Mn(II) complexes with Schiff bases immobilized at nanosilica as catalysts in ozone decomposition reaction

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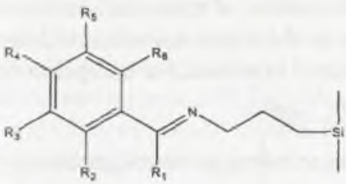
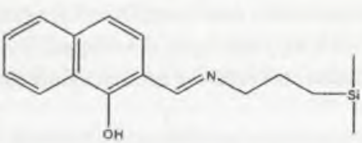
Mn(II) complexes with Schiff bases (see Fig.) immobilized at nanosilica (d_{av} = 10 nm) surface (S_{sp} = 290 m²/g) have been synthesized and characterized by means of UV-vis, IR, ESR spectrometry, and semi empirical quantum chemistry as well.



L3



L1: R_2 = OH, $R_{1, 3–6}$ = H; **L2**: R_2 = OH, R_5 = Br, $R_{1, 3, 4, 6}$ = H; **L4**: R_2 = OH, R_3 = OCH_3; $R_{1, 4–6}$ = H; **L5**: R_1 = CH_3, R_2 = OH, R_3 = C_l, R_5 = C_l, $R_{4, 6}$ = H; **L6**: R_3 = OCH_3, R_4 = OH, $R_{1, 2, 5, 6}$ = H; **L7**: R_2 = OH, R_4 = OCH_3, $R_{1, 3, 5, 6}$ = H

Fig. *Schiff base ligands immobilized at nanosilica surface*

The above mentioned nanocomposites were tested as catalysts in low temperature ozone decomposition in air-ozone mixture ($C(O_3)$ = 200 mg/m³). All complexes are catalytically active in ozone decomposition. For L4 and L6 stationary condition with a formation of catalytically active Mn(IV) oxide was observed. MnO_2 is less active in ozone decomposition than Mn(II) complexes. The influence of ligand nature on catalytic activity of Mn(II) complexes was estimated by a half time ozone decomposition ($\tau_{1/2}$). An activity row could be represented as follows: L3 > L6 > L7 > L1 > L4 > L5 > L2. The influence of substitutes in hydroxybenzalimines (L1, L2, L4, L5) on catalytic activity of the complex obeys Hammett equation. To summarize, all synthesized nanocomposites can be used as antiozonant additives, and the quantity of decomposed ozone ($Q_{ex} \cdot 10^5$, mole O_3) is increasing in the sequence: L2 < L5 < L1 < L7 < L6 < L4 < L3.