CLAIMS

1. A process for producing para-xylene, the process comprising:

(a) providing a catalyst comprising ZSM-5, phosphorus or a compound thereof and a clay binder, wherein the catalyst contains from 5 to 15 wt% ZSM-5 and has been steamed at a temperature of at least 900°C, wherein said steamed catalyst has a Diffusion Parameter for 2,2 dimethylbutane of about 0.1-15 sec^{-1} when measured at a temperature of 120°C and a 2,2 dimethylbutane pressure of 60 torr (8 kPa); and

(b) alkylating benzene and/or toluene with an alkylating agent selected from methanol, dimethyl ether, and mixtures thereof to produce para-xylene and water vapor as a by-product, in the presence of said steamed catalyst under conditions including a temperature of at least 500°C and an H_2O partial pressure of at least ~~12 psia (83 kPaa).~~ 4-15 psia (about 104 kPaa), wherein additional steaming of the catalyst occurs during the alkylation reaction and the Diffusion Parameter for 2,2 dimethylbutane of the catalyst does not exceed about 35 sec^{-1} during the reaction.

2. The process of ~~Claim~~ claim 1, wherein the catalyst in (a) comprises from 2 to less than 8 wt% of elemental phosphorus.

3. The process of ~~any one of the preceding claims~~ claim 1, wherein the ZSM-5 is an aluminosilicate having a silica/alumina molar ratio of at least 200.

4. The process of ~~any one of the preceding claims~~ claim 1, wherein the catalyst contains from 8 to 10 wt% ZSM-5.

~~5. The process of any one of the preceding claims, wherein the binder comprises silica and/or clay.~~

~~6.~~5. The process of ~~any one of the preceding claims~~ claim 1, wherein the catalyst contains from 75 to 90 wt% binder.

~~7.~~6. The process of ~~any one of the preceding claims~~ claim 1, wherein the catalyst

in (a) has been steamed at a temperature of at least 900°C for between about 10 minutes and about 1.5 hours.

~~8. The process of any one of the preceding claims, wherein the conditions in (b) include an H_2O partial pressure of at least 15 psia (103 kPaa).~~

~~9.~~7. The process of ~~any one of the preceding claims~~ claim 1, wherein said conditions in (b) also include a temperature between about 500 and 700°C, a total reactor pressure of between about 1 atmosphere and 1000 psig (100 and 7000 kPa), a weight hourly space velocity between about 0.5 and about 1000 and a molar ratio of toluene to methanol of at least about 0.2.

~~10.~~8. The process of ~~any one of the preceding claims~~ claim 1, wherein the upper limit of ~~H_20~~ H_2O partial pressure is less than 1000 psig (7000 kPa).

~~11.~~9. The process of ~~any one of the preceding claims~~ claim 1, wherein the silica/alumina molar ratio of the catalyst is less than 1,000.