

CLAIMS

1. _____ A molecular sieve composition comprising an aluminophosphate molecular sieve and a CO adsorbing component, wherein:

each ~~the~~ CO adsorbing component comprises at least one metal oxide selected from the group consisting of an oxide of Group IIB metal of the periodic table, an oxide of Group VIB metal of the periodic table, gallium oxide and indium oxide, ~~(preferably at least one metal oxide selected from the group consisting of zinc oxide, chromium oxide, gallium oxide and indium oxide, more preferably at least one metal oxide selected from the group consisting of zinc oxide and chromium oxide, or more preferably a composite metal oxide of zinc oxide and chromium oxide),~~

90% of the aluminophosphate molecular sieve particles have diameters ranging from 0.3 mm to 9 mm, and

90% of the CO adsorbing particles have diameters ranging from 0.3 mm to 9 mm, and the molecular sieve composition does not comprise an SAPO molecular sieve. wherein the aluminophosphate molecular sieve and the CO adsorbing component are present separately from each other, such as packed individually or mechanically mixed with each other.

2. _____ The molecular sieve composition according to claim 1, wherein the aluminophosphate molecular sieve is at least one selected from the group consisting of $\text{AlPO}_4\text{-5}$, $\text{AlPO}_4\text{-11}$, $\text{AlPO}_4\text{-17}$, $\text{AlPO}_4\text{-18}$, $\text{AlPO}_4\text{-20}$, $\text{AlPO}_4\text{-31}$, $\text{AlPO}_4\text{-33}$, $\text{AlPO}_4\text{-34}$, $\text{AlPO}_4\text{-35}$, $\text{AlPO}_4\text{-44}$, and $\text{AlPO}_4\text{-56}$, ~~preferably at least one selected from the group consisting of $\text{AlPO}_4\text{-17}$, $\text{AlPO}_4\text{-18}$, $\text{AlPO}_4\text{-31}$, $\text{AlPO}_4\text{-33}$, $\text{AlPO}_4\text{-34}$, and $\text{AlPO}_4\text{-35}$, or preferably at least one selected from $\text{AlPO}_4\text{-18}$ and $\text{AlPO}_4\text{-34}$, more preferably an eutectic molecular sieve of $\text{AlPO}_4\text{-34}$ and $\text{AlPO}_4\text{-18}$ and an intergrowth molecular sieve of $\text{AlPO}_4\text{-34}$ and $\text{AlPO}_4\text{-18}$.~~

3. _____ The molecular sieve composition according to claim 1, wherein ~~the each~~ aluminophosphate molecular sieve is comprises ~~selected from the combination of $\text{AlPO}_4\text{-34}$ and $\text{AlPO}_4\text{-18}$, with~~ at a weight ratio of the $\text{AlPO}_4\text{-18}$ to the $\text{AlPO}_4\text{-34}$ of from 1:9 to 9:1, ~~preferably from 1:3 to 3:1.~~

4. _____ The molecular sieve composition according to claim 1, wherein at least a part ~~(preferably 50% or more, more preferably 80% or more, or more preferably 90% or more)~~ of the metal oxide exhibits a spinel structure according to XRD spectrum.

5. _____ The molecular sieve composition according to claim 1, wherein the weight ratio of the aluminophosphate molecular sieve to the CO adsorbing component is from 1:5 to 5:1; ~~preferably from 1:3 to 4:1, more preferably from 1:2 to 3:1, or more preferably from 1.5:1 to 4:1.5.~~

6. _____ The molecular sieve composition according to claim 1, wherein ~~the each~~ CO adsorbing component further comprises a binder ~~(preferably at least one selected from the group consisting of alumina, magnesia, titania and zirconia, more preferably alumina).~~

7. _____ The molecular sieve composition according to claim 6, wherein ~~the a~~ weight ratio of the metal oxide to the binder is from 10:1 to 1:1, ~~preferably from 4:1 to 1.2: 1.~~

8. _____ The molecular sieve composition according to claim 1, ~~being~~ is substantially free of at least one element selected from the group consisting of silicon, vanadium, and niobium.

