

GEORGIA INSTITUTE OF TECHNOLOGY  
OFFICE OF CONTRACT ADMINISTRATION  
SPONSORED PROJECT INITIATION

Date: August 17, 1976

Project Title: Characterization of the Physical Structure of Porous Catalysts and  
Adsorbents

Project No: E-19-649

Project Director: Dr. Clyde Orr, Jr.

Sponsor: National Science Foundation

Agreement Period: From 9/1/76 Until 2/28/79\*  
\*24 month budget period plus 6 months for submission or required reports, etc.

Type Agreement: Grant No. ENG76-10057

Amount: \$54,600 NSF  
5,313 GIT (E-19-335)  
\$59,913 Total

Reports Required: Annual Letter Technical, Final Report

Sponsor Contact Person (s):

Technical Matters

Contractual Matters

(thru OCA)

Mr. James L. Bostick

Grants Officer

National Science Foundation

Washington, DC 20550

(202) 632-5965

Defense Priority Rating:

Assigned to: Chemical Engineering (School/Laboratory)

COPIES TO:

Project Director  
Division Chief (EES)  
School/Laboratory Director  
Dean/Director-EES  
Accounting Office  
Procurement Office  
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Library, Technical Reports Section  
Office of Computing Services  
Director, Physical Plant  
EES Information Office  
Project File (OCA)  
Project Code (GTRI)  
Other \_\_\_\_\_

GEORGIA INSTITUTE OF TECHNOLOGY  
OFFICE OF CONTRACT ADMINISTRATION  
SPONSORED PROJECT TERMINATION

Date: 2/15/80

Project Title: <sup>ure</sup> Characterization of the Physical Structure of Porous Catalysts and Adsorbents

Project No: E-19-649

Project Director: Dr. Clyde Orr

Sponsor: National Science Foundation

Effective Termination Date: 2/28/79

Clearance of Accounting Charges: 2/28/79

Grant/Contract Closeout Actions Remaining:

- Final Invoice and Closing Documents
- ~~Final Fiscal Report~~ Federal Cash Transactions Report
- Final Report of Inventions
- Govt. Property Inventory & Related Certificate
- Classified Material Certificate
- Other \_\_\_\_\_

Assigned to: Chemical Engineering (School/Laboratory)

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Library, Technical Reports Section  
EES Information Office  
Project File (OCA)  
Project Code (GTRI)  
Other \_\_\_\_\_

NATIONAL SCIENCE FOUNDATION Washington, D.C. 20550		FINAL PROJECT REPORT NSF FORM 98A			
PLEASE READ INSTRUCTIONS ON REVERSE BEFORE COMPLETING					
PART I-PROJECT IDENTIFICATION INFORMATION					
1. Institution and Address Georgia Institute of Technology Atlanta, Georgia		2. NSF Program Solid and Particulate Processing	3. NSF Award Number ENG 76-10057		
		4. Award Period From 9/1/76 To 2/28/79	5. Cumulative Award Amount \$54,600		
6. Project Title Characterization of the Physical Structure of Porous Catalysts and Adsorbents					
PART II-SUMMARY OF COMPLETED PROJECT (FOR PUBLIC USE)					
<p>The objective of this research was to measure the pore size and volume in selected solids by available methods and then seek to rationalize results. Electron microscopy, high pressure mercury penetration, and low temperature gas adsorption and desorption were employed with a series of porous glasses having nominally different pore diameters distributed over relatively narrow ranges within any one sample. Electron microscopic examination revealed the pores to be basically right cylinders open at both ends in addition to confirming their narrowly distributed size. The data from each test were analyzed for reproducibility and overall accuracy.</p> <p>Results for pore diameter distribution as obtained by electron microscope examination and mercury penetration agreed quite well. Best estimates of total pore volume from electron microscopy also corroborated those of mercury penetration. Thus results from these two very different techniques were taken as having established the pore structure of the glasses.</p> <p>Electron microscopy is too time consuming to be widely employed for catalyst and adsorbent evaluation, and mercury penetration is suspect for studying many catalyst, particularly those incorporating noble metals because of the possibility of amalgamation problems. Gas adsorption and desorption is the preferred technique. Unfortunately, gas adsorption and desorption data when analyzed by the standard methods to reveal pore size and volume did not yield results consistent with the values previously established within what is believed to be the accuracy of the data. A number of parameters in the calculations such as contact angle and adsorbed layer thickness are estimates at best and their influence is open to question. Revisions and modifications to the methods of calculation have not yet been resolved satisfactorily, but they are continuing to be explored.</p>					
PART III-TECHNICAL INFORMATION (FOR PROGRAM MANAGEMENT USES)					
1. ITEM (Check appropriate blocks)	NONE	ATTACHED	PREVIOUSLY FURNISHED	TO BE FURNISHED SEPARATELY TO PROGRAM	
				Check (✓)	Approx. Date
a. Abstracts of Theses	X				
b. Publication Citations			X		
c. Data on Scientific Collaborators		X			
d. Information on Inventions	X				
e. Technical Description of Project and Results				*	April 1980
f. Other (specify) * A manuscript for publication is being prepared					
2. Principal Investigator/Project Director Name (Typed) Clyde Orr		3. Principal Investigator/Project Director Signature		4. Date Nov. 14, 1979	

Scientific Collaborators

Project Director, Dr. Clyde Orr  
Project Co-Director, Dr. Albert Liabastre  
Graduate Assistant, Jean Oakes  
Graduate Assistant, Mohamad Saad