

AN ABSTRACT OF A THESIS

THE OPTIMUM DESIGN OF A DOUBLE CONTACT SULFURIC
ACID PLANT USING THE COMPLEX
METHOD OF OPTIMIZATION

Philip Conrad Rodgers

Master of Science in Chemical Engineering

The complex method, a direct sequential search technique, was used to determine the optimum design of a double contact sulfuric acid plant. A double contact plant of the proper design is capable of meeting today's air pollution standard set for sulfuric acid plants (four pounds of sulfur dioxide emitted per ton of 100 percent sulfuric acid produced).

Seven variables were manipulated during the search: the areas of four exchangers, the area of a waste heat boiler, the air flow rate into the plant, and the split of the air stream into cooling streams. The effects of changing economic conditions, and the effect of a tax imposed on sulfur dioxide emissions over the standard were examined.

The objective function was shown to be a difficult function to optimize because of its shape. The optimum was located only after repeated runs using different starting points.

THE OPTIMUM DESIGN OF A DOUBLE CONTACT SULFURIC
ACID PLANT USING THE COMPLEX
METHOD OF OPTIMIZATION

A Thesis
Presented to
the Faculty of the Graduate School
Tennessee Technological University

In Partial Fulfillment
of the Requirements for the Degree
MASTER OF SCIENCE
Chemical Engineering

by
Philip Conrad Rogers

June 1975

CERTIFICATE OF APPROVAL OF THESIS

THE OPTIMUM DESIGN OF A DOUBLE CONTACT SULFURIC
ACID PLANT USING THE COMPLEX
METHOD OF OPTIMIZATION

by

Philip Conrad Rogers

Graduate Advisory Committee:

Clayton P. Kerr May 7, 1975
Chairman date

John C. McGee May 7, 1975
Member date

William P. Bonner May 8, 1975
Member date

Approved for the Faculty:

Martin Peters
Dean, Graduate School

May 15, 1975
Date