Claims

1. Process for producing a chromium catalysed ethylene copolymer powder by polymerisation of the corresponding monomers in the presence of an activated supported chromium oxide based catalyst, wherein the ~~C~~chromium catalysed ethylene copolymer powder is characterised by a particle fragmentation coefficient ("m") equal or superior to 0.29, preferably 0.30, more preferably 0.31 wherein the particle fragmentation coefficient ("m") of the copolymer powder is defined by

m = Ln (APS particle / APS catalyst) / Ln (Productivity)

wherein

"Ln" is the "natural logarithm",

"APS particle" is the median particle size (D50) of the polymer powder,

"APS catalyst" is the median particle size (D50) of the catalyst, and

"Productivity" is the number of grams of polymer per gram of catalyst.

2. Process according to claim 1 wherein the ~~C~~chromium catalysed ethylene copolymer powder ~~according to claim 1 has~~ving a D50 lower than 2000, preferably comprised between 200 and 1800, more preferably comprised between 500 and 900 microns.

3. Process~~Chromium catalysed ethylene copolymer powder~~ according to any of the preceding claims wherein the D50 of the chromium catalyst is lower than 150,

preferably comprised between 40 and 140, more preferably comprised between 45 and 110 microns.

4. Process according to any of the preceding claims wherein the ~~C~~chromium catalysed ethylene copolymer powder ~~according to any of the preceding claims characterised in that it~~ exhibits a spherical and/or spheroidal morphology.

5. Process for producing a chromium catalysed ethylene copolymer powder according to any of the preceding claims by polymerising the corresponding monomers in the presence of an activated supported chromium oxide based catalyst, wherein the process for the activation of said supported chromium oxide based catalyst is performed in a fluidised bed activation reactor which comprises a catalyst bed being fluidised by a fluidisation gas, said activation including treatment at temperatures above 500°C, characterised in that the fluidisation velocity (Vf1) of the fluidisation gas is initially maintained below 6.5 centimetres per second (cm/sec), preferably below 6 cm/sec, more preferably below 5.5 cm/sec, even more preferably below 5 cm/sec until the temperature inside the activation reactor reaches at least 200°C, and said fluidisation gas is then brought to a value (Vf2) which is at least 1 cm/sec higher than Vf1.

6. Process according to claim 5 wherein said ethylene copolymer powder has been obtained by the gas phase polymerisation of ethylene together with at least one other alpha olefin containing from 3 to 12 carbon atoms in the presence of a supported chromium oxide based catalyst.

7. Process according to any of claims 5 to 6 wherein the control of the fluidisation gas velocity during the initial stage of the activation process is maintained until the temperature inside the activation reactor reaches 250°C.

8. Process according to claim 7 wherein the control of the fluidisation gas velocity during the initial stage of the activation process is maintained until the temperature inside the activation reactor reaches 400°C.

9. Process according to any of claims 5 to 8 wherein the fluidisation gas velocity during the initial stage of the activation process is maintained above 1.5 cm/s.

10. Process according to any of claims 5 to 9 wherein the fluidisation gas used during the initial stage of the activation process is an inert gas, preferably nitrogen.

11. Process according to any of claims 5 to 10 wherein the fluidisation gas velocity Vf2 of the fluidisation gas used during the consecutive stage of the activation process is at least 1.5 cm/sec higher than Vf1.

12. Process according to any of claims 5 to 11 wherein the fluidisation gas used during the consecutive stage of the activation process is chosen amongst inert gases, e.g. nitrogen, and/or oxidising gases, e.g. air, or sequentially (and preferably) an inert gas followed by an oxidising gas.

13. Process according to any of claims 5 to 12 wherein said consecutive fluidisation stage includes thermal treatments with holding temperatures higher than 600°C.

14. Process according to any of claims 5 to 13 wherein the fluidisation gas velocity Vf2 is at least 6cm/s, preferably at least 7cm/s, for example at least 8cm/s.

15. Process according to any of claims 5 to 14 wherein the fluidisation gas velocity Vf2 is maintained below 12 cm/s, preferably below 11 cm/s, for example below 10cm/s.

16. Process according to any of claims 5 to 15 wherein the duration of the initial fluidisation stage lasts at least 10 minutes, preferably at least 1 hour, more preferably at least 3 hours, for example at least 8 hours.

17. Process according to any of claims 5 to 16 wherein the duration of the consecutive fluidisation stage lasts at least 10 minutes, preferably at least 1 hour, more preferably at least 3 hours, for example at least 8 hours.

18. Process according to any of claims 5 to 17 wherein the consecutive fluidisation stage comprises at least two separate thermal treatment steps wherein

- the first step consists in bringing the catalyst from the initial stage under an inert atmosphere to a temperature comprised between 600 and 900°C and then keeping the catalyst during a holding time of less than or equal to 8 hours under an inert atmosphere at a temperature comprised between 600 and 900°C, and

- the second step consists in the treatment of the catalyst coming from step 1 under an oxidizing atmosphere, preferably air, at a temperature comprised between 400 and 700 °C during a holding time comprised between 2 and 10 hours, and
- wherein the maximum temperature of step 2 is always lower than the maximum temperature of step 1 and wherein the difference between the maximum temperature of step 1 and the maximum temperature of step 2 is comprised between 50 and 250 °C.

19. ~~Chromium catalysed ethylene copolymer powder or p~~Process according to any of the preceding claims wherein the supported chromium oxide based catalyst used to produce the powder is a titanium modified supported chromium oxide based catalyst.

20. ~~Chromium catalysed ethylene copolymer powder or p~~Process according to any of the preceding claims wherein the catalyst support is a refractory oxide support selected amongst silica, alumina, aluminophosphate, metal oxides such as oxides of titanium, zirconium, boron, zinc, magnesium, and the like, or combinations thereof.

21. ~~Chromium catalysed ethylene copolymer powder or p~~Process according to any of the preceding claims wherein the catalyst support is a spherical and/or spheroidal refractory oxide support.

22. ~~Chromium catalysed ethylene copolymer powder or p~~Process according to any of the preceding claims wherein the chromium oxide based catalyst contains 0.3 to 2%

by weight, particularly 0.3 to 1.3% by weight of chromium and even more particularly 0.3 to 1% by weight of chromium, more preferably between 0.3 and 0.7 % by weight of chromium, most preferably between 0.4 and 0.6% by weight of chromium (these weights being expressed with respect to the weight of final supported catalyst).

23. ~~Chromium catalysed ethylene copolymer powder or p~~Process according to any of the preceding claims wherein the chromium oxide based catalyst contains between 0.5 and 5 % by weight of titanium, most preferably between 1.5 and 4 %, most preferably between 2 and 4 %, most preferably between 2 and 3 % (these weights being expressed with respect to the weight of final supported catalyst).