CLAIMS

1. A process to prepare an ethylene-based polymer, said process comprising polymerizing a mixture comprising ethylene, at a pressure greater than, or equal to, 100 MPa, in the presence of at least one free-radical initiator; and in a reactor system comprising at least one reactor and at least one Hyper-compressor, and

wherein at least one oil formulation, optionally comprising one or more lubrication agents, is added to the Hyper-compressor; and wherein at least one of the following steps takes place:

A) thermally treating the one or more lubrication agents, in an oxygen-free atmosphere, to achieve a peroxide level ≤ 10 ppm, based on the weight of the lubrication agent(s), and then adding said agent(s) to the oil formulation, prior to adding the oil formulation to the Hyper-compressor; or

B) thermally treating the oil formulation, in an oxygen-free atmosphere, to achieve a peroxide level ≤ 10 ppm, based on the weight of the oil formulation, prior to adding the oil formulation to the Hyper-compressor;

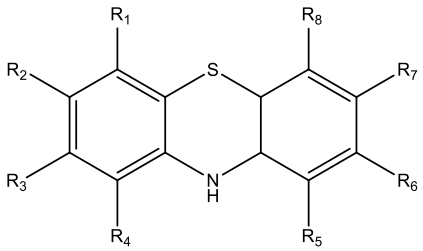
C) a combination of A and B.

2. The process of claim 1, wherein the at least one reactor is a tubular reactor.

3. The process of any one of the previous claims, wherein the oil formulation is thermally treated at a temperature from 50°C to 200°C.

4. The process of any one of the previous claims, wherein the oil formulation comprises one or more lubrication agents, and the one or more lubrication agent(s) is/are thermally treated at a temperature from 50°C to 200°C, before adding said agents to the oil formulation.

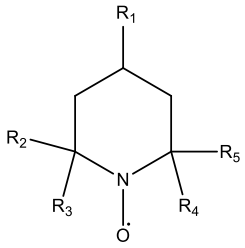
5. The process of any one of the previous claims, wherein the oil formulation further comprises at least one compound selected from the following compounds i) through iv):

i) 

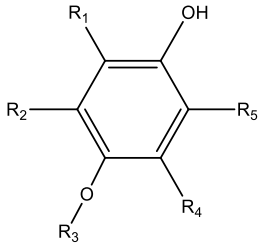
(Compound 1),

wherein, for Compound 1, R1, R2, R3, R4, R5, R6, R7 and R8 are each independently

selected from H, an alkyl, or an alkoxy;

ii)  (Compound 2),

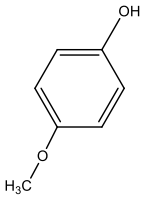
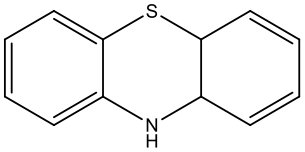
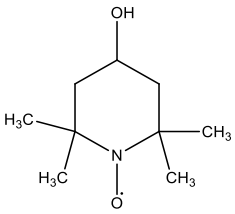
wherein, for Compound 2, R1 is selected from OH or O-R, wherein R is alkyl; and R2, R3, R4 and R5 are each independently selected from H, an alkyl, or an alkoxy;

iii)  (Compound 3),

wherein, for Compound 3, R1, R2, R4 and R5 are each independently selected from H, an alkyl, or an alkoxy; and R3 is selected from H or an alkyl; or

iv) a combination of two or more of Compounds 1 through 3.

6. The process of claim 5, wherein the compound is selected from the following compounds a) through d):


monomethyl ether hydroquinone (MEHQ) a), 
Phenothiazine (PTZ) b), 
4-hydroxy Tempo c), or d) a combination thereof.

7. The process of any one of the previous claims, wherein the oil formulation comprises greater than, or equal to, 70.0 wt% oil, based on the weight of the oil formulation.

8. The process of any one of the previous claims, wherein the oil formulation is injected at one or more injection points into the Hyper-compressor.

9. The process of any one of the previous claims, wherein the ethylene-based polymer is an ethylene homopolymer.