METHODS OF SULFUR PROTECTION OF FUELS PRIOR TO THEIR USE IN BOILERS

Tyutyunik L., Ivanova L., Kasilov V.
National Technical UniversityKharkiv Polytechnic Institute, Kharkiv

Demand for environmental protection is increasing around the world in the wake of economists' predictions of accelerated explosive techno-economic development. One of the objects of particular attention is sulfur compounds, which are formed during the combustion of organic fuels. The damage caused by sulfur oxides is so great that in many countries sulfur treatment programs are implemented several years in advance. Recent research and development in the field of sulfur purification has shown that there are currently a large number of processes capable of meeting various technical and economic requirements. The solution to the problem of reducing sulfur compounds in the combustion of organic fuels can be done through the following measures. The first action- the so-called method of non-permanent technology - implies that, under favorable weather conditions, the power plant burns high sulfur fuel, and in unfavorable conditions - low sulfur. The second method, depending on the type of fuel, can be implemented at various specialized enterprises. Oil fumigation can be carried out at refineries either directly or indirectly. In the direct method, the petroleum residue is subjected to catalytic hydrotreating at elevated temperature and pressure. An indirect method of sulfur treatment is that by vacuum distillation of oil, volatiles are separated from heavy oil residues. Then these light components are desulfurized by hydrotreating and mixed with heavy ones. This produces boiler fuel with a sulfur content of less than 1% by weight.The technology for the desulfurization of solid fuels is the separation of sulfur pyrites (pyrite) from coal at coal-mining plants. These properties are used in the processes of dry and wet coal enrichment. Enrichment can be effective (20 - 30%) if the proportion of pyrite sulfur in coal is high enough. Other more expensive methods can be used for the desulfurization of solid fuels. For example, hydrothermal sulfur treatment of crushed fuel in autoclaves at a temperature of 225-350 ^{0}C and a pressure of 1.8 MPa with the use of alkaline solutions of hydrates of sodium and calcium oxides. To remove organic sulfur, various special solvents are used in the presence of hydrogen at temperatures of about 450 ° C and a pressure of 1.4 MPa. The third method is by gasification of liquid and solid fuels and combustion of these fuels in a fluid bed. In this case, both in the first and in the second case bind sulfur compounds with different reagents with the subsequent receipt of marketable products in the form of elemental sulfur or sulfur dioxide used in sulfuric acid and other industries. The recovered calcium oxide is again fed into the fluidized bed. It should be noted that due to the low temperature level of the combustion process, the possibility of formation of nitrogen oxides is significantly reduced. The fourth method - flue gas sulfur purification - is the most difficult and expensive. This is because the concentration in the flue gas is relatively small, the water solubility is low.