

ABSTRACT

COOLING APPARATUS AND METHOD FOR AMMONIA-BASED DECARBONIZATION

Ammonia-based decarbonization cooling apparatus and a method therefor. The cooling apparatus may include: a first-stage cooling function zone which may use a first circulating liquid to cool a process gas to a temperature of $T_{\text{gas } 1}$, a second-stage cooling function zone which may use a second circulating liquid to cool the process gas to a temperature of $T_{\text{gas } 2}$, and a third-stage cooling function zone which may use a third circulating liquid to cool the process gas to a temperature of $T_{\text{gas } 3}$, wherein $T_{\text{gas } 3} < T_{\text{gas } 2} < T_{\text{gas } 1} < T_{\text{gas } 0}$, and $T_{\text{gas } 0}$ is an initial temperature of the process gas when entering the first-stage cooling function zone; a first cold source for cooling the first circulating liquid, a second cold source for cooling the second circulating liquid, and a third cold source for cooling the third circulating liquid, wherein the three cold sources may be different. The apparatus and method of the present invention use circulating water or a closed cooling tower or an air cooler, cold process gas, chilled liquid or a chiller for staged cooling, respectively, to make full use of low-energy cold and recycling of process gas cold, thus saving investment costs and reducing energy consumption.

[Figure 1]