ENCLOSURE (B) 11

EXPERIMENTS ON VARIOUS COALS PRODUCED IN JAPAN

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by

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LIST OF TABLES AND ILLUSTRATIONS

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SUMMARY

High pressure hydrogenation tests were made on coals from NAIBUCHI (Saghalien), BIBAI and URYU (Hokkaido), IWAKI (Fukushima), KITOMO (Yamagata), MOKUSAN, ZUIHO, TANISHO and NANSHO (Formosa), and AGOCHI (Korea), and the results are presented below.

I. INTRODUCTION

In previous reports, the effect of changing reaction conditions on the hydrogenation of Oyama coal were investigated. In this report various kinds of coals were liquefied under the same conditions and the yields and qualities of the oils were compared with those of Oyama coal.

II. DETAILED DESCRIPTION

A rotating autoclave with a capacity of 2.4 liters was used. The charge to the autoclave consisted of 150 grams of coal (crushed finer than 60 mesh) together with 5 % by wt. of $ZnCl_2$ catalyst. The initial pressure of electrolytic hydrogen was 100 atmospheres. The autoclave was heated to the reaction temperature at a rate of 2.75°/min, and was maintained at that temperature for 1 hour.

Analyses of the coals used are given in Table I(B)11 and the experimental results are summarized in Table II(B)11.

III. CONCLUSIONS

1. Naibuchi coals were liquefied much easier than Oyama coal and gasoline content of produced oils was good.

2. Bibai coals were liquefied easier then Oyama coal and the gasoline content of produced oils was also good.

3. In the case of Uryu coal, a higher reaction temperature was required than for Oyama coal and the produced oil was more viscous and had a lower content of gasoline.

4. Iwaki and Kitomo coals had high ash contents and required higher reaction temperatures.

5. In the case of Mokusan #3 mine coal and Zuiho coal, the reaction temperatures were lower and the yields of oil were higher than for Oyama. Although Taisho and Mokusan #1 mine coals required slightly higher temperatures, the rates of liquefaction and the qualities of the produced oils were good.

Nansho coal was more difficult to liquefy than the others.

6. The rate of liquefaction and the quality of the produced oil from Agochi coal were almost the same as for Oyama coal.

Table I(B)11
PROPERTIES OF COAL

Coal	Proximate Analysis(wt %)				Ultimate Analysis(wt %)				
	Moisture	Vol.Matter	F.Carbon	Ash	C	H	O	N	S
Oyama	5.5	41.1	46.0	7.0	79.0	6.2	13.0	1.3	0.5
Kaibuchi #3	4.8	44.0	43.1	8.1	76.4	5.9	16.1	1.4	0.2
Kaibuchi #5	4.6	43.9	38.5	13.0	77.5	6.1	14.8	1.4	0.2
Kaibuchi #7	5.2	44.2	41.4	9.2	76.4	5.7	16.3	1.4	0.2
Kaibuchi #8	5.0	45.8	42.0	7.2	77.6	5.9	15.0	1.3	0.2
Bibai, upper	4.0	39.6	46.0	10.4	79.6	6.0	12.5	1.6	0.3
Bibai, lower	2.8	41.8	48.9	6.5	80.8	5.8	11.7	1.4	0.3
Iwahi	6.3	37.2	29.5	28.0	71.2	5.6	17.5	1.0	4.7
Uryu	3.7	35.0	41.8	19.5	79.3	5.7	12.8	1.7	0.5
Kitomo	15.0	28.8	17.7	28.5	67.2	5.3	25.3	1.0	1.2
Mokusan #1	2.2	43.3	47.4	7.1	81.3	6.6	7.7	1.6	2.8
Mokusan #3	2.3	37.3	47.3	12.7	81.2	6.0	9.2	1.9	1.7
Taisho	2.3	38.3	49.6	9.8	82.5	5.7	8.4	1.7	1.7
Zuiho	4.1	42.0	45.0	8.9	80.0	6.7	9.8	1.9	1.6
Nansho	6.7	21.3	73.9	4.0	89.4	5.2	1.7	2.0	1.7

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Table II(B)11
RESULTS OF HYDROGENATION RUNS

Coal	R.Temp (°C)	Initial P. (atm)	Final P. (atm)	Yield of Oil (wt% of charge)	Yield of 240°C Gasoline (wt% of charge)
Fushun Oyama	425	100	65	63.8	15.5
Naibuchi #3	425	100	65	69.2	15.8
Naibuchi #5	425	100	75	75.8	11.4
Naibuchi #7	425	100	70	73.0	13.8
Naibuchi #8	425	100	70	73.5	14.7
Bibai, upper	425	100	67	70.3	17.9
Bibai, lower	425	100	67	78.5	23.7
Iwaki	425	100	87	58.7	3.8
Uryu	425	100	76	78.9	10.2
Kitomo	425	100	94	58.3	5.4
Mokusan #1	425	100	71	65.1	15.5
Mokusan #3	425	100	71	66.0	18.6
Taisho	425	100	66	66.1	15.6
Zuiho	425	100	67	65.0	19.1
Hansho	425	100	66	46.7	9.4
Hansho	450	100	65	39.2	10.0
Agochi	425	100	71	69.4	19.7
Agochi	400	100	76	71.7	12.8
Agochi	375	100	76	71.0	8.8