

## Investigation of nitrate removal from aqueous solution by Clinoptilolite zeolite modified with Cu and Zn

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### Abstract

Nitrate entered into the human body is transformed into nitrite through processes that combine with amines and cause the formation of nitrosamine, which is a carcinogenic substance. According to research, nitrate also causes Alzheimer's disease[1]. Therefore, it is necessary to remove nitrate from water. In this research work, due to the low efficiency of unmodified clinoptilolite zeolite, zinc chloride and copper acetate were used to modify the adsorbent. Various factors such as environmental pH, nitrate concentration, contact time and adsorbent dosage were investigated. The results showed that the modified zeolite is more efficient in removing nitrate from aqueous solutions due to the different adsorption sites, the simplicity of the system and the high removal efficiency compared to the unmodified zeolite. The results of the effect of contact time on the amount of nitrate removal after modification of the adsorbent by both substances show that the maximum was reached with the increase of the contact time from 2 to about 80 minutes and then with the excessive increase of the contact time, the efficiency decreased gradually. The increase in efficiency at early contact times may be due to the increase in the number of vacant sites on the adsorbent surface. After the period of time when the empty sites were occupied, the amount of removal of the adsorbent depends on the activity of the added substance, in this case, copper acetate has removed the nitrate particles more strongly. Therefore, in high concentrations of nitrate, zeolite modified with zinc chloride was the most suitable adsorbent, while in low concentrations of nitrate, zeolite modified with copper acetate showed the highest removal efficiency.

**Keywords:** Zeolite, clinoptilolite, nitrate removal, zinc chloride, copper acetate

### References

- [1] Azari, A., Mahvi, A., Naseri, S., Rezaei, R. Nitrate removal from aqueous solution by using modified clinoptilolite. *Archives of Hygiene Sciences*, 2014, 3(1):184-92.