CLAIMS

1. A process for preparation of catalyst support particles having a pore structure with a pore volume of 1.5 cm^3/g or more and a surface area of 600 m^2/g or more, the process comprising:

a) providing a silica hydrogel having a solids content from 15% to 33% by weight by acidification of an alkali metal silicate,

b) forming the silica hydrogel into hydrogel particles,

c) washing the hydrogel particles for a period of 1 hour or longer, at a pH of 3.5 or less to provide an alkali metal oxide content of less than 2000 ppm by weight of hydrogel~~substantially remove salt, optionally for a period of 1 hour or longer~~,

d) contacting the hydrogel particles with an aqueous ageing solution, arranged to provide an aqueous dispersion having a pH from 3 to 5, and at an ageing temperature from 40ºC up to the boiling point of the solution, for an ageing period of 4 hours or longer, to provide aged hydrogel particles, wherein the ageing temperature is from a lowest ageing temperature T_L to a highest ageing temperature T_H, wherein T_L= (90 - 10 x pH)ºC and T_H = (184 -22.6 x pH)ºC,

e) carrying out solvent exchange on the aged hydrogel particles with a liquid solvent having a surface tension of 35 mN/m or less whereby the aqueous solution in the aged hydrogel particles is substantially replaced by the liquid solvent, and

f) substantially removing the liquid solvent from the aged hydrogel particles to provide the catalyst support particles.

2. A process according to claim 1 wherein the ageing period is from 4 to 30 hours, preferably from 4 to 20 hours.

3. A process according to claim 1 or claim 2 wherein the aged hydrogel of step d) is acidified to a pH less than 3 after ageing in step d) and before solvent exchange in step e).

4. A process according to any preceding claim wherein the aqueous ageing solution comprises a buffer arranged to provide the aqueous dispersion with a substantially constant pH from 3 to 5 whilst contacting the hydrogel particles to provide aged hydrogel particles.

5. A process according to claim 4, wherein the buffer is a sodium carboxylate/carboxylic acid buffer.

6. A process according to any preceding claim wherein the solvent is removed under a pressure of atmospheric pressure or less.

7. A process according to any preceding claim wherein the hydrogel particles prior to ageing have a surface area measurable on the washed hydrogel, after drying at 150ºC, of 920 m^2/g or more.

8. A process according to any preceding claim wherein the hydrogel particles prior to ageing have a pore volume measurable on the washed hydrogel, after solvent exchange, of 1.3 cm^3/g or less.

9. A process according to any preceding claim wherein the silica xerogel comprises at least 90% by weight of silica.

10. A process according to any preceding claim wherein the catalyst support particles have a pore volume of 1.8 cm^3/g or more.

11. A process according to any preceding claim wherein the catalyst support particles have a surface area of 800m^2/g or more.

~~12 A catalyst support particle obtained by the process of any one of claims 1 to 11~~

~~13 A catalyst support particle according to claim 12 providing a pH of 6 or less when measured at 25ºC in a slurry of boiled, demineralised water with 12.5g of catalyst support per 100ml of slurry.~~

~~14. A catalyst support particle according to claim 12 or claim 13 having a soda content from 20 to 1000 ppm by weight.~~

~~15~~12. A catalyst support particle which is a silica xerogel comprising at least 90% by weight of silica, having a pore volume of 1.5 cm^3/g or more and a surface area of ~~600~~ 800 m^2/g or more, optionally a pore volume of 1.8 cm^3/g or more ~~and a surface area of 800m^2/g or more~~, wherein the catalyst support particle provides a pH of ~~6~~ 3-5 ~~or less~~ when measured at 25ºC in a slurry of boiled, demineralised water with 12.5 g of catalyst support per 100ml of slurry, and wherein the catalyst support particle has a soda content from 20 to 1000 ppm by weight.

~~16~~13. A catalyst precursor comprising a catalyst support particle according to ~~any one of~~ claim~~s~~ 12 ~~to 15~~, the catalyst support particle comprising a compound of a catalyst metal deposited within the pore structure, preferably wherein the catalyst metal comprises chromium.

~~17~~14. An olefin polymerisation catalyst obtained or obtainable by heating a catalyst precursor according to claim ~~16~~ 13 in a non-reducing atmosphere at a temperature from 200 to 1200 ºC for an activation period from 30 minutes to 15 hours.

~~18~~15. A method for polymerisation of one or more C_2 to C_8 α-alkenes characterized in that the polymerisation is carried out in the presence of an olefin polymerisation catalyst according to claim ~~17~~14.

~~19. The use of an olefin polymerisation catalyst according to claim 17 for polymerisation of one or more C_2 to C_8 α-alkenes to generate low melt index polymers.~~