

CLAIMS

1. A catalyst composition comprising a zeolite and a mesoporous binder, said mesoporous binder comprises a mesoporous metal oxide which has a particle diameter of greater than or equal to 20 μm at 50% of the cumulative pore size distribution (d_{50}) and a pore volume of less than 1 cc/g, wherein said catalyst composition has a surface area of less than or equal to 300 m^2/g as measured by ASTM D2484.
2. The catalyst composition of claim 1, wherein said zeolite has a framework structure which comprises BEA*, FAU, MOR, MWW and mixtures of two or more thereof.
3. The catalyst composition of claim 2, wherein said framework structure which comprises BEA* is zeolite beta, said framework structure which comprises FAU is faujasite, zeolite Y, USY, Deal-Y, UHP-Y, REY, and mixtures of two or more thereof, said framework structure which comprises MOR is mordenite, TEA-mordenite, EMM-34, UZM-14, and mixtures of two or more thereof, said framework structure which comprises MWW is a MCM-22 family material selected from the group consisting of MCM-22, PSH-3, SSZ-25, MCM-36, MCM-49, MCM-56, ERB-1, EMM-10, EMM-10-P, EMM-12, EMM-13, UZM-8, UZM-8HS, UZM-37, MIT-1, ITQ-1, ITQ-2, ITQ-30, and mixtures of two or more thereof.
4. The catalyst composition of any preceding claim, wherein said mesoporous metal oxide comprises any one of aluminum oxide, aluminum hydroxide, boehmite, pseudoboehmite alumina, amorphous silica-alumina or combinations of two or more thereof.
5. The catalyst composition of any preceding claim, wherein said zeolite has a Si/Al_2 molar ratio of less than or equal to 100.
6. The catalyst composition of any preceding claim, wherein said mesoporous metal oxide has an alumina content of greater than or equal to 75%, by weight.
7. The catalyst composition of any preceding claim, wherein the ratio of said zeolite to said mesoporous metal oxide is in the range of from 1:99 to 100:0 by weight.

8. A process for producing a mono-alkylated aromatic compound comprising the step of:
- (a) contacting a portion of a stream comprising an alkylatable aromatic compound with a stream comprising an alkylating agent in the presence of an alkylation catalyst under alkylation conditions to produce an alkylation effluent which comprises said mono-alkylated aromatic compound and a poly-alkylated aromatic compound, wherein said alkylation catalyst comprises a first catalyst composition of any one of claims 1 to 7.
9. The process of claim 8, wherein said alkylation catalyst further comprises a second catalyst composition, wherein said second catalyst composition comprises another zeolite and another mesoporous binder.
10. The process of claim 9, wherein said another mesoporous binder of said second catalyst composition is different from said mesoporous binder of said first catalyst composition.
11. The process of claim 9, wherein said first catalyst composition has a selectivity to said mono-alkylated aromatic greater than said selectivity of said second catalyst composition and/or said first catalyst composition has a catalytic activity that is less than said catalytic activity of said second catalyst composition.
12. The process of claim 10, wherein said zeolite of said first catalyst composition is the same or different from said zeolite of said second catalyst composition, either of said zeolite has a framework structure which comprises BEA*, FAU, MOR, MWW and mixtures of two or more thereof.
13. The process of claim 8 or claim 9, further comprising the steps of:
- (b) separating said alkylation effluent stream to recover a stream comprising said mono-alkylated aromatic compound and a stream comprising said poly-alkylated aromatic compound; and
- (c) contacting said stream comprising said polyalkylated aromatic compound with another portion of said stream comprising said alkylatable aromatic compound in the presence of a transalkylation catalyst under transalkylation conditions to produce a transalkylation effluent which comprises additional mono-alkylated aromatic compound.

14. The process of claim 13, wherein said transalkylation catalyst is a large pore molecular sieve having a Constraint Index of less than 2, or a MCM-22 family material.
15. The process of claim 14, wherein said large pore molecular sieve is selected from the group of consisting of zeolite beta, faujasite, zeolite Y, Ultrastable Y (USY), Dealuminized Y (Deal Y), Rare Earth Y(REY), Ultrahydrophobic Y (UHP-Y), mordenite, TEA-mordenite, EMM-34, ZSM-2, ZSM-3, ZSM-4, ZSM-12, ZSM-14, ZSM-18, ZSM-20, ZSM-50, MCM-68, ECR-4, ECR-17, ECR-32, ECR-35 and mixtures of two or more thereof.
16. The process of claim 14, wherein said MCM-22 family material is selected from the group consisting of MCM-22, PSH-3, SSZ-25, MCM-36, MCM-49, MCM-56, ERB-1, EMM-10, EMM-10-P, EMM-12, EMM-13, UZM-8, UZM-8HS, UZM-37, MIT-1, ITQ-1, ITQ-2, ITQ-30 and mixtures of two or more thereof.
17. The process of any one of claims 8 to 16, wherein said stream comprising said alkylatable aromatic compound is an impure stream which further comprises impurities.
18. The process of claim 17, further comprising the steps of:
- (d) supplying said impure stream to a guard bed zone having a guard bed material disposed therein; and
 - (e) contacting said impure stream with said guard bed material under treatment conditions to remove at least a portion of said impurities to produce a treated stream comprising an alkylatable aromatic compound having a reduced amount of impurities.
19. The process of claim 18, further comprising the steps of:
- (f) supplying an alkylating agent along with said impure stream to said guard bed zone having said guard bed material disposed therein; and
 - (g) contacting said impure stream and said alkylating agent with said guard bed material under treatment conditions to remove at least a portion of said impurities and to alkylate at least a portion of said alkylatable aromatic compound to produce a treated stream, said treated stream having a reduced amount of impurities and comprising an alkylatable aromatic compound and additional mono-alkylated aromatic compound.

20. The process of claim 19, wherein said guard bed material is selected from the group consisting of a clay, a resin, an activated alumina, a molecular sieve and mixtures of two or more thereof.
- 5 21. The process of claim 20, wherein said molecular sieve is selected from the group consisting Linde X, Linde A, zeolite beta, faujasite, zeolite Y, Ultrastable Y (USY), Dealuminized Y (Deal Y), Rare Earth Y (REY), Ultrahydrophobic Y (UHP-Y), mordenite, TEA-mordenite, UZM-14, ZSM-3, ZSM-4, ZSM-12, ZSM-14, ZSM-18, ZSM-20 and combinations thereof.
- 10 22. The process of any one of claims 8 to 21, wherein said alkylatable aromatic compound is benzene.
23. The process of any one of claims 8 to 22, wherein said alkylating agent is ethylene,
15 said mono-alkylated aromatic compound is ethylbenzene and said poly-alkylated aromatic compound is poly-ethylbenzene.
24. The process of any one of claims 8 to 22, wherein said alkylating agent is propylene,
said mono-alkylated aromatic compound is cumene and said poly-alkylated aromatic
20 compound is poly-isopropylbenzene.