Claims

1. A catalyst composition comprising MgO from about 44 wt % to about 67 wt %, Al_2O_3 from about 30 wt % to about 50 wt %, and one or more further alkaline earth metal oxides, wherein wt % is calculated based on the total weight of the catalyst composition, wherein the catalyst composition is in a shaped form, and wherein the catalyst composition has a pore volume of about 0.3 cm^3/g to about 0.72 cm^3/g as determined according to ASTM D4284.

2. The catalyst composition according to claim 1, wherein the shaped form is selected from a group consisting of agglomerates, tablets, rings, stars, wagon wheels, extrudates, rods, cylinders, spheres, spheroids, briquettes and pellets.

3. The catalyst composition according to claim 1, having an average largest diameter from about 1 mm to about 25 mm.

4. The catalyst composition according to claim 1, wherein the shaped form is cylinder-like with an average diameter of from about 1 mm to about 8 mm and an average length of from about 2 mm to about 20 mm.

5. The catalyst composition according to claim 1, wherein the shaped form is star-like.

6. The catalyst composition according to claim 1, further comprising one or more metal hydroxides selected from the group consisting of $Mg(OH)_2$, $Al(OH)_3$, and hydroxides of one or more further alkaline earth metals.

7. The catalyst composition according to claim 1, wherein the catalyst composition is in a form of an extrudate.

8. The catalyst composition according to claim 1, further comprising one or more alkaline earth metal oxides selected from CaO, SrO and BaO.

9. The catalyst composition according to claim 1, further comprising CaO.

10. The catalyst composition according to claim 1, comprising from about 3 wt% to about 20 wt% of the one or more further alkaline earth metal oxides, in total, based on the total weight of the composition.

11. The composition according to claim 1, wherein the composition has one or more of:
a crush strength of $\geq$ 2.0 lbs/mm, or
a surface area of from about 50 m^2/g to about 170 m^2/g.

12. A method to prepare the catalyst composition of claim 1, the method comprising:
preparing a mixture comprising i) MgO and/or $Mg(OH)_2$, ii) alumina and iii) oxides and/or hydroxides of one or more further alkaline earth metals;
shaping the mixture into a shaped form;
drying the shaped form; and
calcining the dried, shaped form.

13. A method of preparing propylene, the method comprising
contacting a feed stream containing 1-butene, 1-pentene or a mixture thereof with ethylene in the presence of the catalyst composition according to claim 1 and a metathesis catalyst.

14. A method of isomerizing an olefin, the method comprising contacting the olefin with the catalyst composition according to claim 1.

15. A method of olefin isomerization, the method comprising contacting 1-butene, 1-pentene or a mixture thereof with the catalyst composition of claim 1 to provide 2-butene, 2-pentene or a mixture thereof.