

**RESEARCH ON USING SILICA SAND FOR GROUNDWATER  
TREATMENT**

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An experimental research of the removal of ammonium nitrogen compounds from groundwater using silica sand was performed at water laboratory. Ammonium ions concentration were between 1.5– till 2.5 mg/L within the primary research at laboratory filter model. Silica sand filter media was used at water treatment plants within the filter before using it within the filter model. Groundwater artificially polluted with iron sulphate and ammonium solutions were treated through the filter model filled in with 1 m high silica sand. Replicated research performed for each operational scenario, the filter medium silica sand was backwashed with treated water. The most effective removal of ammonium ions from the groundwater solution was obtained using filtration rate approximately 3 m/h with the naturally treated silica sand. Ammonium ions removal efficiency was nearly 90 % using 5 m/h filtration rate. The best ammonium removal efficiency (94 %) was achieved using 0.6–2.0 mm natural fraction silica sand.

Though a high efficiency of water treatment from nitrogen compounds is reached by using novel and high filtration capacity filtration media, it's purposeful to invest in research for natural and locally obtained, filter materials even of a lower removal capacity. Recently, in groundwater treatment for drinkable supply, conventional technologies conventional filtration through silica sand are in use.

It is stated within the requirements that the most limit and allowed concentration for nowadays is to succeed in and minimize the amount of ammonium ions concentration till 0.5 mg/L for drinking water supply.

To find out an efficient removal of ammonium nitrogen by naturally obtained silica sand media and to treat groundwater, an in depth research of ammonium ions removal dynamics is required.

As the definition by geologists, useful as filter media sand particles aim diameter from 0.0625 mm to 2 mm. Following ISO 14688 grades

sands as fine, medium and coarse with the ranges from 0.063 mm to 0.2 mm, 0.63 mm.

For the needs mentioned above, it had been useful to search out what proportion of ammonium ions concentration are often removed from groundwater using naturally obtained filter media [1]. The main idea of the experiments presented in this research is to increase the efficiency of the removal of ammonium ions from groundwater and to find their interference dynamic [2]. It is known that the removal capacity is increased by using highest filter media or decrease the filtration rate because the contact time increases [3]. Therefore, the smallest naturally obtained fraction (imported from Poland) of natural silica sand was used in this study, with lowest possible filtration rate of 5 m/h.

Obtained results of this study are going to be used for estimating the filter medium height needed to remove of relatively high concentration of ammonium ions from groundwater.

The preliminary obtained results of this study need more extensive research in the future with evaluation of other compounds that possibly influence the filtration technology. Other locally obtained materials from wasted crashed gravel or any natural ecological substances need to be evaluated.

### References

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