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## Experimental study on cleaning and detoxification of chromium in construction waste

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### Abstract

By selecting varieties of factors, designing experiment in groups and other methods, the cleaning and detoxification of chromium in construction<sup>†</sup> waste has been studied. Experimental results show that: When particle diameter is larger than 1cm, chromium and content are volatile in waste. On the opposite, the effect of particle size on the detoxification of waste is not significantly when it is smaller than 1cm. In addition, the type and concentration of detergent have a great influence on cleaning and detoxifying. Detoxification effects on chromium of citric acid (0.1mol/L, 0.5mol/L) and concentration hydrochloric acid (0.5mol/L, 1mol/L) are very efficient, and removal rate is up to 90%. Citric acid, oxalic acid, concentrated hydrochloric acid, and concentrated acetic acid have the best effect on Cr<sup>6+</sup> removal works. Removal rate is more than 99%.

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### 1. Introduction

Chrome is one of the essential trace elements of human beings, but if the content is large, it can cause alopecia toothache, carcinogenesis and other serious consequences. Chrome element is susceptible to oxidation reduction

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reaction, mainly existing in two states: trivalent and hexavalent. Toxicity of hexavalent chromium is 100 times than trivalent chromium. Chrome is strongly mutagenic substances. Cr(VI) is absorbed more easily by the human body and is the reason of cancer<sup>[1]</sup>. Due to the huge perniciousness of chromium to human body, Cr pollution is being worldwide hot issues.

In recent years, with China's urbanization process accelerating, in order to improve the urban environment, many polluting enterprises implement the relocation plan. But construction waste of old factory demolition is generally associated with the contaminants, like heavy metal chromium which is one of the most serious pollution. Removal of Cr pollution in construction waste is a very important pollution treatment work. Methods used for Cr detoxification currently are detoxification techniques of pyrolysis, wet detoxification, io-detoxification, microwave digestion<sup>[2-4]</sup>, electro-kinetic remediation<sup>[5]</sup> and other methods developed rapidly in recent years. This paper focuses on research of wet method of detoxification process. Confirm the best cleaning method of detoxification treatment through a variety of experiments, to provide a basis for the implementation of the later remediation of waste pollution.

## 2 Experiments

### 2.1 Experimental Materials

#### 2.1.1 Construction Waste

Select brick, tile fragments and concrete blocks, the natural stone of construction waste in Cr contaminated site, shown in figure 1.



(a) Brick

(b) Tile Fragments

(c) Concrete Blocks

Fig.1 Three Different Kind of Construction Waste with Different Sources

Test the basic characteristics of three kinds of construction waste, which are shown in table 1.

Table1 Heavy Metal Content of three kinds of Construction Waste

Items	Brick	tile fragments	Concrete blocks	Standards
Total Cr (mg/kg)	555	2445	413	200
Cr <sup>6+</sup> (mg/kg)	283	1701	298	—
Cu (mg/kg)	not checked out	not checked out	not checked out	200
Pb (mg/kg)	not checked out	not checked out	not checked out	300
As (mg/kg)	0.57	1.36	0.67	30
Hg (mg/kg)	not checked out	not checked out	not checked out	0.5

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