

APPENDIX I.

Project Planning Summary

PROJECT PLANNING SUMMARY

NOVEL CARBON MOLECULAR SIEVE CATALYST
FOR WAX SUPPRESSION IN THE FISCHER-TROPSCH REACTION

Dr. H. Foley, Group Leader; Dr. D. Valentine, Manager

OBJECTIVE:

Develop new shape selective catalysts based on carbon molecular sieves which will efficiently produce gasoline and/or diesel range products but not waxes. The work is being supported in part by a 2-year contract (DE/AC22-84PC70031) from the Department of Energy.

STRATEGY:

1. Utilize 3 methods to prepare 3 types of inorganic oxide-modified carbon molecular sieves and characterize their sieve properties.
Method 1: Combine silica with polyfurfuryl alcohol (PFA)-Type I.
Method 2: Combine PFA with oxide particles or suitable oxide precursor-Type II.
2. Method 3: Combine PFA with oxide modified carbon filler particles-Type III.
2. Test catalytically active samples prepared by the three methods; compare activity and selectivity to appropriate control catalysts.
3. Optimize the best catalysts with respect to preparation, pretreatment and operating conditions.

CRITICAL ISSUES:

1. Can reactor and laboratory construction be completed on a timely basis?
2. Can inorganic oxide modified carbon molecular sieves be made by the three methods?
3. Will catalyst prepared on these new sieves display reasonable activity? Will they be chemically or physically poisoned by carbon?
4. Can a Type I, II and III material attenuate the hydrocarbon product distribution in the F.-T. reaction, i.e., suppress wax?

RESOURCES:

Headcount: 2
Budget: K\$444.895 Government Share
 : 95.245 CRD Share
 K\$529.140 Total for 24 months.

BARCHART PROJECT SCHEDULE

(REPORT RUN ON: 8-Apr-86 AT 10:06)

MILE	ACT	ACTIVITY DESCRIPTION	TARGET START	TARGET FINISH	ACTIVITY STATUS	11/24/84	6/22/85	1/18/86	9/16/86
IDR									
700		Preliminary Pat/lit searches	24Sep84	19Oct84	FINISHED	CC			
25		October '84 Project Status Report	27Oct84	2Nov84	FINISHED	C			
705		Preliminary information analysis	27Oct84	16Nov84	FINISHED	nn			
35		November '84 Project Status Report	19Nov84	4Dec84	FINISHED	CC			
710		Prelim Assessm't of Patent Info.	19Nov84	7Jan85	FINISHED	nnnn			
45		December '84 Project Status Report	20Dec84	8Jan85	FINISHED	CC			
30		Prep Type I PPA/SiO2 Sieve	2Jan85	25Feb85	FINISHED	CCCC			
12		Lab for HP Reactor-construction cost estim	4Jan85	17Jan85	FINISHED	CC			
715		In-depth Patent/literature searches	8Jan85	4Feb85	FINISHED	nn			
47		-----1ST TECH PROGRESS REPORT-----	9Jan85	5Feb85	FINISHED	nn			
13		Approval for construction costs obtained	18Jan85	31Jan85	FINISHED	CC			
55		January '85 Project Status Report	24Jan85	6Feb85	FINISHED	nn			
14		Lab constructed for High Pressure Reactor	17Feb85	29Mar85	FINISHED	CCC			
720		Assess in-depth lit search materials	5Feb85	5Mar85	FINISHED	nn			
15		Construct High Pressure (HP) Reactor	21Feb85	31May85	FINISHED	CCCC			
65		February '85 Project Status Report	22Feb85	7Mar85	FINISHED	n			
40		Characterize Type I PPA/SiO2 Sieve Properties	26Feb85	25Mar85	FINISHED	CC			
32		Modify Type I prep-add PVC&SiO2/PVC+PVD&SiO2	26Feb85	1Jul85	FINISHED	nnnnnnn			
730		Initiate/maintain current info awareness	6Mar85	5Mar86	INPROGRESS	nnnnnnnnnnnnnnnnnnnn			
73		-----PROPERTY REPORT FOR MAR 31 '85-----	8Mar85	29Mar85	CANCELLED	nn			
42		Characterize PVC&SiO2/PVC+PVD&SiO2 sieve properties	12Mar85	1Jul85	FINISHED	nnnnnn			
77		-----2ND TECH PROGRESS REPORT-----	18Mar85	31May85	FINISHED	CCCC			
75		March '85 Project Status Report	25Mar85	8Apr85	FINISHED	nn			

