

УДК 628.316.12

EVALUATION OF THE LEACHATE REAGENT TREATMENT

Dehtiar Mariia

*PhD, The Department of Water and Wastewater Engineering
OM Beketov National University of Urban Economy in Kharkiv, Ukraine*

ORCID ID: 0000-0001-7836-1680

Abstract In the article the possible way of leachate treatment has been considered, to be exact the opportunity of using activated aluminum sulfate coagulant has been estimated. In particular, the possibility of reducing the estimated doses of coagulant without reducing the efficiency treatment had been considered.

Key words: landfill, leachate, aluminum sulfate coagulant, activate, effect doses of coagulant

According to the data of the Ministry of Environmental Protection of Ukraine [1], half a billion tons of waste are generated annually in Ukraine (Fig. 1), more than 90% of which end up in solid household waste landfills. At the same time, waste processing plants are currently at the design stage.

The majority of solid waste landfills have already exhausted their resources and require the alienation of new territories for the arrangement of new queues. In any case, the functioning of the landfill have a negative influence on ecosystems. The main negative consequences of waste disposal in landfills are the formation of leachate and biogas.

Physical, chemical, biological methods, as well as their combination, are used to clean highly concentrated wastewater (leachate) from solid waste landfills.

In the course of research, it was proposed to use a combination of the above-mentioned methods with the use of a solution of coagulant aluminum sulfate, activated by magnetic treatment and electrocoagulation [2].

Finding optimal conditions, in particular, setting the optimal dose of coagulant, is a very important task, the solution of which depends on the treatment effectiveness. Optimum doses of coagulant make it possible to maintain the necessary technological mode of operation of treatment facilities in the event of a change in the leachate quality entering the facilities.

The most important indicators characterizing the effectiveness of wastewater treatment are: the BOD₅, COD, the content of suspended solids and phosphates, the presence of which in treated wastewater is regulated depending on the place of discharge or further use of wastewater.

The study of the influence of the activation parameters of the aluminum sulfate coagulant solution was performed on model water with a content of suspended solids in the range of 280-300 mg/dm³, with a phosphate content of up to 45 mg/dm³ and a BOD₅ that does not exceed 200 mgO₂/dm³.

The results of previous studies [2-3] allow us to conclude that the use of activated coagulant solutions makes it possible to intensify the treatment process, and thus reduce the calculated doses of the reagent used.

According to the research regulations the change in quality indicators was recorded after mechanical cleaning: the content of suspended substances and color were determined. .

The analysis of the obtained data showed that during the purification of the filtrate using an untreated coagulant solution at doses of 100 mg/dm^3 , the content of suspended solids was 109.6 mg/dm^3 and 79.9 mg/dm^3 under the condition of using an activated coagulant solution, the color was 138 and 100 respectively.

The adsorption capacity of aluminum hydroxide coagulant in water purification processes can be increased by an average of 10-15% with an activated solution of aluminum sulfate coagulant. It is this factor that can explain the decrease of indicators such as COD and BOD_5 by an average of 12% compared to the use of a conventional coagulant solute.

Studies were conducted with a dose of coagulant in the range of 150-300 mg/dm^3 . The most noticeable effect was recorded for coagulant doses of 200 mg/dm^3 , at which the content of suspended solids was 62.3 mg/dm^3 for treatment with a normal coagulant solution and 40.3 mg/dm^3 for treatment with an activated coagulant solution, color was 95 and 58 degrees respectively.

After analyzing the indicators of cleaning efficiency when using an ordinary coagulant solution (suspended substances content - 62.3 mg/dm^3 , color 95 degrees) for doses of 200 mg/dm^3 with indicators of cleaning efficiency when using an activated coagulant solution (suspended substances content - 58.3 mg/dm^3 , color 88 degrees) for doses of 150 mg/dm^3 , it can be concluded that the use of an activated coagulant solute makes it possible to reduce the calculated coagulant doses without changing the quality of the filtrate (Fig. 1).

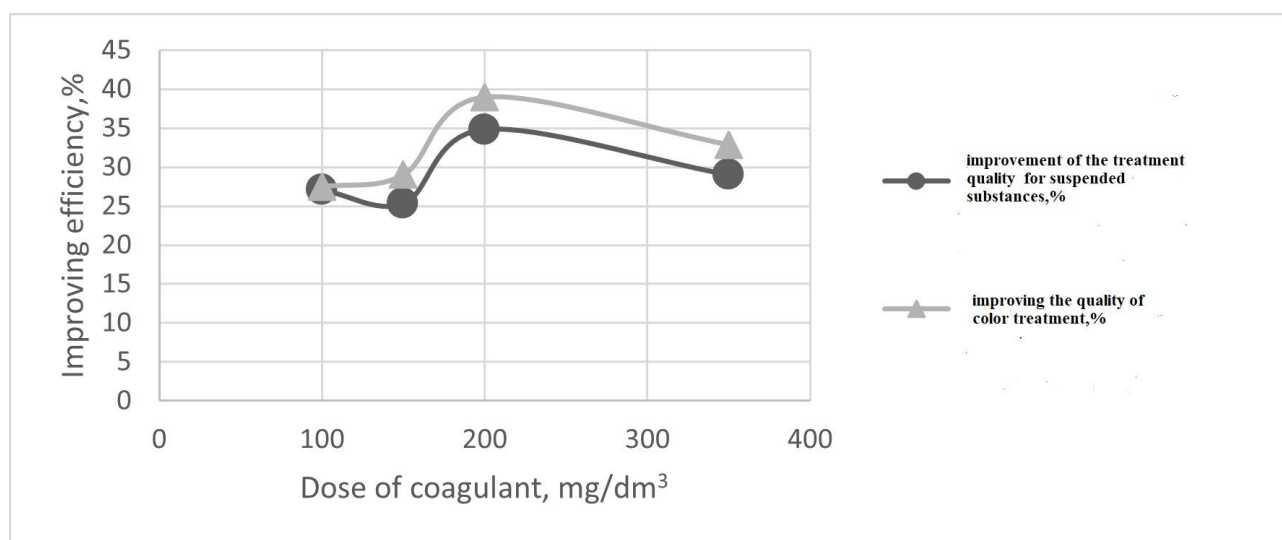


Fig.1 - Dependence of the treatment efficiency on coagulation dose

To conclude, using of an activated coagulant solution of aluminum sulfate makes it possible to reduce the calculated dose of coagulant, compared to the usual coagulant solution, by an average of 28-30%, without deteriorating the quality of the filtrate.

References

[1] Waste processing plants, landfills, installations: The government approved the procedure for monitoring waste treatment facilities//<https://mepr.gov.ua/smittyepererobni-zavody-poligony-ustanovky-uryad->

zatverdyy-poryadok-monitoryngu-ob-yektiv-obroblennya-vidhodiv/

[2] Degtyar M.V. *Assessment of the impact of waste disposal facilities on the environment//The 8th International conference —Science and society* (November 9, 2018) Accent Graphics Communications & Publishing, Hamilton, Canada. 2018. 580 p. (47-56 years) ISBN 978-1-77192-360-6

[3] Dushkin S.S., Kramarenko L.V., Gusleva A.L. Theoretical principles of coagulant solution activation// Communal economy. Scientific and technical rep. Sat.-K.: Technology, 1997. Issue 7.-S.13-14.,