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Defluoridation of Sahara water by small plant electrocoagulation using bipolar aluminium electrodes

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Abstract

The purpose of this paper is to propose an efficient and low cost defluoridation process based on electrocoagulation with aluminium bipolar electrodes. The performance of a pilot scale electrochemical reactor equipped with aluminium bipolar electrodes with an anode active area surface of about 1.6 m^2 was studied. The pilot study yielded promising results, suggesting that further in-depth development studies are justified.

Keywords: Electrocoagulation; Bipolar electrodes; Defluoridation; Small plant

1. Introduction

In North African region, drinking water of certain regions contains excess amount of fluoride. As a result, a significant number of people are afflicted with fluorose. Indeed, no less than 20% of the populations of El Oued city have contracted this disease [1 – 3]. Several defluoridation methods have been developed to remove fluoride and im- prove the quality of water. The first method pro- posed, which was based on the fluoride precipitation with aluminium salt or calcium dihy- droxide, was found to be not cost effective [4,5]. The same was also true for processes based on the adsorption [5 –9].

A new process based on electrocoagulation with bipolar aluminium electrodes was developed in 1998 [1]. On this process the aluminium-fluoride weight ratio attained 17/1 without adding soluble salts to the treated water. The optimum operating

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