III International Scientific Conference "**Sustainable and efficient use of energy, water and natural resources – SEWAN-2021**"

Natural and wastewater treatment using an electrostatic field

Authors: Oksana Medvedeva, Tatyana Sautkina

Affiliations: Yuri Gagarin State Technical University of Saratov, Russia, Saratov

Saint-Petersburg, April 19-24, 2021

Names Oksana Medvedeva, Tatyana Sautkina
Affiliations Yuri Gagarin State Technical University of Saratov

Keywords:
turbidity, coagulation, precipitation, electric field, Static-charge accumulation

Research Objective:

to develop technical solutions aimed at intensifying the coagulation process by using environmentally friendly non-reactive technologies, including low-turbidity waters

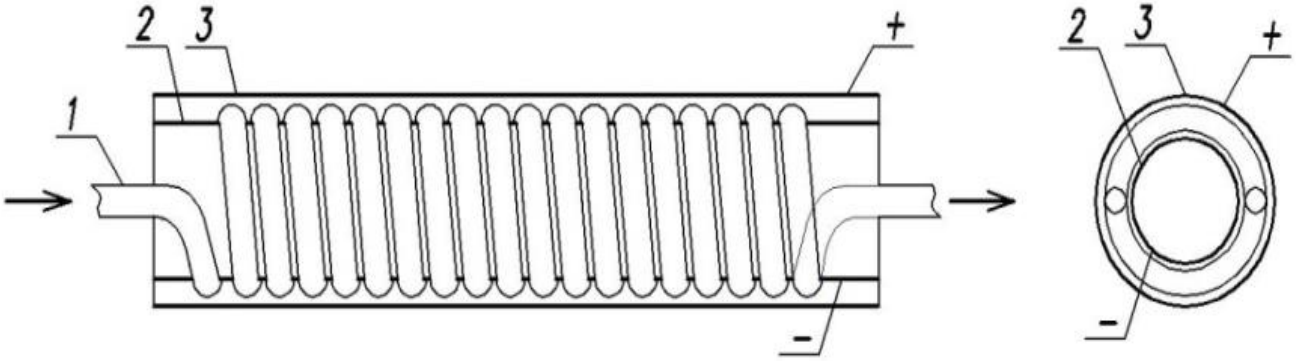

Figure 1. A device for intensifying the sedimentation of suspended particles in a liquid:
1 – polyethylene tube; 2 – the frame on which a spiral is wound, which is an insulated metal cylinder; 3 – external insulated metal cylinder of the capacitor

Names **Oksana Medvedeva, Tatyana Sautkina**
Affiliations **Yuri Gagarin State Technical University of Saratov**

Keywords:
turbidity, coagulation, precipitation, electric field, Static-charge accumulation

Results

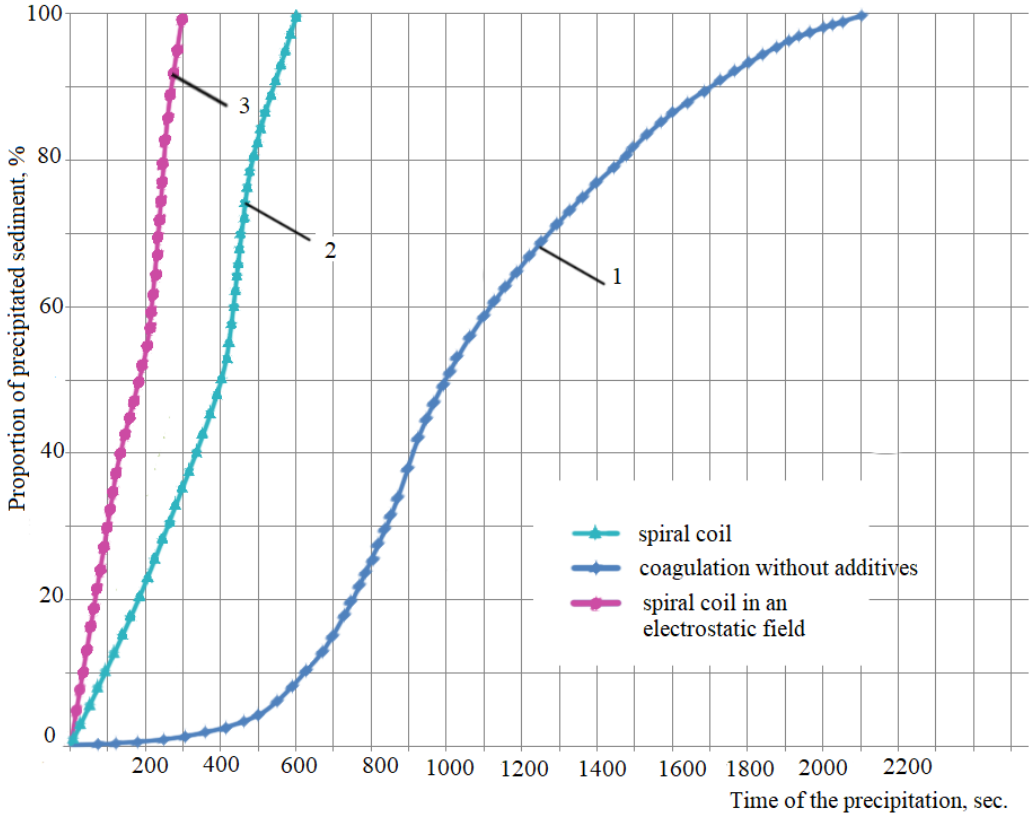

Figure 2. Coagulated slurry deposition kinetics curves: 1 – coagulation without additives; 2 – coagulant treated in a spiral coil; 3 – coagulant treated in a spiral coil in an electrostatic field.

