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# INDOLE-BASED SUPPORTED CATALYSTS FOR THE SELECTIVE PHENOL OXIDATION

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**Abstract.** A new class of supported catalysts were synthesized by anchoring 2-((1*H*-indole-3-yl)methyleneamino)phenol (HIMAP) onto chloromethylated polystyrene beads, followed by binding with various metal ions. The catalysts were evaluated for their efficiency in the selective oxidation of phenol under mild conditions using *tert*-butyl hydroperoxides (TBHP) and hydrogen peroxide as oxidants. Among all catalysts, the PS-HIMAP-Cu exhibited superior catalytic performance, achieving up to 97.2% phenol conversion and 91.5% selectivity toward catechol with TBHP. Interestingly, PS-HIMAP-Ni showed the highest catechol selectivity (96.8%) when $H_2O_2$ was employed, despite a lower overall conversion rate. Catalytic efficiency generally peaked at 70°C with 0.15 g of catalyst over 6 hours. Reusability studies demonstrated remarkable stability, with all catalysts retaining high activity over six consecutive cycles, maintaining the structural integrity of the catalysts. Based on elemental, FTIR, EDX, DRS and EPR, the copper catalyst adopts a square-planar geometry, while the nickel and manganese catalysts exhibit tetrahedral coordination environments. The iron catalyst possesses an octahedral geometry, whereas the vanadium catalyst displays a square-pyramidal coordination geometry. The proposed mechanism involves the formation of metal-peroxo intermediates, followed by the electrophilic attack on the phenol ring. This study presents a robust and recyclable catalytic platform of heterogeneous catalysis offering promising avenues for phenol valorisation and wastewater treatment applications.

**Keywords:** polymeric support, functionalized resin, catalysis, reusability, oxidation.

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