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REPORT ON

THE JAPANESE MOTOR OIL COMPANY

(NIHON HATSUKOKIYU K.K.)

UBE, YAMAGUCHI PREFECTURE

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I. INTRODUCTION

This report records and summarizes the technical information pertaining to the Ube plant of the Japanese Motor Oil Company (NIHON HATSUDOKIYU K. K.) obtained by the Petroleum Section of the U.S. Naval Technical Mission to Japan on 29 October 1945. The following Japanese personnel were interviewed and assisted in gathering the information presented herewith:

Mr. S. KORA, President
Mr. S. NAGATA, Managing Director
Mr. T. YOSHII, Head of Manufacturing Department

II. HISTORY AND ORGANIZATION

The Japanese Motor Oil Company was established in 1928 as a refinery for automobile lubricants. During the war, however, production of mineral oil lubricants was stopped and the entire production capacity was transferred to the manufacture of special oils such as hydraulic brake fluids and ester-type lubricants obtained from vegetable products. The capitalization of the plant is two million yen, and the entire stock is owned by individuals. The company also owns a grease manufacturing plant in nearby MISAKI and a plant manufacturing cutting oil in TOKYO.

There were 111 men employed at the UBE plant at the end of the war.

III. DESCRIPTION OF PRODUCTS AND PRODUCTION DATA

The principal products prepared by the Japanese Motor Oil Company are discussed below. The physical and chemical properties of these products are tabulated in Table I(D) and production data for each is given in Table II(D).

A. Hydraulic Brake Fluid

The hydraulic brake fluid prepared by subject company consisted of a mixture of butyl ricinoleate (45% by volume) in n-butanol (55% by volume). A schematic flow diagram showing the various steps in the manufacture of this fluid is given in Figure 1(D). This product was prepared specifically for the Japanese Army and was utilized by them throughout the war.

B. Low Temperature Lubricating Oil

A special low temperature lubricating oil was manufactured for the use of the Army in Manchurian operations. Production of this oil was stopped early in 1944 since there was no appreciable military activity in that area. The oil was composed of a blend of butyl ricinoleate (87% volume) and polymerized soya bean oil (13% by volume). A schematic flow diagram showing the steps in the manufacture of the oil is given in Figure 1(D). The product was satisfactory in most respects but was found to be subject to deterioration during prolonged storage.

C. "Mixed" Automobile Oil

A lubricating oil similar to the low temperature lubricant described above was prepared in much the same manner using a mixture of ethyl ricinoleate (90% by volume) and polymerized soya bean oil (10% by volume). This lubricant was first prepared in February 1945, and production was discontinued in April 1945 because of poor performance characteristics. When this lubricant was used in engines many failures were encountered due to evaporation of the ester and subsequent sticking of pistons in the presence of high concentrations of polymerized oil.

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D. "Sulfurized" Automobile Oil

A new product which had been in production for only a month at the end of the war was the so-called "sulfurized" automobile oil. This lubricant was prepared by adding 0.5% sulfur to rape seed oil which had first been neutralized and treated with Japanese acid clay. The sulfur-oil mixture was churned for 6 hours at 150°C and then filtered. No performance data for this oil were available.

IV. RESEARCH

During the war the chemists employed by the Japanese Motor Oil Company were primarily concerned with control work. However, in 1945 some research was undertaken relative to improving the storage stability of the low temperature lubricating oil. Diphenyl amine or hydroquinone inhibitors were found to be effective. Lubricating oils prepared from pine root oil, tar, or pitch and soya bean oil, were also investigated. As would be expected, both of these lubricants had poor oxidation stability.

Research pertaining to post-war activities is now underway and includes a study of processes for reclaiming lubricating oils, the manufacture of insecticides and water proof paints, and various substitute food studies.

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Table I(D)
PROPERTIES OF LUBRICANTS PREPARED BY
THE JAPANESE MOTOR OIL CO.

		Oil			
		Hydraulic Brake	Low Temperature Lubricating	"Mixed" Automobile	"Sulfurised" Automobile
Specific Gravity, 15/4°C.		0.86	-	0.93	0.92
Reaction		Neutral	Neutral	Neutral	Neutral
Flash Point (°C)		34	183	185	190
Pour Point (°C)		-60	-52	-28	0
Neutralisation Number		0.15	2.2	2.0	2.2
Corrosion, Cu Strip, 3hrs.		None	None	None	None
Ash (%)		-	-	-	0.02
Conradson Carbon (%)		-	-	-	1.2
Viscosity, Redwood Seconds	at 50°C.	-	198	190	-
	at 100°C.	-	65.2	65	55
Viscosity, Stokes	at -30°C.	-	-80	-	-
	at -40°C.	20	-	-	-
Viscosity Index		-	-	-	140

Table II(D)
PRODUCTION DATA
OF THE JAPANESE MOTOR OIL COMPANY

Oil	Period	Production (kl)
Hydraulic Brake	May 1941 - July 1945	500
Low Temperature Lubricating	May 1941 - Jan. 1944	2800
"Mixed" Automobile	Feb. 1945 - April 1945	248
"Sulfurised" Automobile	July 1945	178

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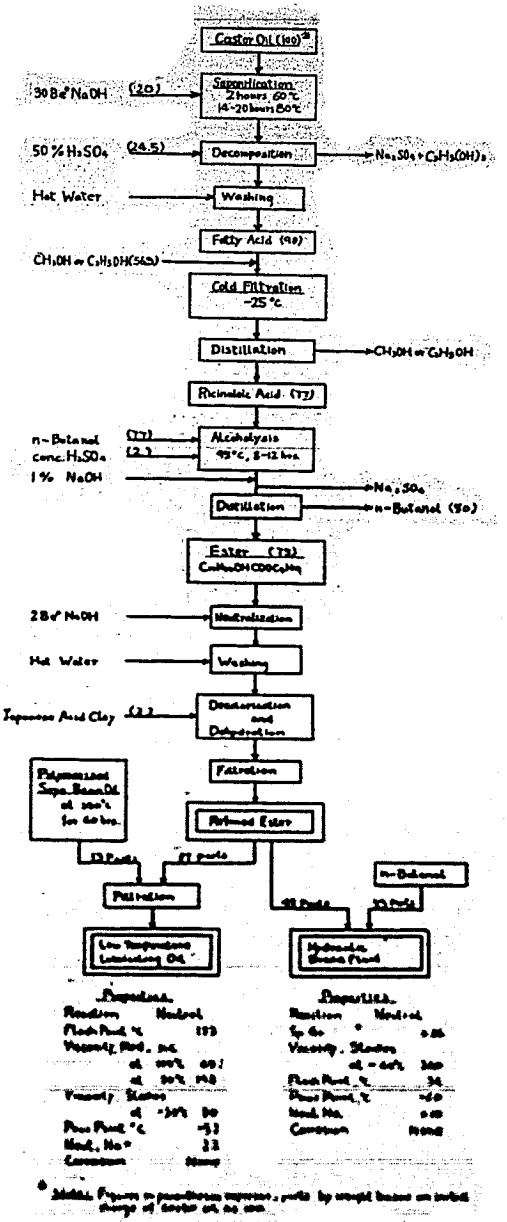

* Moles. Figures in parentheses represent parts by weight based on method charge of castor oil, as one.

Figure 1(D)
PREPARATION OF LOW TEMPERATURE LUBRICATING OIL AND HYDRAULIC BRAKE FLUID