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# Oxidation of dibenzothiophene catalyzed by $[C_8H_{17}N(CH_3)_3]_3H_3V_{10}O_{28}$ using molecular oxygen as oxidant

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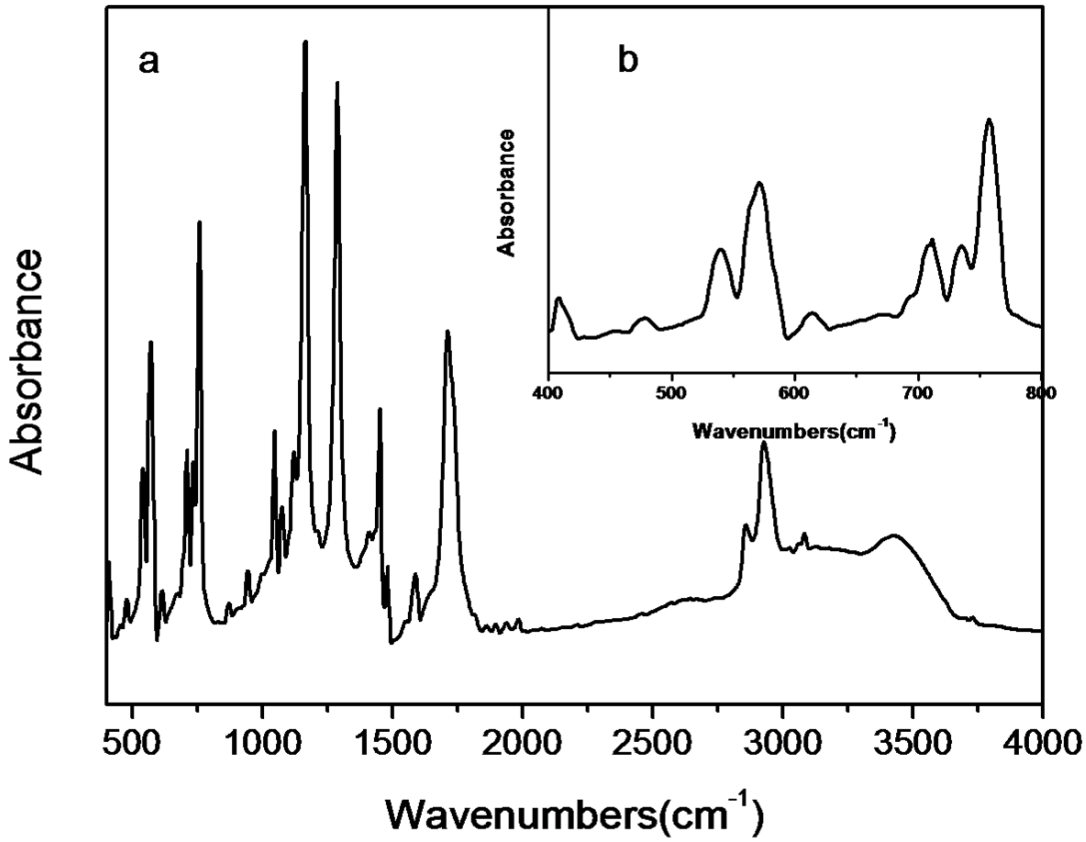
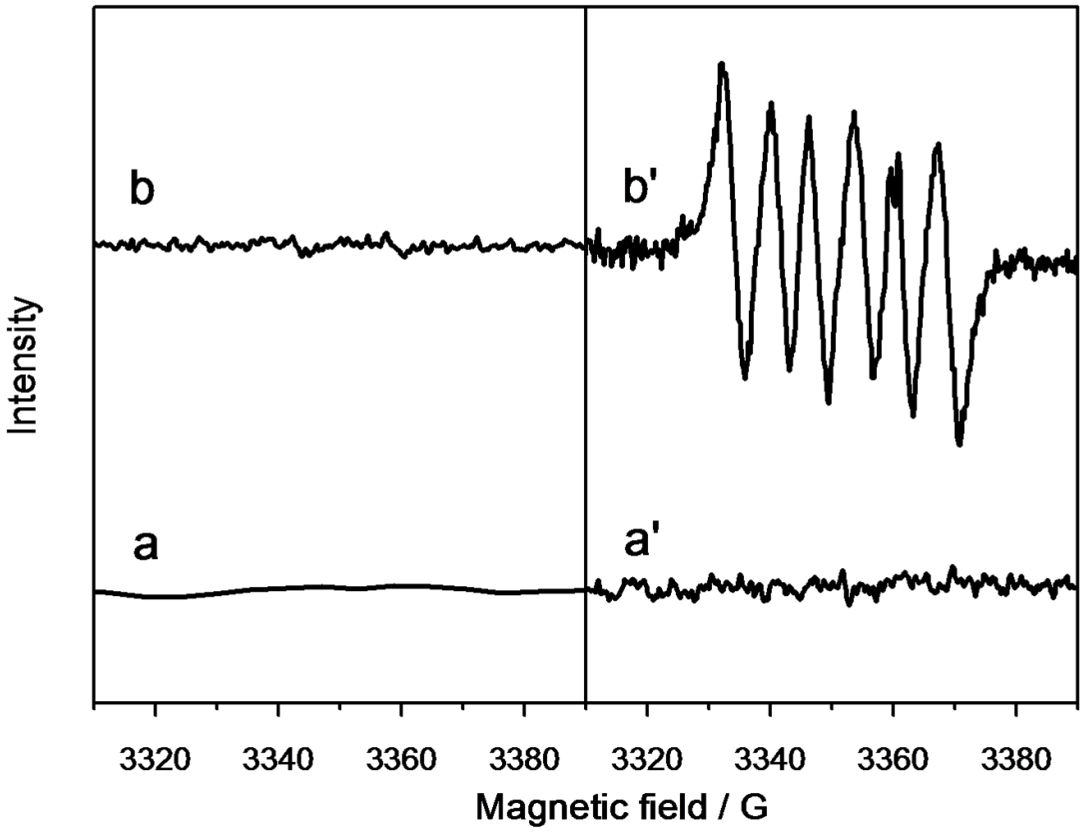
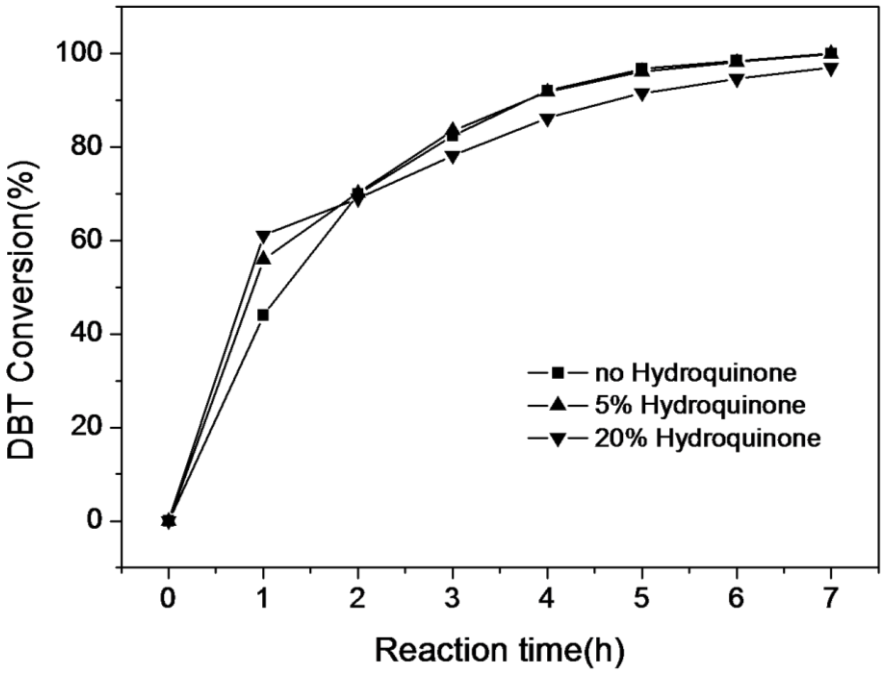



