ~~zeolite~~process according to any one of the preceding claims wherein the crystallites are of dimensions such that the ratio of the dimension in the c-axis to the dimension in the b-axis is less than or equal to 3:1.

~~9~~6. A ~~zeolite~~process according to any one of the preceding claims wherein the zeolite has a mesopore volume of at least 0.1 cm^3/g as measured by N_2 absorption.

~~10~~7. A ~~zeolite~~process according to claim ~~9~~6 wherein the mesopore volume is 0.1 to 0.2 cm^3/g as measured by N_2 absorption.

~~11. A zeolite according to any one of claims 1 to 9 wherein the zeolite as synthesised has an X-ray diffraction pattern as substantially as shown in Table 1 and a mesopore volume of at least 0.1 cm^3/g as measured by N_2 absorption.~~

~~12. A zeolite according to any one of the preceding claims wherein the FER framework type zeolite is in the hydrogen form or substantially in the hydrogen form.~~

~~13~~8. A ~~zeolite~~process according to any one of the preceding claims wherein the FER framework type zeolite is in alkali metal form.

~~14~~9. A ~~zeolite~~process according to claim ~~13~~ 8 wherein the zeolite has 1 mol% to 60 mol% of its cation exchange capacity occupied by cations of one or more alkali metals.

~~15~~10. A ~~zeolite~~process according to claim ~~13~~ 8 or claim ~~14~~ 9 wherein the alkali metal is cesium.

~~16~~11. A ~~zeolite~~process according to any one of the preceding claims wherein the zeolite is ferrierite.

12. A process according to any one of the preceding claims wherein the catalyst contains a refractory oxide binder.

13. A process according to any one of the preceding claims wherein water is added to the process in an amount in the range 0.1 to 60 mol% based on the total feed to the process.

14. A process according to any one of the preceding claims wherein the process is operated in the vapour phase.

15. A process according to any one of the preceding claims wherein the process is carried out at temperatures of from 170 °C to 300 °C.

16. A process according to any one of the preceding claims wherein the process is carried out at pressures in the range atmospheric to 30 barg.

17. A process according to any one of the preceding claims wherein the zeolite is prepared by the method of any one of claims 18 to 33.

~~17~~18. A method for preparing a crystalline zeolite having a FER framework type wherein ~~the~~ said zeolite has crystallites ~~have~~ having a dimension ~~in the c-axis~~ of about 500 nm or less in the c-axis comprising:

a) preparing a synthesis mixture comprising sources of silica, alumina, an alkali metal and a saturated nitrogen-containing heterocyclic compound, said mixture having the following composition, in moles

$R^+ / (R^+ + M^+)$	0.2 - 1.0
OH^-/SiO_2	0.05 - 0.5
H_2O/OH^-	41 - 500
SiO_2/Al_2O_3	9 - 200

wherein R is a saturated nitrogen containing heterocyclic compound and M is an alkali metal;

b) heating said mixture at a temperature of 90 to 200 °C with agitation; and

c) recovering the FER type zeolite.

~~18~~19. A method according to claim ~~17~~ 18 which further comprises the steps:

d) removing at least a portion of the saturated nitrogen-containing heterocyclic compound present in the recovered FER type zeolite by heating it at a temperature from about 500 °C to about 600 °C to obtain a calcined zeolite;

e) contacting the calcined zeolite with a source of ammonium ion to provide an ammonium ion-exchanged zeolite; and

f) calcining the ammonium ion-exchanged zeolite at a temperature from about 500 °C to about 600 °C to obtain a hydrogen form FER type zeolite.

~~19~~20. A method according to claim ~~17~~ 18 or claim ~~18~~ 19 wherein the saturated nitrogen-containing heterocyclic compound contains a 5-membered heterocyclic ring or a 6-membered heterocyclic ring.

~~20~~21. A method according to claim ~~19~~ 20 wherein the heterocyclic ring contains 1 to 2 nitrogen atoms.

~~21~~22. A method according to ~~any one of claims 19 to 20~~claim 20 or claim 21 wherein the heterocyclic ring is substituted by one or more alkyl groups.

