

ABSTRACT

INTEGRATED AMMONIA-BASED DESULFURIZATION AND DECARBONIZATION APPARATUS AND METHOD

The present invention is applicable to the desulfurization and decarbonization of a process gas containing sulfur oxides and CO₂, and belongs to the field of environmental protection. Ammonia is used as a desulfurizing and decarbonizing agent. The gas enters first a desulfurization apparatus for desulfurization, to produce an ammonium sulfate fertilizer. The desulfurized gas enters a decarbonization apparatus to remove carbon dioxide in the gas, and to produce an ammonium bicarbonate fertilizer. The decarbonized gas, that contains free ammonia, is washed with a desulfurization circulating fluid and then with water. The washing fluids are returned to the desulfurization tower for use as an absorbing agent for desulfurization. This technology integrates decarbonization and desulfurization technologies organically, and uses acidic desulfurization circulating fluid to wash ammonia, thereby achieving a high ammonia washing efficiency and solving the ammonia slip problem suffered by decarbonization processes. The process is simpler, the investment and operation costs are low, ammonium sulfate and ammonium bicarbonate fertilizers are co-produced, and there is no need to inject all of CO₂ back to underground for sequestration. Rather, part of CO₂ can be used to produce downstream products such as urea, soda ash, etc. The product mix can be flexibly adjusted, and by-product ammonia can be used, thereby realizing treating wastes with wastes and a circular economy.

[Figure 2]