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Using computer simulation technology to improve the removal of volatile chemicals from fuel gases and process waters

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Industrial coking processes usually involve downstream gas purification and process water treatment to recover economically valuable chemicals, while reducing environmental impact. The removal of volatile organic compounds, mainly ammonia and hydrogen sulfide, is a key procedure. We can use a scrubber system to scrub some of volatile organic compounds from Coke Oven Gas (COG) to process water and a distillation system to remove volatile organic compounds from the process water to the acid gas, which is then transported to the sulfur plant. Optimized industrial processes can reduce operating costs; however, industrial trials are costly and may adversely affect on-going process operations. Unfortunately, such processes are too complex to simulate in the laboratory, while attempts to understand the processes' characteristics can result in problems restoring normal working. For the mature processes, if we can understand both basic material properties and chemical reactions, we can use factory operation data to build a process simulation model and make process operation predictions in a cost-effective and convenient manner. Our model offers a reasonable simulation: The difference between the predicted result and the actual factory data is typically less than 30%; some of our case studies show less than 10% divergence. The operational trends analysis also provides an operational reference for the industrial facility, e.g., one of the model's simulation results has reduced energy loss by 1% using a simple operational step change.

Biography

Ai-Lin Shen is a Chemical Engineering. Her research areas include electrochemistry, material, spectral analysis, data analysis, pharmaceutical procedure, chemical process engineering, energy technology and carbon capture and her research region is cross-field. By analyzing large amounts of data, she proved the multi-peak curve fitting method, which has been applied for decades to a variety of spectra, to be ineffectual; the ideas she has applied are completely original and subvert traditional concepts. Her current work mainly focuses on chemical process improvement and energy technology research.

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