BARCHART PROJECT SCHEDULE

MILE ACT ID#	ACTIVITY DESCRIPTION	TARGET START	TARGET FINISH	ACTIVITY STATUS	11/24/84	6/22/85	1/18/86	8/16/86
50	Investigate PFA/SiO2 ratio for Type I	26Mar85	23Apr85	FINISHED	nnn			
85	April '85 Project Status Report	24Apr85	7May85	FINISHED	n			
60	Extend Type I technol to 5 other Oxides	24Apr85	12Feb86	FINISHED	nnnnnnnnnnnnnn			
70	Prep Type II samples	22May85	19Jun85	FINISHED	nn			
95	May '85 Project Status Report	23May85	6Jun85	FINISHED	nn			
101	Test C-73 Catalyst: standard P-T.	3Jun85	1Aug85	FINISHED	CCC			
80	Characterize Type II sieve properties	20Jun85	11Jul85	FINISHED	nn			
103	----3RD TECH PROGRESS REPORT----	20Jun85	4Oct85	FINISHED	nnnnnn			
105	June '85 Status Report	24Jun85	8Jul85	FINISHED	n			
118	Prepare Carbon-C-73 Catalysts	1Jul85	31Jul85	FINISHED	CC			
121	Test Carbon-C-73 Catalyst	1Jul85	3Sep85	FINISHED	CCCC			
108	Develop off-line product analysis method	2Jul85	2Aug85	FINISHED	nn			
90	Investig PFA/oxide ratio for Type II	12Jul85	25Jul85	FINISHED	nn			
100	Extend Type II technol to 3 other oxides	26Jul85	28Feb86	INPROGRESS	nnnnnnnnnnnn			
115	July '85 Status Report	29Jul85	9Aug85	FINISHED	nn			
125	August '85 Status Report	26Aug85	30Sep85	FINISHED	nn			
128	Prep Fe/SiO2 & Fe/K/SiO2:Type I	3Sep85	10Oct85	FINISHED	CC			
137	----PROPERTY REPORT FOR SEPT 30 1985----	4Sep85	30Sep85	CANCELLED	nn			
111	Organize product analysis calculations	4Sep85	20Oct85	FINISHED	nn			
138	Test Fe/SiO2 & Carbon-Fe/SiO2	4Sep85	27Nov85	FINISHED	CCCC			
141	Prep TiO2 & SrO2 & TiO2-SrO2	16Sep85	15Oct85	FINISHED	nn			
148	Prep Ru/SiO2 & Carbon Ru/SiO2:Type I	30Sep85	4Oct85	FINISHED	C			
135	September '85 Status Report	10Oct85	14Oct85	FINISHED	nn			

CARBON MOLECULAR SIEVE CATALYSTS MFoley=GL DValentine=Mgr

BARCHART PROJECT SCHEDULE

(REPORT RUN ON: 8-Apr-86 AT 10:06)

MILE ID#	ACTIVITY DESCRIPTION	TARGET START	TARGET FINISH	ACTIVITY STATUS	11/24/84	6/22/85	1/18/86	8/16/86
151	Test Carbon-Fe/K/SiO2	10ct85	1Nov85	FINISHED				
132	---4TH TECH PROGRESS REPORT---							
130	Test Ru/SiO2 & Carbon Ru/SiO2	7Oct85	1Nov85	FINISHED				
168	Prep Fe2O3-CuO-K2O catalyst	7Oct85	30Dec85	FINISHED				
120	Test Fe2O3-CuO-K2O catalyst	21Oct85	25Oct85	FINISHED				
145	October '85 Status Report	28Oct85	8Nov85	FINISHED				
152	---5TH TECH PROGRESS REPORT---							
161	Prep Rh-Mo/AlO3	4Nov85	3Dec85	INPROGRESS				
170	Test Rh-Mo/AlO3	11Nov85	15Nov85	FINISHED				
155	November '85 Status Report	18Nov85	3Dec85	FINISHED				
158	Prep C-FeO3-CuO-K2O:Type I	2Dec85	13Dec85	FINISHED				
171	Test C-FeO3-CuO-K2O:Type I	4Dec85	10Dec85	FINISHED				
140	Prep C-FeO3-CuO-K2O:Type II	11Dec85	26Dec85	FINISHED				
165	December '85 Status Report	27Dec85	13Jan86	FINISHED				
150	Test C-FeO3-CuO-K2O:Type II	30Dec85	14Jan86	FINISHED				
181	Prep C-TiO2/C-ZrO2/C-TiO2ZrO2/C-Al2O3:Type II	14Jan86	27Jan86	FINISHED				
175	January '86 Status Report	28Jan86	3Feb86	FINISHED				
188	Prep Ti(OR)4/Zr(OR)4/Al(OR)3CPPA:Type II	30Jan86	12Feb86	FINISHED				
191	Data C content on Type II:II samples w C burnoff	4Feb86	10Feb86	FINISHED				
160	Prep 3 sample w ZFAsonide mldcd carbon:TypeIII	11Feb86	25Feb86	FINISHED				
162	---5TH TECH PROGRESS REPORT---							
185	February '86 Status Report	26Feb86	4Mar86	FINISHED				
167	---PROPERTY REPORT FOR MAR 31 '86---	26Feb86	11Mar86					
		28Feb86	13Mar86	FINISHED				
		4Mar86	17Mar86	CANCELLED				

