CLAIMS

1. Use of a carrier to carry a biofilm in a moving bed biofilm reactor (MBBR), in a moving bed biofilm reactor (MBBR) process, characterized in that the carrier comprises a carrier material,

wherein the carrier material consists of a single high density polyethylene having a bimodal molecular weight distribution, or

the carrier material comprises at least 5 wt. % of a first high density polyethylene with a bimodal molecular weight distribution, and a second high density polyethylene, the second high density polyethylene having unimodal, bimodal or multimodal molecular weight distribution,

whereby the carrier material has a bimodal or a multimodal molecular weight distribution.

2. The use according to claim 1, wherein the carrier material comprises at least 5 wt. % of a first high density polyethylene with a bimodal molecular weight distribution, and a second high density polyethylene having unimodal molecular weight distribution.

3. The use according to claim 1 or 2, wherein the carrier material has a density between 0.9 and 1.1 g/cm^3, such as a density between 0.92 and 0.98 g/cm^3, such as a density between 0.94 and 0.96 g/cm^3.

4. The use according to any one of claims 1 to 3, wherein the carrier material has a crossover point at an angular frequency of <15 rad/s, preferably below 6 rad/s, even more preferably <3 rad/s.

5. The use according to any one of claims 1 to 4, wherein the carrier material has a crossover point at a modulus between 25000-45000 Pa.

6. The use according to any one of claims 1 to 4, wherein the carrier material has a delta end value less than 35 degrees more preferably less than 25 degrees, more preferably less than 20 degrees, even more preferably than 15 degrees.

7. The use according to any one of claims 1 to 6, wherein the carrier material comprises

at least 10, 15, 20, 25, 30, 35, 40 or 45 wt. % of high density polyethylene with a bimodal molecular weight distribution.

8. The use according to any one of claims 1 to 7, wherein the carrier material comprises

at least 50 wt. %, more preferably at least 80 wt. %, most preferably at least 95wt. %, of a high density polyethylene with a bimodal molecular weight distribution,

whereby the carrier material has a bimodal or a multimodal molecular weight distribution.

9. The use according to any one of one claims 1 to 8, wherein the carrier material comprises

at least 50 wt. % of a first high density polyethylene with a bimodal molecular weight distribution, and

a second high density polyethylene having either a unimodal, bimodal or multimodal molecular weight distribution, *preferably having unimodal* molecular weight distribution,

whereby the carrier material has a multimodal molecular weight distribution.

10. The use according to any one of claims 1 to 9, wherein the carrier material comprises

a first high density polyethylene with a first bimodal molecular weight distribution and a second high density polyethylene with a second bimodal molecular weight distribution,

whereby the carrier material has a multimodal molecular weight distribution.

11. The use according to claim 10, wherein the carrier material comprises

at least 5 wt.%, such as at least 10, 15, 20, 25, 50, 95 wt.% of a first high density polyethylene with a bimodal molecular weight distribution, and

a second high density polyethylene with a bimodal molecular weight distribution,

whereby the carrier material has a multimodal molecular weight distribution.

12. The use according to any one of claims 1 to 9, wherein the carrier material comprises

a first high density polyethylene with a first bimodal molecular weight distribution, and

at least one more high density polyethylene having a unimodal or a bimodal or a multimodal molecular weight distribution,

whereby the carrier material has a multimodal molecular weight distribution.

13. The use according to any one of claim 1 to 12, the carrier material comprising high density polyethylene with a bimodal molecular weight distribution, comprising

a lower molecular weight fraction (LMW), and

a higher molecular weight fraction (HMW),

wherein the peak ratio of the LMW fraction to the HMW fraction is between 10:1 to 1:10, preferably between 5:1 to 1:5, more preferably 2.5:1 to 1:2.5, more preferably between 2:1 to 1:2, most preferably between 1.5:1 to 1:1.5.

14. The use according to any one of claims 1 to 13, the carrier material comprising high density polyethylene with a bimodal molecular weight distribution, comprising

a lower molecular weight fraction (LMW), and

a higher molecular weight fraction (HMW),

wherein the LMW is a homopolymer or a copolymer and the HMW is a homopolymer or copolymer; preferably the LMW being a homopolymer and the HMW being a copolymer.

15. The use according to any one of claims 1 to 14, wherein the carrier has a structure that allows for protected surfaces for biofilm growth.

16. The use according to claim 15, wherein the carrier is disc-shaped or saddle shaped.

17. The use according to claim 15 or 16, wherein the protected surfaces are facilitated by the presence of holes, wells, protrusions, honeycomb structure or raster structures, making the carrier more prone to stress damage.

18. Use according to claim 1, wherein the MBBR process is a High energy MBBR process having a stirring energy of at least 15 W/m^3 reactor volume or an aeration energy of at least 40 W/m^3 reactor volume.

19. Use according to any one of claims 1 to 18, wherein the MBBR process includes mixing the carriers in the bioreactor utilizing submerged mechanical mixers.

20. Use according to any one of claims 1 to 19, wherein the MBBR process is performed in a bioreactor having inner walls with defects or high roughness, such as in MBBR retrofits or existing MBBR plants with poor reactor wall conditions.

21. Use according to any one of claims 1 to 20, wherein wastewater purified in the MBBR process contains hazardous substances being detrimental to the carrier.

22. Use according to any one of claims 1 to 21, wherein the MBBR process function is dependent on addition of external chemical substances, such as external carbon sources.

23. Use according to any one of claims 1 to 22, wherein the MBBR process is a treatment for the production of drinking water.