PhD. Thesis

RESEARCH CONCERNING THE INTENSIVE DEPOLLUTION OF GASES WITH NANOMATERIALS BASED ON CLAYS

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Abstract

The theme of this thesis is very actually because of the air pollution problems with various gaseous ammonia types. For complete removal of the ammonia concentration from the atmosphere is used the intensive techniques to contact the gas- particles. In order to optimize the adsorption process in terms of process efficiency and feasibility are used the fluidized bed and electro-magnetically stabilized fluidized bed.

The purpose of this study was to find an optimum ways to contact the gas- particles using nanomaterials adsorbent as pillared clay with aluminum in different structural configurations mixed with steel particles.

The objectives of this study were:

- the literature study regarding the properties, the methods of chemical modification and characterization of nanomaterials as pillared clay;
- theoretical aspects of the dynamic behavior of fluidized bed mono-component and multi-component in the absence / presence of electro-magnetic field;
- theoretical aspects of the adsorption process of gaseous pollutants from the atmosphere;
- setting by the experimental research of the optimal parameters for preparation of pillared nanomaterials used as adsorbents in the ammonia retention;
- setting by the experimental research of the dynamic parameters from the gas-particles contact methods selected – fluidized bed and electro-magnetically stabilized fluidized bed;
- the correlation of the experimental data in the empirical relationships useful in the operation and design of the gaseous pollutants adsorption apparatus;
- the comparative study of ammonia adsorption in the fluidized bed and electro-magnetically stabilized fluidized bed by the experimental research on adsorption kinetics;
- the study of the regenerability of the nanomaterial particles by thermal desorption.

Process intensification chosen to increase gas-particle contact area was fluidized bed co-axial electro-magnetic which allows the creation of the dynamic conditions favorable to mass transfer.