Typically, the inlet and outlet temperature of the spray drier is in the range of 110 to 220 ^{o}C and 70 to 120 ^{o}C, respectively.

The spray drying of the homogeneous slurry can be carried out with a feed rate varying between 0.5 to 1.5 kg/hr, aspirator speed varying between 1300 and 2800 rpm, and under vacuum varying between -70 and -170 mm of water.

The spray drying of the homogeneous slurry can be carried out using nitrogen as a drying medium.

The water absorbent polymer obtained can be a copolymer.

The water absorbent polymer obtained can be a graft copolymer.

In accordance with the present disclosure there is provided a water absorbent polymer prepared in accordance with the process of the present disclosure, characterized in that said water absorbent polymer exhibits a bulk-density of at least 0.69 g/cc as measured by ASTM D7481-09 method.

BRIEF DESCRIPTION OF THE DRAWINGS:

FIG. 1(A) illustrates Polarized Optical Microscopy image of spray dried water absorbent polymer particles (examples-1), and FIG. 1(B) illustrates a Polarized Optical Microscopy image of air dried water absorbent polymer particles (example-2).

DETAILED DESCRIPTION:

The disadvantages associated with the conventional methods for preparing water absorbent polymers are overcome in the present disclosure by providing a process for preparing water absorbent polymers wherein a slurry comprising relatively high

pipe. Initially the slurry could be spray dried for a few minutes, but the feed pipe got choked due to clogging of the slurry and the spray drying got suspended. This was due to the long length of the feed pipe.

The water absorbent polymer particles as obtained in examples-1 and 2 are characterized by using a Polarized Optical Microscope (POM). Polarized Optical Microscope images as provided in FIGS. 1(A) and 1(B) clearly indicate that in case of examples 2 (see FIG. 1(B)), water absorbent polymer particles are attached together along with the dispersant, as incase of direct drying dispersant remains in the polymer particles thereby decreasing absorbency under load (AUL) around 75 %. Whereas in the process of present disclosure as given in example-1 (see FIG. 1(A)), dispersant is removed during spray drying and the water absorbent polymer particles remains un-agglomerated. The un-agglomerated form of water absorbent polymer particles of the present discourse demonstrates increased absorbency under load (AUL) i.e. around 100% absorbency under load (AUL).

Test Methods:

1. **Absorbency Capacity in Water / Saline:**

Water absorbent polymer particles of example-1 (~0.2 g) was weighed precisely and poured in a large excess (300 ml) of distilled water / saline (0.9% NaCl solution) and allowed to stand for 30 minutes at room temperature. The slurry was stirred occasionally with a glass rod. The amount of water / saline absorbed by the water absorbent polymer particles was determined gravimetrically after the swelling equilibrium reached (30 minutes). Then the slurry was filtered through 100 micron mesh wire sieve. The water/saline absorbency (Q) was determined by weighing the swollen water absorbent polymer particles and calculated according to the following relationship:

$$Q\ (g / g) = (W_2 - W_1) / W_1$$

W_2 = Weight of the swollen water absorbent polymer particles

W_1 = Weight of the dried water absorbent polymer particles

CLAIMS:

1. A process for preparing a water absorbent polymer, said process comprising the following steps:
   i. preparing by inverse suspension polymerization, a slurry comprising polymer particles having water absorbed therein, wherein said polymer particles are present in an amount ranging between 40% and 55% of the total mass of the slurry;
   ii. homogenising the slurry with the help of heat and stirring, to obtain a homogeneous slurry; and
   iii. spray drying the homogeneous slurry in a spray drier to obtain water absorbent polymer particles.

2. The process as claimed in claim 1, wherein the method step of preparing the slurry comprises the following steps:
   (a) partially neutralizing an aqueous monomer solution of a pre-determined concentration by an alkali solution of a pre-determined concentration, to obtain a partially neutralized aqueous monomer solution;
   (b) adding a pre-determined weight proportion of at least one cross-linking agent and at least one free radical initiator to the partially neutralized aqueous monomer solution, to obtain a resultant solution;
   (c) mixing at least one organic solvent with at least one dispersing agent under continuous stirring, at a pre-determined temperature, to obtain a non-aqueous mixture; and
   (d) dispersing said resultant solution drop by drop into the non-aqueous mixture under continuous stirring at a temperature ranging from 55 to 110 ^{o}C for a time period varying from 60 to 180 minutes to obtain the slurry.

3. The process as claimed in claim 2, wherein the monomer includes at least one monomer selected from the group consisting of acrylic acid, methacrylic acid, sodium acrylate, potassium acrylate and acrylamide.

4. The process as claimed in claim 2, wherein the cross-linking agent includes at least one compound selected from the group consisting of N,N´-´methylenebisacrylamide, ethylene glycol diacrylate, polyethylene glycol diacrylate, ethylene glycol dimethacrylate, polyethylene glycol dimethacrylate, glycerol triacrylate, glycerol trimethacrylate, trimethylolpropane trimethacrylate, trimethylolpropane triacrylate, and triglycol diacrylate.

5. The process as claimed in claim 2, wherein the free radical initiator is at least one compound selected from the group consisting of potassium persulfate, sodium persulfate, ammonium persulfate, alkali metal salts, sulfites, thiosulfates, ascorbates, ferrites and combinations thereof. .

6. The process as claimed in claim 2, wherein the organic solvent includes at least one solvent selected from the group consisting of cyclohexane, N-hexane, N-heptane and toluene.

7. The process as claimed in claim 1, wherein the step of homogenizing the slurry in method step (ii) is carried out at a temperature ranging between 40 ^{o}C and 50 ^{o}C .

8. The process as claimed in claim 1, wherein the inlet and outlet temperature of the spray drier is in the range of 70 to 220 ^{o}C and 70 to 140 ^{o}C, respectively.

9. The process as claimed in claim 1, wherein the spray drying of the homogeneous slurry is carried out at a feed rate varying between 0.5 to 1.5 kg/hr aspirator speed varying between 1300 and 2800 rpm, and under vacuum varying between -70 and -170 mm of water.

10. The process as claimed in claim 1, wherein the spray drying of the homogeneous slurry is carried out using nitrogen as a drying medium.

11. The process as claimed in claim 1, wherein the water absorbent polymer obtained is a copolymer.