

Claims

1. Additive particles for use in a fluid catalytic cracking system, comprising active particulates and a binder material, wherein at least 50 wt % of the active particulates are in a size range from 0.5 μm to 40 μm .

2. The particles of claim 1, wherein at least 90 wt. % of the active particulates are in a size range from 0.5 μm to 20 μm .

~~3. The particles of claim 1, wherein at least a portion of the additive particles are in a size range from 45 μm to 200 μm .~~

~~43.~~ The particles of claim 1, wherein at least 50 wt. % of the additive particles are in a size range from 45 μm to 200 μm .

~~54.~~ The particles of claim 1, wherein the binder material comprises alumina or an active source of alumina.

~~65.~~ The particles of claim 1, wherein the additive particles comprise from 0.1 wt. % to 50 wt. % of the binder material.

~~76.~~ The particles of claim 1, wherein the additive particles further comprise a matrix material.

~~87.~~ The particles of claim 1, wherein the additive particles are SO_x additive particles, comprising at least one SO_x active particulate that is reactive with sulfur trioxide or sulfur dioxide and oxygen at fluid catalytic cracking regenerator conditions to form at least one sulfur-containing solid.

~~98.~~ The particles of claim ~~87~~, wherein the at least one SO_x active particulate comprises alumina, magnesia, or combinations thereof.

~~109.~~ The particles of claim ~~87~~, wherein the at least one SO_x active particulate comprises a magnesium-alumina spinel.

~~11~~10. The particles of claim ~~8~~7, wherein the at least one SO_x active particulate comprises a magnesium-alumina spinel and a binder.

~~12~~11. The particles of claim ~~8~~7, wherein the SO_x additive particles further comprise a binder selected from alumina, silica, magnesia, or combinations thereof.

~~13~~12. The particles of claim ~~8~~7, wherein the SO_x additive particles further comprise a promoter.

~~14~~13. The particles of claim ~~13~~12, wherein the promoter comprises at least one metal selected from a rare earth metal, a noble metal, a base metal, or combinations thereof.

~~15~~14. The particles of claim ~~13~~12, wherein the promoter comprises cerium or lanthanum.

~~16~~15. The particles of claim ~~13~~12, wherein the promoter comprises platinum or palladium.

~~17~~16. The particles of claim ~~13~~12, wherein the promoter comprises vanadium.

~~18~~17. The particles of claim 1, wherein the additive particles comprise catalytic cracking particles comprising at least one active cracking particulate and the binder material.

~~19~~18. The particles of claim ~~18~~17, wherein the binder material comprises alumina or an active source of alumina.

~~20~~19. The particles of claim ~~18~~17, wherein the at least one active cracking particulate comprises a zeolite.

~~21~~20. The particles of claim ~~19~~19, wherein the zeolite is selected from a group consisting of rare earth-exchanged X or Y, hydrogen Y, ultrastable Y, or ZSM-5.