

## Use of chitosan in coagulation flocculation of raw water of Keddara and Beni Amrane dams

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### ABSTRACT

The effectiveness of chitosan as a coagulant flocculant in surface water treatment has been studied. Tests were carried out in laboratory on treated and raw water. The treated water was mixed with high and low concentrations of bentonite to simulate turbid water. This treated water provides from water treatment plant of Algiers (Boudouaou site) which is supplied by both dams of Keddara and Beni Amrane. The raw water comes directly from these two dams. Chitosan with 85% degree of deacetylation and derived from crab chitin has been used. The performance of coagulation flocculation process has been assessed by measuring the supernatant turbidity for different doses of chitosan, initial turbidity, water quality and pH. The obtained results show that chitosan can be used in a large pH range. Chitosan is effective for coagulation of bentonite suspension and for raw water with high initial turbidity. Otherwise, chitosan is inefficient for raw water with very low initial turbidity. In this case, the use of chitosan as aid coagulant with aluminium sulfate (main coagulant) allows more effectiveness in removing turbidity.

Key words | Bentonite, chitosan, coagulation flocculation, raw water, turbidity

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### INTRODUCTION

Surface waters contain impurities which affect their appearance and may have harmful effects for consumers. These impurities may be present either in dissolved or in colloidal suspension forms. Turbidity is caused by colloidal particles, characterized by a very small diameter and electronegatively charged generating inter-colloidal repulsion forces. These two properties give to colloids a lower sedimentation speed (Amirtharajah & O'Melia 2004).

Coagulation flocculation process is commonly used in water treatment in order to remove turbidity and natural organic matter. This process occurs in two stages to accelerate the colloids sedimentation by the injection and the scattering of chemical coagulants (Amirtharajah & O'Melia 2004). These coagulants aggregate the colloidal

particles and dissolved organic matter and easily eliminate them by sedimentation, flotation or filtration. Coagulation is generally induced by metals salts. The most widely and commonly used are aluminium and iron salts. The addition of these chemicals engenders colloidal destabilization by electronegative charge neutralization of colloids leading to the formation of micro-flocs (Roussy *et al.* 2004). Flocculation permits, by the addition of synthetic polymers such as polyacrylamide, to bind the micro-flocs together through slow mixing. Then, a simple separation step eliminates the flocs. However, the use of these chemicals, particularly aluminium, may have several environmental consequences: (a) human health implications such as Alzheimer's and other diseases with carcinogenic properties (McLachlan