

# A Study on the Mechanism of the Adhesion of *Escherichia coli* on Zinc Oxide Modified Zeolite

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**Abstract:** The mechanism of the adhesion of *Escherichia coli* on Zinc oxide modified zeolite (ZMZ) has been investigated in this paper. A Leica DMIL-LED type fluorescence inversion microscope was used to observe the distribution of *Escherichia coli* labeled in green fluorescence in the *Escherichia coli* suspension which is added with zeolite, Zinc oxide and ZMZ. The adhesion behavior of *Escherichia coli* on the surface of the ZMZ was further analyzed and explored by using Zeta potentiometer and scanning electron microscopy (SEM). The plate counting method was used to evaluate the removal efficiency of *Escherichia coli* by zeolite, Zinc oxide and ZMZ, respectively. The results show that the interaction between the 0.05 g ZMZ and the  $2.1 \times 10^4$  CFU/mL *Escherichia coli* suspension for 2 h at 25 °C resulted in a maximum *Escherichia coli* removal efficiency of 98%. The Freundlich isotherm model is very suitable for explaining the removing process of *Escherichia coli* by adhesion of the ZMZ. Furthermore, the removal of *Escherichia coli* by the ZMZ occurred in two steps. Firstly, *Escherichia coli* is adhered to the surface of ZMZ due to the electrostatic attraction. Secondly, *Escherichia coli* is gradually settled down and subsequently form multilayers on the surface of the ZMZ due to the stability decrease of the *Escherichia coli* suspension caused by the adhesion of *Escherichia coli* on the surface of the ZMZ.

**Keywords:** zinc oxide; zeolite; *Escherichia coli*; adhesion; electrostatic attraction