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Fig. S1 Thermogravimetric analysis of (a) $K_{1.0}$ PMo (b) $K_{2.0}$ PMo (c) $K_{3.0}$ PMo (d) $K_{4.0}$ PMo.



Fig. S2 Effect of recycling times on DBT conversion. Experimental conditions: catalysts dosage=0.2g, T=60°C, n(H₂O₂)/n(DBT)=4, t=60min, C₀=320ppmw, V(oil)/V(methanol)=1.5:1.



Fig. S3 (a) Powder XRD patterns (b) FT-IR spectra of $K_{4.0}$ PMo before and after catalytic

reaction.



Fig. S4. Raman spectra of different samples. (a) HPMo (b) $k_{1.0}$ PMo (c) $k_{2.0}$ PMo (d) $k_{3.0}$ PMo (e) $k_{4.0}$ PMo.



Fig. S5. TPR profiles of (a) HPMo (b) $K_{1.0}$ PMo (c) $K_{2.0}$ PMo (d) $K_{3.0}$ PMo (e) $K_{4.0}$ PMo.