~~22~~23. A method according to claim 21 wherein the saturated nitrogen-containing heterocyclic compound is an N-alkyl saturated nitrogen-containing heterocyclic compound.

~~23~~24. A method according to any one of claims ~~17~~ 18 to ~~22~~ 23 wherein the saturated nitrogen-containing heterocyclic compound is selected from pyrrolidine, N-methyl pyrrolidine, and piperidine.

~~24~~25. A method according to any one of claims ~~17~~ 18 to ~~23~~ 24 wherein the synthesis mixture has a pH of greater than 7.

~~25~~26. A method according to any one of claims ~~17~~ 18 to ~~24~~ 25 wherein the synthesis mixture contains no added sulphuric acid.

~~26~~27. A method according to any one of claims ~~17~~ 18 to ~~25~~ 26 wherein the source of silica is a colloidal silica.

~~27~~28. A method according to claim ~~26~~ 27 wherein the colloidal silica is a solution of 20-40 wt% silica in water.

~~28~~29. A method according to any one of claims ~~17~~ 18 to ~~27~~ 28 wherein the source of the alkali metal is selected from sodium hydroxide and potassium hydroxide.

~~29~~30. A method according to any one of claims ~~17~~ 18 to ~~28~~ 29 wherein the synthesis mixture is heated at a temperature of 130 °C to 180 °C.

~~30~~31. A method according to claim ~~29~~ 30 wherein the synthesis mixture is heated at a temperature of 130 °C to 150 °C for 17 days or longer.

~~31~~32. A method according to any one of claims 18 to 31 wherein ~~for preparing an alkali metal form of a zeolite of FER framework type which has crystallites having a dimension in the c-axis of from about 500 nm or less by exchanging~~ at least 1 mol% of the cation exchangeable sites of the ~~FER type~~ zeolite ~~as claimed in any one of claims1 to 16 or as prepared in any one of claims 17 to 30~~so-prepared are exchanged by cations of one or more alkali metals.

~~32~~33. A method according to claim ~~31~~ 32 wherein the ~~FER~~ zeolite is ferrierite.

~~33~~34. A method according to claim ~~31~~ 32 or claim ~~32~~ 33 wherein the alkali metal form of the ~~FER~~ zeolite is the cesium form.

~~34. A process for the co-production of acetic acid and dimethyl ether comprising the step of contacting methyl acetate and methanol in the presence of a catalyst comprising a crystalline zeolite having a FER framework type wherein said zeolite has crystallites having a dimension of about 500 nm or less in the c-axis as claimed in any one of claims 1 to 16 or as prepared in any one of claims 17 to 33.~~

~~35. A process according to claim 34 wherein the catalyst contains a refractory oxide binder.~~

~~36. A process according to claim 34 or claim 35 wherein the catalyst is a zeolite which is in alkali metal form.~~

~~37. A process according to claim 36 wherein the zeolite has at least 1 mol% of its cation exchange capacity, for example 1 to 60 mol%, such as 1 to 50 mol%, for instance 5 to 50 mol% or 10 to 45 mol% occupied by cations of one or more alkali metals.~~

~~38. A process according to claim 36 or claim 37 wherein the zeolite is in a cesium form.~~

~~39. A process according to any one of claims 34 to 38 wherein the zeolite is ferrierite.~~

~~40. A process according to any one of claims 34 to 39 wherein acetone is present in one or both of the methanol and methyl acetate in an amount of >0 to 5 mol% based on the total feed to the process.~~

~~41. A process according to any one of claims 34 to 40 wherein water is added to the process in an amount in the range 0.1 to 60 mol% based on the total feed to the process.~~

~~42. A process according to any one of claims 34 to 41 wherein the process is operated in the vapour phase.~~

~~43. A process according to any one of claims 34 to 42 wherein the process is carried out at temperatures of from 170 °C to 300 °C.~~

~~44. A process according to any one of claims 34 to 43 wherein the process is carried out at pressures in the range atmospheric to 30 barg.~~