



1825.

Office Memorandum on Investigation of New Batch  
of Catalyst 633 for Production of Hydrogen from Natural Gas.

Introduction.

Previous test work at Baton Rouge on this catalyst (D&R-Memo 81, 1/15/35) had shown excellent catalytic activity but poor mechanical strength. Originally, this catalyst had arrived from the I.G. in the form of 10 mm pills, which, because, of pressure drop consideration, were ground and re-pilled to a 20 mm size. The subsequent failure of these pills in the test-work brought up the question whether the re-pilling operation itself was responsible. To investigate this possibility, a new batch of catalyst 20 mm in size was ordered from I.G. This catalyst was then tested out in the 20-foot experimental tube at Baton Rouge.

Summary.

The 20 mm pilled I.G. Catalyst 633 was tested out for activity on natural gas containing 90% CH<sub>4</sub>, 5% C<sub>2</sub>H<sub>6</sub> and 5% N<sub>2</sub>; the excess steam used was 100% (two volumes steam per volume gas). The activity at various throughputs and temperatures is summarized below, and compared with former results on Catalyst G-410:

Space Velocity (Theoret. H <sub>2</sub> )	Temperature °F	% Residual CH <sub>4</sub>	
		On Cat. 633	On Cat. G-410
615	1 400	0,4	1,5
615	1 300	1,1	3,5
1 080	1 500	0,5	1,5

The new I.G. catalyst is definitely more active on natural gas than G-410. It seems to take an operating temperature about 100°F lower than for G-410 for the same activity.

The strength of this batch of catalyst is immeasurably better than that of the previous batch, but is still not satisfactory. Over 21 days' operation the catalyst showed the following losses:

Catalyst originally installed, lbs	323
Catalyst removed at end of run, lbs	300
% loss in weight	7,1
Dust removed, lbs	48
Good catalyst recovered, lbs	252
% dust (on catalyst removed)	16
Shrinkage, inches	8
% shrinkage per day (21 days)	0,15

The appearance of the so-called "good" pills recovered was not very satisfactory. They seemed subject to easy dusting and had lost considerable strength.

Based on these real results it seems very desirable to continue the work at Baton Rouge on the addition of a binding agent during the manufacturing process.