BARChart PROJECT SCHEDULE

(REPORT RUN ON: 8-APR-86 AT 10:06)

MILE ACT	ACTIVITY DESCRIPTION	TARGET START	TARGET FINISH	ACTIVITY STATUS	11/24/84	6/22/85	1/18/86	8/16/86
260	Characterise Type III samples	5Mar86	11Mar86	FINISHED				C
270	Prep combined FT:MC cats (1:1-FT:MC)	12Mar86	18Mar86	FINISHED				C
280	Prep Types I & II FT:MC cats	19Mar86	9Apr86	IMPROGRESS				CC
300	Test Type I:FT:MC cats	24Mar86	14Apr86	IMPROGRESS				CC
240	Discuss w Catalyst Dept	31Mar86	7Apr86	FINISHED				n
195	March '86 Status Report	31Mar86	11Apr86					n
310	Test FT:MC control cat	14Apr86	30Apr86					n
290	Characterise Type IsII FT:MC cats	15Apr86	21Apr86					C
330	Prep C-FT:MC cats w vary FT:MC ratio-TypesII	16Apr86	21Apr86					C
380	Prep FeTiO2-ZrO2	21Apr86	25Apr86					nn
370	Test TypeIsII C-FT:MC cats w vary ratio FT:MC	21Apr86	16May86					nn
360	Test CSiC6 isomorm paraffin separata w Type IsII	22Apr86	5May86					C
390	Prep Type IsII C-Fe/TiO2-ZrO2	25Apr86	2May86					nn
320	Test Type II:FT:MC cats	30Apr86	14May86					CC
400	Charact Type IsII D-Fe/TiO2-ZrO2	2May86	9May86					nn
205	April '86 Status Report	2May86	15May86					CC
410	Test C-Fe/TiO2-ZrO2	6May86	30May86					n
340	Data attritn resistance of Types IsII systems	15May86	21May86					CCCCC
350	Discuss results w Catalyst Dept	22May86	22May86					n
420	Optimize & test best formulations	30May86	29Aug86					n
750	File ROI's	2Jun86	13Jun86					n
215	May '86 Status Report	2Jun86	13Jun86					n
725	Request for formal Patentability Assessment	16Jun86	20Jun86					n

SON CULJ LEVE ALY HFO GL lent Mgr

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MILE ACT ID#	ACTIVITY DESCRIPTION	TARGET START	TARGET FINISH	ACTIVITY STATUS	11/24/84	6/22/85	1/18/86	9/16/86
760	Consider Infringement search	16Jun86	20Jun86					n
735	Formal Patentability/Infringement Assessment	23Jun86	22Jul86					nn
225	June'86 Status Report	7Jul86	18Jul86					C
765	Consider Foreign Patent search	23Jul86	29Jul86					nn
740	Consider Patent/Trademark(PTO) Office search	23Jul86	29Jul86					nn
235	July'86 Status Report	4Aug86	15Aug86					C
245	August'86 Status Report	25Sep86	15Sep86					CC
257	-----PROPERTY REPORT FOR SEPT 30 '86-----	25Sep86	15Sep86	CANCELLED				nn
180	Prep 1st Draft Final Report	25Sep86	29Sep86					CCC
255	September'86 Status Report	10Oct86	14Oct86					C
755	File initial US Patent Applications	15Oct86	11Dec86					CCCC
765	Consider foreign Patent filing(if appropr)	12Jun87	3Sep87					
770	Consider filing additional US Patents	4Sep87	26Nov87					