

ABSTRACT

The disclosure belongs to the technical field of decomposition and recovery of a hydrogen sulfide acid gas, and relates to a device and method for collaborative recovery of sulfur and hydrogen resources from a hydrogen sulfide acid gas. The device includes a catalytic unit, a sulfur-hydrogen separation unit, an amine regeneration unit, pipelines connecting the above units, and delivery pumps, valves and gauges for automatic control that are disposed on the connecting pipelines. A method for collaborative recovery of sulfur and hydrogen resources from a hydrogen sulfide acid gas using the device includes: subjecting a hydrogen sulfide acid gas to catalytic reaction in the thermal catalytic reactor; recovering sulfur generated by cooling sulfur vapor; and absorbing hydrogen by amine, and then purifying and concentrating the hydrogen, where, hydrocarbons in the acid gas react with water vapor at a high temperature to form CO and H₂; and NH₃ is thermally decomposed into N₂ and H₂ at a high temperature under the action of a catalyst. The disclosure combines thermal catalytic decomposition of hydrogen sulfide, hydrogenation and amine regeneration for the first time to decompose a hydrogen sulfide acid gas into elemental sulfur and hydrogen, which can fully recover sulfur resources while recovering hydrogen resources with a higher added value.

FIG. 1 for publication.