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(54) **Title:** PHOSPHORUS MODIFIED ZEOLITE CATALYSTS

(57) **Abstract:** An unbound catalyst composition comprises a zeolite and phosphorus in an amount between about 0.01 wt% and about 3 wt% of the total catalyst composition. The catalyst composition, as calcined at ~1000°F (~538°C) for at least -3 hours, can exhibit (i) 2,2- dimethylbutane diffusivity $>1.5 \times 10^{-2} \text{ sec}^{-1}$ when measured at ~120°C and ~60 torr (~8 kPa), (ii) coke deactivation rate constant <0.15 , and (iii) alpha value at least 10, and further exhibiting at least one of: (a) mesoporosity $>0.2 \text{ ml/g}$; (b) micro-porous surface area at least $375 \text{ m}^2/\text{g}$; and (c) coke deactivation rate constant <0.05 after steaming in ~100% steam tor~96 hours at ~1000°F (~538°C).

