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Investigation of the Gas Purification System in Furnaces with Electro-thermal Boiling Layer

The exhaust gases from the furnaces and kilns contain harmful pollutants and odors generated during the thermal disintegration of the solvents and binders. The problem of effective purification of high temperature gases from sulfur and nitrogen oxides, carbon and ash dust particles arises during high temperature treatment of carbon materials. After the gases outlet of the furnace it is necessary to burn away volatile products. Further purification is performed after cooling of the furnace gases that reduces their consumption.

These gases always contain various chemical substances – in the form of gasses or fine particles – in higher concentrations than are good for the environment. To prevent those from being released into the environment, the flue gasses are cleansed before they leave the chimney. This occurs by means of different purification systems. The scheme of purification of gases after their leaving the furnace in our case is following.

Coke is subjected to high temperature treatment and outlet gases with the temperature of 2500-2700 ^{0}C are formed. Outlet gases from the furnace get to waste-heat boiler. These gases include a sufficient amount of hydrogen, which have to be burnt away with the lack of oxygen in order the reducing atmosphere was formed. Further the gases are cooled to the temperature of 700-1000^{0}C and enter to gas heater of recuperative type, where they are cooled to the temperature of 300 ^{0}C. Then gas is cleaned from solid particles in the cyclone and bag filter.

Further with the help of gas blower the outlet gases go into the absorption column and are cleaned from sulfur oxides. The purification is carried out by gas washing with NaOH and receiving of gypsum. Then gas is heated in the gas heater up to the temperature of 500 ^{0}C. During this heating nitrogen oxides NO_x are restored to N2, and then CO is burnt away in the second block at the temperature of 300 ^{0}C.The combustion products are removed through the chimney stack with the help of smoke exhauster.

Gypsum received from regeneration of solution NaOH is pressed out in the roll-squeezing arrangement and is dried in the drum dryer.

Further task of investigation is calculation of the burning away process of outlet gases, determination of the combustion products and their temperature using software "TERRA".