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Sulfur forming—Granulation process

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Abstract

Global sulfur production rose from about 42 million metric tons to 63 million metric tons from 2000 to 2017, a rise of approximately 2% p.a. It is expected to rise at the same rate for the next few years and reach approximately 68 million metric tons by 2022. About half of this sulfur is traded internationally. The major areas where sulfur production will increase are Canada (Oil Sands) and the Middle East. (Bala Suresh et. al, 2017).

About 70% of the sulfur produced is a by-product of hydrocarbon processing. In oil refineries and gas plants, the sulfur in the feed ends up in the Sulfur Recovery Unit (SRU) as H_2S and the output of the SRU unit is molten sulfur.

It is viable to transport molten sulfur over short distances only. For an overwhelming proportion of the sulfur trade, it is necessary to solidify this sulfur into forms suitable for handling and transport. For the refinery (or gas plant), the produced sulfur is a "nuisance" product, not a profit center. Separate organizations often take this molten sulfur from the refinery and manage the subsequent handling and marketing themselves.

Slating, granulation, prilling, and pastillation are some of the technologies used to produce solid sulfur from molten sulfur.

This review addresses the technology and economics of one such process—the granulation process. This review presents a technical and economic evaluation of the granulation process, for a plant with a processing capacity of 1,500 Mtpd sulfur. The selected capacity is suitable for sulfur produced in two 300,000 bbl/day refineries processing medium sour crude.

This review provides insight into the granulation plant technology and economics. It can be used as a tool for cost estimation for different plant capacities. It will be beneficial for planners, producers, and designers who are looking for independent data for sulfur granulation plants.

It includes the process flow diagram, material balance, major equipment sizes, and specifications. Cost data, including battery limit and offsite costs, variable costs, capex, opex, and overall production costs, is provided. An interactive iPEP Navigator module of the process is included, which provides a snapshot of the process economics and allows the user to select the units and global region of interest.

The technological and economic assessment of the process is IHS Markit PEP's independent interpretation of a commercial process based on information presented in the open literature (such as patents or technical articles) or in-house generated data (e.g., HYSYS simulation, equipment cost estimation). While this assessment may not reflect the actual plant data in whole, IHS Markit PEP believes that it is sufficiently representative of the process and process economics within the range of accuracy necessary for economic evaluations of a chemical process design.

Contents

Tables

Figures

Appendix D Figures

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