CLAIMS

1. A process for the oligomerisation of ethylene to predominantly 1-hexene or 1-octene or mixtures of 1-hexene and 1-octene, the process including contacting ethylene with a catalyst under ethylene oligomerisation conditions, said catalyst comprising:

   i) a source of chromium;

   ii) a ligating compound of the formula

$$R^1R^2P^1XP^2R^3R^4$$

   wherein P^1 and P^2 are phosphorus atoms;
   X consists of $-N(R^6)-$, $-N(R^6)-N(R^7)-$, $-C(R^{8a})(R^{8b})-N(R^6)-$ or a hydrocarbylene, where R^6 and R^7 are independently a hydrocarbyl group, a heterohydrocarbyl group or an organoheteryl group and R^{8a} and R^{8b} are independently a hydrogen, a hydrocarbyl group, a heterohydrocarbyl group or an organoheteryl group; and
   R^1 to R^4 are independently a hydrocarbyl group, an organoheteryl group or a heterohydrocarbyl group, wherein at least one of R^1, R^2, R^3, and R^4 includes a fused cyclic structure including at least two rings, the fused cyclic structure including a 5- to 7-membered aromatic first ring bonded to the respective phosphorus atom, the aromatic first ring being fused to a 4- to 8-membered heterocyclic second ring, the heterocyclic second ring including a heteroatom, the heteroatom being separated from the respective phosphorous atom by two ring atoms along the shortest path; and

   iii) optionally a catalyst activator or combination of catalyst activators.

2. The process of claim 1, wherein the aromatic first ring bonded to the respective phosphorus atom is a 6 membered aromatic ring.

3. The process of claim 1, including contacting ethylene with a catalyst under ethylene oligomerisation conditions, said catalyst comprising:

i) a source of chromium;

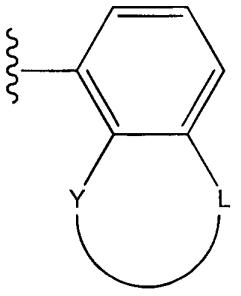
ii) a ligating compound of the formula

$$R^1R^2P^1XP^2R^3R^4$$

wherein P^1 and P^2 are phosphorus atoms;

X consists of $-N(R^6)-$, $-N(R^6)-N(R^7)-$, $-C(R^{8a})(R^{8b})-N(R^6)-$ or a hydrocarbylene, where R^6 and R^7 are independently a hydrocarbyl group, a heterohydrocarbyl group or an organoheteryl group and R^{8a} and R^{8b} are independently a hydrogen, a hydrocarbyl group, a heterohydrocarbyl group or an organoheteryl group; and

R^1 to R^4 are independently a hydrocarbyl group, an organoheteryl group or a heterohydrocarbyl group, wherein at least one of R^1, R^2, R^3, and R^4 comprises Z, where Z includes a fused bicyclic structure including a six-membered aromatic ring fused to a 4- to 8-membered heterocyclic second ring, and comprises:

Z = 

such that Y = O, S, P, N or NR^5, where R^5 includes hydrogen, halogen, hydrocarbyl, organoheteryl, heterohydrocarbyl or polar groups; and

L is a linking group between Y and the six-membered aromatic ring; and

iii) optionally a catalyst activator or combination of catalyst activators.

4. The process of claim 3, wherein L is selected such that Z is a fused bicyclic heteroaryl group incorporating Y as a ring atom of this bicyclic heteroaryl group, where the ring including Y is a 5- or 6-membered ring.

5. The process of claim 3 or claim 4, wherein L is selected from the group comprising a hydrocarbylene group, -N=N- and $-CR^7=N-$, where R^7 is a hydrogen, hydrocarbyl or heterohydrocarbyl group.

6. The process of any one of claims 3 to 5, wherein L is selected such that Z is a fused bicyclic heteroaryl group including further fused ring structures to form a fused polycyclic structure with more than two rings.

7. The process of any one of claims 3 to 6, wherein Z is selected from the group consisting of 1-benzofuran-7-yl, 5-dibenzofuran-4-yl, 1-benzothiophen-7-yl, quinol-8-yl, indol-7-yl and 8-benzophosphabenzene.

8. The process of any one of claims 3 to 7, wherein Z is a 1-benzofuran-7-yl group, a 1-benzothiophen-7-yl group or a 5-dibenzofuran-4-yl-group.

9. The process of any one of claims 3 to 8, wherein Z is a 1-benzofuran-7-yl group or a 5-dibenzofuran-4-yl group.

10. The process of any one of the preceding claims, wherein no more than two of R^1 to R^4 include a fused cyclic structure.

11. The process of any one of the preceding claims, wherein only one of R^1, R^2, R^3, and R^4 includes a fused cyclic structure.

12. The process of any one of the preceding claims, wherein groups R^1 to R^4 that are not the fused cyclic structure as claimed in claim 1 or claim 2 are phenyl groups.

13. The process of any one of the preceding claims where X consists of -N(R^9)-, where R^9 is a hydrocarbyl group, a heterohydrocarbyl group or an organoheteryl group.