Wastewater treatment in coke plants in the aspect of a circular economy

Marzena Smol a,*, Maria Włodarczyk-Makula b, Jolanta Kozak c

a Mineral and Energy Economy Research Institute of the Polish Academy of Sciences, Cracow, Poland, email: smol@meeri.pl, https://orcid.org/0000-0001-5833-2954
b Czestochowa University of Technology, Czestochowa, Poland, email: maria.wlodarczyk-makula@pcz.pl, https://orcid.org/0000-0002-3978-2420
c Chief Inspectorate for Environmental Protection, Central Research Laboratory, Czestochowa, Poland, email: jolanta.kozak@poczta.onet.pl, https://orcid.org/0000-0001-6816-4966

Received 29 March 2023; Accepted 21 May 2023

ABSTRACT

Nowadays, more and more attention is dedicated to the possibility of implementation of the circular economy (CE) solutions in various sectors. One of the interesting examples are wastewater treatment plants (WWTPs) – both industrial and municipal, where it is possible to recover valuable raw materials, energy and water, in accordance with the CE concept. This paper presents a review of possible technological solutions that can be implemented in the coke WWTPs, as a way toward a CE, that is the main economic policy of the European Union (EU). The special focus is dedicated to treatment methods of coke wastewater, which are integral part of environmental management in industrial plants. Scope of paper includes a short characteristic of coke plants and coke wastewater and an overview of treatment technologies that are used to remove various pollutants (including toxic organic substances) from this wastewater. Moreover, water and wastewater flows in coke plants are presented. There are several recovery and recycling possibilities of useful components and treated wastewater in coke plants. Currently, closing water and materials loops in the industrial plants, including coke plants, is forced by legal regulations and European recommendations regarding the CE implementation. Therefore, further development of innovation in this area, and the implementation of CE solutions in coke plants can be expected in the coming years.

Keywords: Coke plant; Wastewater treatment; Water recovery; Circular economy (CE)