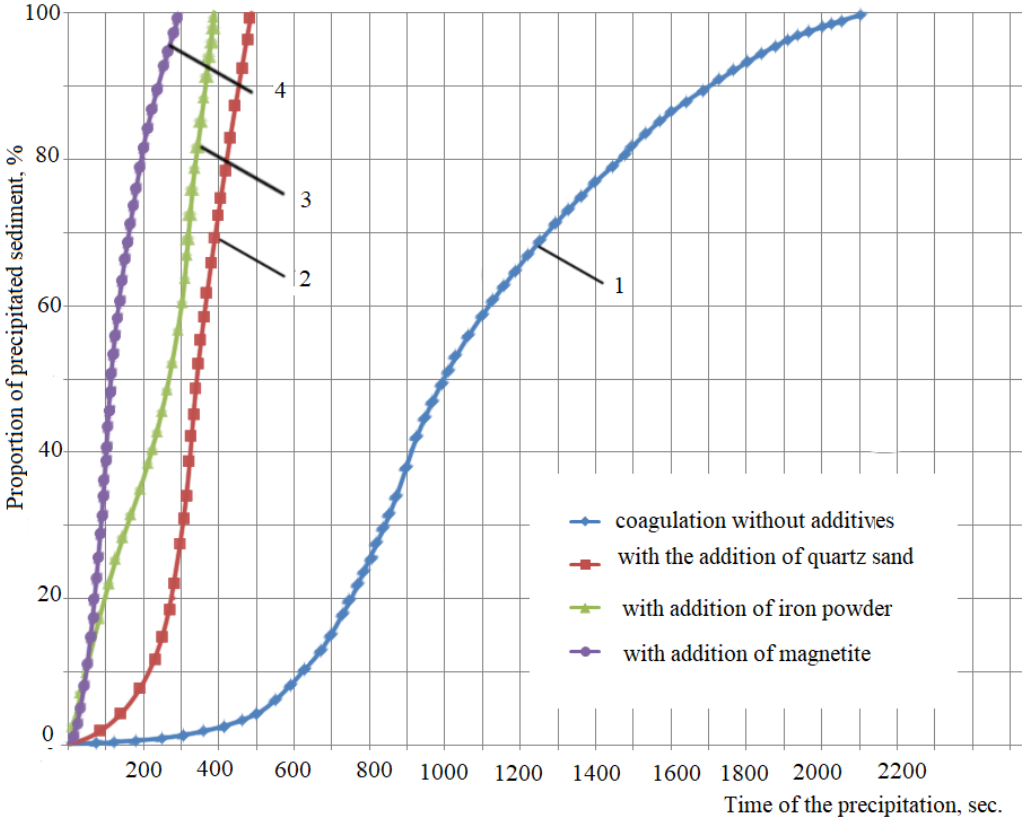

Figure 3. Coagulated slurry deposition kinetics curves: 1 – no additives; 2 – with the addition of quartz sand; 3 – with addition of iron powder; 4 – with addition of magnetite

Names **Oksana Medvedeva, Tatyana Sautkina**
Affiliations **Yuri Gagarin State Technical University of Saratov**

Keywords:
turbidity, coagulation, precipitation, electric field, Static-charge accumulation

Conclusions

According to the results of the experiments, it can be concluded that the time when treating water with the use of weighting additives and when treating water in an electric field is approximately the same. At the same time, the use of non-reactive technologies does not harm the environment and does not increase the mud load on the sedimentation tanks and filters.

As a result of comprehensive studies on the intensification of the coagulation process using electrophysical fields, the efficiency of the process of purification of low-turbid colored waters was proved. The best quality of water clarification and discoloration was achieved by passing the coagulant solution through the developed device – a spiral coil placed between the electrostatic field capacitor plates.

References

1. Kalyakin A.M. 2004 *Hydraulic Calculations of Pipelines. Liquid Outflow Through Holes and Nozzles. Hydrodynamic Modeling* (Saratov: SSTU) p 56
2. Nepro Hakizimanaaf J, Gouricha B, Chafia M, Stiribab Y, Vialcd Ch, Droguie P and Najaf J 2017 Electrocoagulation process in water treatment: A review of electrocoagulation modeling approaches *Desalination* **404** 1–21
3. Medvedeva O.N., Kalyakin A.M. Device for intensification of processes of purification of liquids from impurities by sedimentation: utility model patent RU 200770 U1

Acknowledgement

Names **Oksana Medvedeva, Tatyana Sautkina**
Affilations **Yuri Gagarin State Technical University of Saratov**

Keywords:
turbidity, coagulation, precipitation, electric field, Static-charge accumulation

Thank you for your attention!

Authors: **Oksana Medvedeva, Tatyana Sautkina**
Affiliations: **Yuri Gagarin State Technical University of Saratov, Russia, Saratov**

Contact details: **medvedeva-on@mail.ru**