9. _____ The molecular sieve composition according to claim 1, wherein 90% of the aluminophosphate molecular sieve particles ~~is present in particulate form and the 90% particle have diameters thereof is from 0.3 to 9mm (preferably from 0.4 to 5mm, more preferably from 0.5 to 0.9 mm), and/or the CO adsorbing component is present in particulate form and and/or the 90% of the CO adsorbing particles have diameters thereof is from 0.3 to 9mm (preferably ranging from 0.4 to 5mm, more preferably from 0.5 to 0.9 mm).~~

10. _____ A process of preparing a molecular sieve composition of claim 1, comprising the step of combining an aluminophosphate molecular sieve particles and a CO adsorbing ~~adsorbing particles~~ component (for example, ~~packing each individually or mechanically mixing with each other, preferably mechanically mixing with each other~~), wherein the CO adsorbing component comprises at least one metal oxide selected from the group consisting of an oxide of Group IIB metal of the periodic table, an oxide of Group VIB metal of the periodic table, ~~gallium oxide and indium oxide (preferably at least one metal oxide selected from the group consisting of zinc oxide, chromium oxide, gallium oxide and indium oxide, more preferably at least one metal oxide selected from the group consisting of zinc oxide and chromium oxide, or more preferably a composite metal oxide of zinc oxide and chromium oxide).~~

11. _____ A process of producing lower olefins, comprising the step of contacting synthesis gas with the molecular sieve composition according to claim 1 ~~or the molecular sieve composition prepared by the preparation process according to claim 10~~, to produce lower olefins.

12. _____ The process according to claim 11, ~~carried out at a~~ wherein the reaction temperature ~~is of~~ 320-480 °C (preferably 360-440 °C, more preferably 370-430 °C, or more preferably 380-410 °C), the reaction pressure (gauge pressure) is 0.5-8MPa ~~(preferably 1-6 MPa, more preferably 2-5 MPa)~~, ~~the a~~ gas hourly space velocity is 800-10000 h⁻¹ ~~(preferably 1,000-8,000 h⁻¹, more preferably 2,000-7,000 h⁻¹)~~, and ~~the a~~ volume ratio of CO to H₂ in the synthesis gas is 0.3-3.5 ~~(preferably 0.5-3, more preferably 0.7-2.5).~~

13. The molecular sieve composition according to claim 1, wherein the aluminophosphate molecular sieve particles and the CO adsorbing particles are mechanically mixed with each other.

14. The molecular sieve composition according to claim 1, wherein each CO adsorbing particle comprises at least one metal oxide selected from the group consisting of zinc oxide, chromium oxide, gallium oxide, indium oxide, and a composite metal oxide of zinc oxide and chromium oxide.

15. The molecular sieve composition according to claim 2, wherein the aluminophosphate molecular sieve is at least one selected from the group consisting of $\text{AlPO}_4\text{-17}$, $\text{AlPO}_4\text{-18}$, $\text{AlPO}_4\text{-31}$, $\text{AlPO}_4\text{-33}$, $\text{AlPO}_4\text{-34}$, $\text{AlPO}_4\text{-35}$, and the intergrowth molecular sieve of $\text{AlPO}_4\text{-34}$ and $\text{AlPO}_4\text{-18}$.

16. The molecular sieve composition according to claim 3, wherein the weight ratio of the $\text{AlPO}_4\text{-18}$ to the $\text{AlPO}_4\text{-34}$ is from 1:3 to 3:1.

17. The molecular sieve composition according to claim 4, wherein at least 50% or more of the metal oxide exhibits the spinel structure according to XRD spectrum.

18. The molecular sieve composition according to claim 5, wherein the weight ratio of the aluminophosphate molecular sieve particles to the CO adsorbing particles ranges from 1:3 to 4:1.

19. The molecular sieve composition according to claim 6, wherein the binder is at least one selected from the group consisting of alumina, magnesia, titania, and zirconia.

20. The molecular sieve composition according to claim 7, wherein the weight ratio of the metal oxide to the binder ranges from 4:1 to 1.2:1.

21. The molecular sieve composition according to claim 9, wherein 90% of the CO adsorbing particles have diameters ranging from 0.5 mm to 0.9mm.