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## REDUCTIVE DECHLORINATION OF POLYCHLORINATED BIPHENYLS (PCBs) BY MEANS OF NANOSCALE ZERO-VALENT NICKEL-IRON (NZVNI) PARTICLES

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### Abstract

Polychlorinated biphenyls (PCBs) are toxic and recalcitrant compounds that can be reductively dechlorinated in the presence of expensive catalyzers, such as bimetallic Fe/Pd nanosized particles. Other Pd-free zerovalent metallic and bimetallic systems, such as Nanoscale Zero Valent Iron (NZVI) and Nanoscale Zero Valent Nickel-Iron (NZVNI) particles, are cheaper and able to promote the dechlorination of aliphatics and aromatics. In this paper, we investigated the dechlorination capability of NZVI (1.67g Fe<sup>0</sup>/L) and NZVNI (1.67g Fe<sup>0</sup>/L and 0.88g Ni<sup>0</sup>/L) particles towards 2,3,4,5-CB (2 mg/L) in water and methanol/water 30% (v/v) solution at room temperature. NZVI proved ineffective in 2,3,4,5-CB dechlorination under both the above-mentioned conditions. On the contrary, NZVNI dechlorinated 7.1±1.8 % and 27.7±0.4 % of the 2,3,4,5-CB occurring in water and in methanol/water solution, respectively, in 8 weeks of incubation. Dechlorination occurred via preferential removal of the less sterically hindered chlorine in *meta* position 5 and proceeded by removing chlorines in *para* position and in *meta* position 3.

**Key words:** Nanoscale Zero Valent Iron particles (NZVI), Nanoscale Zero Valent Nickel-Iron particles (NZVNI), Polychlorinated Biphenyls (PCBs), reductive dechlorination

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