DOI: 10.31081/1681-309X-2024-0-3-22-27 Speciality 161. U.D.C. 620.9:662.74

COKE DRY QUENCHING: UTILISATION OF EXCESS CIRCULATING GAS

© **A.A. Kogtin** (STATE ENTERPRISE 'STATE INSTITUTE FOR DESIGN OF COKE AND CHEMICAL INDUSTRY ENTERPRISES' (SE 'GIPROKOKS'), 60 Sumska str., Kharkiv, 61002, Ukraine)

The article is devoted to a practical solution to the problem of improving the environmental safety of a coke dry quenching unit by means of a new technology developed to reduce CO and coke dust emissions by introducing of the utilisation of excess circulating gas using a special utilisation unit, the main element of which is a special utilisation boiler.

It is shown that the need to discharge harmful substances into the atmosphere during the operation of the coke dry quenching unit is associated with the fact that during the operation of the unit, repeated circulation of gases through hot coke leads to a change in the gas composition in the direction of increasing the amount of carbon monoxide (CO). This makes the plant explosive and the gas highly toxic. To reduce the explosion hazard of the plant, it is necessary to reduce the concentration of combustible components in the circulating gas. This is done by diluting the mixture with nitrogen.

This article discusses the method developed by GIPROKOKS to utilise excess circulating gases by burning CO to CO_2 using a special utilisation unit. The equipment of the utilisation unit can be located directly in the boiler house of the coke dry quenching unit or in a separate building near the coke dry quenching unit. The operation of the utilisation unit is controlled by a modern process control system. The concentration and gross carbon monoxide emissions are reduced in a special reactor. In the process of refining the implemented technology, it became necessary to make changes and improve some solutions. In particular, the operation of the gas path of the unit was changed, which increased the potential for receiving excess circulating gas, stabilised the combustion mode and became a key solution to ensure the aerodynamic operation of the coke dry quenching unit. A mixing device was also installed at the circulating gas inlet to the waste heat boiler, which, by controlling the flow rate and composition of the circulating gas, allowed to stabilise the reactor operation and somewhat improve the conditions for the utilisation (combustion) of combustible components when circulating gas of 'ballasted' composition is supplied.

It is shown that the implementation of this technology by SE "GIPROKOKS" can significantly reduce the concentration of harmful substances and provides additional steam generation, which can be used for the technological needs of the enterprise or for generating electricity.

Keywords: coke, dry quenching, afterburning, waste heat boiler, circulating gas, surplus, utilisation, CO content, carbon monoxide, coke quality.

Corresponding author: A.A. Kogtin, e-mail: kogtin.giprokoks@gmail.com