**Supplementary Fig. 1.** (a), FT-IR spectrum of reaction product; (b), FT-IR spectrum of reaction product, wavenumbers : 400 ~ 800 $cm^{-1}$




**Supplementary Fig. 2.** *In situ* ESR spectra of DMPO-$O_2^{\cdot -}$ adduct generated in the oxidative desulfurization process. (a) the sample tested without catalyst at 25 $^{o}$C. (b) the sample tested without catalyst at 60 $^{o}$C. (a') the sample tested with catalyst at 25 $^{o}$C. (b') the sample tested with catalyst at 60 $^{o}$C.




**Supplementary Fig. 3.** Effect of hydroquinone on ODS catalyzed by $[C_8H_{17}N(CH_3)_3]_3H_3V_{10}O_{28}$. ■: no hydroquinone; ▲: 5% hydroquinone; ▼: 20% hydroquinone.

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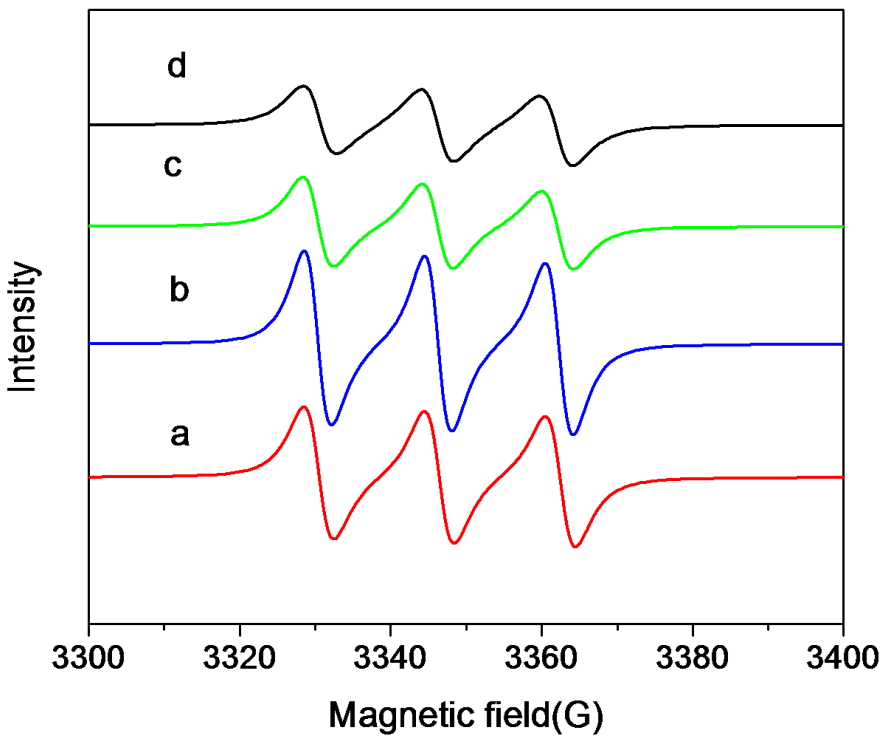
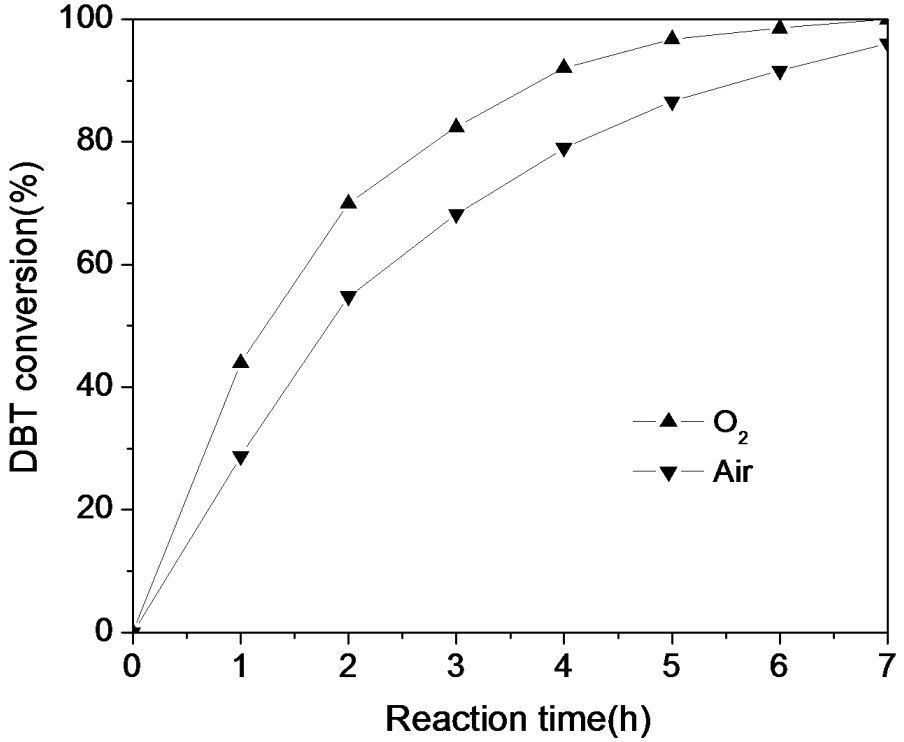



**Supplementary Fig. 4.** ESR spectra of TEMPO-$^1O_2$. (a) the sample tested without catalyst at 25 $^oC$. (b) the sample tested with catalyst at 25 $^oC$. (c) the sample tested with catalyst at 60 $^oC$. (d) the sample tested with catalyst at 80 $^oC$.




**Supplementary Fig. 5.** The conversion of DBT *vs*. reaction time using $O_2$ or air. Reaction condition: 40 mg $Q_3H_3V_{10}O_{28}$, 20 ml DBT/decalin (500ng $\mu l^{-1}$), 90 $^{o}$C.