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ENCLOSURE (B) 9

STUDIES ON THE DESULPHURIZATION  
OF GASOLINE

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SUMMARY

Cracked gasoline from midway petroleum, with 0.032% total sulphur content, was desulphurized over a catalyst named "Redgel" in a small continuous-type apparatus, and 50-60% of the total sulphur was removed. The catalyst life was greater than 10 days. The catalyst showed no selectivity with regard to type of sulphur compound removed.

I. INTRODUCTIONA. History of Project

It is a well known fact that sulphur in gasoline retards the catalytic activity of nickel hydrogenation catalyst and also reduces the anti-knocking effectiveness of tetraethyl-lead. Among many investigations on the desulphurization of gasoline, that of Chem. Eng. Lieut. FURUYA is worthy of mention. He used an Fe-Si catalyst named "Redgel" which had remarkable adsorptive capacity for sulphur compounds in gasoline. The present investigation was undertaken to confirm these results using a small continuous-type apparatus.

This work was carried on from April to September 1943.

B. Key Research Personnel Working on Project

Eng. Chem. Capt. S. YAMAGUCHI

Eng. Chem. Lieut. N. SAKOTA

II. DETAILED DESCRIPTIONA. Test Apparatus and Procedure

The apparatus used in the experiment is shown in Figure 1(B)9. The reaction tube (B) contains 30 iron dishes, of dia. 10cm and depth 3cm, holding the catalyst "Redgel". The preheater and reaction tube were both heated electrically.

The gasoline to be desulphurized was heated to 200°C in the preheater and the vaporized gasoline came into contact, at a rate of 7<sup>1</sup>/<sub>hr</sub>, with 10 kg of catalyst heated to 200°C. The reaction product was tested for sulphur content each 24 hours.

B. Catalyst Preparation

One molar ferrous sulphate solution was poured slowly into one molar sodium silicate solution and the gelatinous precipitate formed was filtered, water-washed, and dried for six hours at 105-106°C.

The dried catalyst was formed into pellets 3mm in height and 5mm in diameter.

C. Experimental Results

The experimental results are summarized in Table I(B)9.

By processing midway cracked gasoline, which contained 0.032% total sulphur (ASTM lamp method), over "Redgel" catalyst, 50-60% of the sulphur was removed. The approximate amounts of elementary sulphur, mercaptans,

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Table I(B)9  
EXPERIMENTAL RESULTS

	Feed Stock	Day									
		1	2	3	4	5	6	7	8	9	10
Total Sulphur, (%)	0.032	0.015	0.014	0.015	0.013	0.013	0.015	0.014	0.014	0.013	0.014
H <sub>2</sub> S	0.005	0	0	0	0	0	0	0	0	0	0
Elementary Sulphur	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Mercaptan	0.007	0.003	0.003	0.003	0.003	0.004	0.003	0.003	0.003	0.003	0.003
Disulphide	0.006	0.004	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Thiophene	0.012	0.006	0.006	0.006	0.006	0.007	0.007	0.007	0.007	0.007	0.007
Percent of Desulphurization		53	56	53	59	59	53	56	56	59	56

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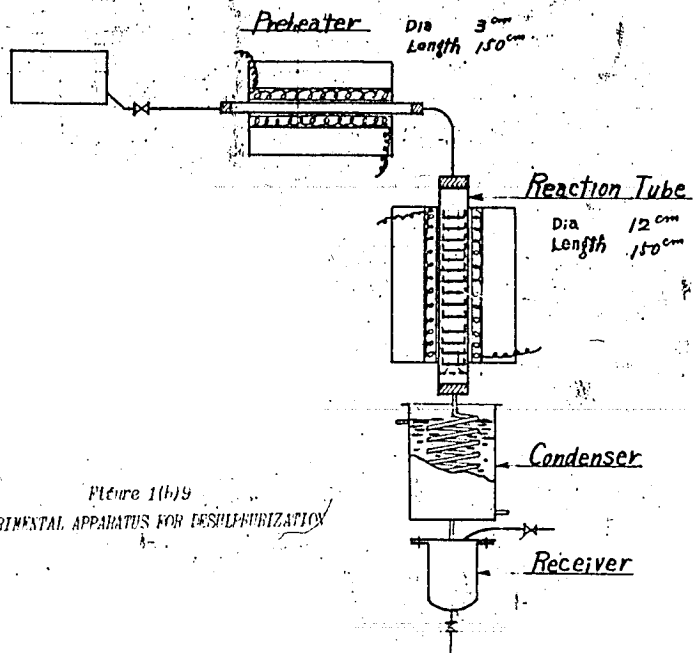


Figure 1(b) 9  
EXPERIMENTAL APPARATUS FOR DESULFURIZATION