

Editorial on Flue-Gas Desulfurization

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Editorial

Flue-gas desulfurization (FGD) is a series of technologies for removing sulphur dioxide from fossil-fuel power plant exhaust flue gases, as well as other sulphur oxide emitting processes including waste incineration. With the development of large-scale power plants in England in the 1920s, the public became worried about the problems associated with large quantities of SO₂ from a single source. The issue of SO₂ emissions did not receive much attention until 1929, when the House of Lords upheld a landowner's lawsuit against the Manchester Corporation's Barton Electricity Works for damages to his land caused by SO₂ emissions. A press campaign was launched shortly after against the construction of power plants within the city limits of London. As a result of the public uproar, all such power plants were required to implement SO₂ controls.

FGD on ships

Sulfur can be found in large quantities in fossil fuels like coal and oil. When fossil fuels are burned, a large portion of the sulphur is converted to sulphur dioxide, typically 95 percent or more (SO₂). This conversion takes place under normal temperature and oxygen levels in the flue gas. There are, however, certain situations in which such a reaction is unlikely to occur.

FGD chemistry

Most FGD systems have two stages: one for removing fly ash and another for removing SO₂. It was attempted to extract both the fly ash and the SO₂ in a single scrubbing

vessel. However, these systems had a lot of maintenance issues and had a poor removal quality. In wet scrubbing systems, flue gas passes first through a fly ash removal device, either an electrostatic injection precipitator or a baghouse, and then into the SO₂-absorber. However, in dry or in spray drying operations at first the SO₂ is reacted with the lime, and then flue gas passes through a particulate control device.

Wet scrubbers usage

A variety of wet scrubber designs have been used to maximize gas-liquid surface area and residence time, including spray towers, venturis, plate towers, and mobile packed beds. The trend is to use simple scrubbers such as spray towers instead of more complicated scrubbers due to scale buildup, plugging, or erosion, which affect FGD dependability and absorber performance. The flue gas will flow concurrently, counter-currently, or cross-currently with respect to the liquid, depending on the tower's configuration. Spray towers have the disadvantage of having a higher liquid-to-gas ratio for comparable SO₂ removal than other absorber designs.

Alternative methods of reducing sulfur dioxide emissions

Sulfur removal from the fuel before or during combustion is an alternative to extracting sulphur from the flue gases after combustion. Fuel combustion, hydrodesulfurization has been used to treat fuel oils prior to usage. During fluidized bed combustion adds lime to the fuel. Lime reacts with SO₂ to form sulphates, which are then incorporated into the ash. Then this elemental sulphur is removed and recovered at the end of the process for use in agricultural products.

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