ENCLOSURE (B) 31

RESEARCH ON OXYGEN COMPOUNDS AS ANTIDETONANTS

by

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SUMMARY

To obtain a substitute for isooctane the use of oxygen compounds was investigated.

Ketones and ethers were better than several other oxygen compounds. By the C.F.R. test engine 100 octane rating fuel was obtained from 91 octane number gasoline as follows:

Pynacoline (vol.%) 17.5

Isopropyl Ether (vol.%) 20

2-Methyl Pentanone (vol.%) 26

Isooctane (vol.%) 45

But by the full scale engine test it was discovered that the antiknock properties of the oxygen compounds were depreciated under full power conditions of operation.

I. INTRODUCTION

Isooctane as the blending fuel for 100 octane rating gasoline was very searce in Japan. Therefore the author selected the oxygen compounds as the substitute of isooctane, and tested them by the use of C.F.R. engine only. The relation of the combination of oxygen to another group and the antiknock properties was tested. Among them ketone and ether groups were preferable, but by full scale engine tests it was discovered that these compounds were deficient in anti-knock quality.

II. DETAILED DESCRIPTION

All data are given in Table I (B)31. From that table it was concluded that;

$$R_2CO > R_2O > ROH$$

$$RCHO > ROH$$

(Among the corresponding compounds)

These compounds were blended in 91 octane gasoline and 100 O.N. gasoline was obtained as shown in Table II (B)31.

III. CONCLUSION

Ketones and ethers were better than the other several oxygen compounds. These substances were necessary for producing 100 octane rating gasoline from 91 octane number fuel as follows:

Pynacoline (Vol.%) 17.5

Isopropyl Ether (Vol.%) 20

2-Methyl Pentanone (Vol.%) 26

of Isooctane (Vol.%) 45

But by the full scale engine test it was discovered that the oxygen compounds were depreciated in antiknock properties at full power performance. Full scale engine test detailed data are not available.

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Table I(B)31
BASE FUEL: TALANGIMAR GASOLINE
(Pb 0.1% 86.7, 0.15% 89.9)

Compounds	Physical Properties			Antiknock Properties*			
	Sp. Gr. 15°/4°	B.P. °C	N_D^{20}	Pb. 0.1% 20% Added (Vol.)	Pb. 0.15% 10% Added (Vol.)	Sum of Difference	Compare
Acetone	0.7940	55-58	-	91.2	91.0		
Iso-Propyl Alcohol	0.7964	81-90	-	89.8	89.8	2.6	V
Methyl Ethyl Ketone	0.8080	76-91	1.3800	93.5	91.9		
Sec. Butyl Alcohol	0.8095	96-103	1.3968	88.5	88.7	8.2	V
Pynacoline	0.8104	99.1-115	1.3980	93.9	91.8		
Pynacolyl Alcohol	0.8205	111.5-122	1.4148	89.3	90.0	6.4	V
2-Methyl Pentanone	0.8032	104-117	-	97.2	91.5		
2-Methyl Pentanol	-	127-130	-	88.5	88.9	11.3	V
n-Heptanone	-	138-143	-	90.7	93.2		
n-Heptanol	0.8260	145-155	-	87.1	89.7	7.1	V
n-Butyl Aldehyde	0.8210	115-116	-	-	90.6		
n-Buthanol	0.8140	115-116.5	-	-	88.8	1.8	V
Isopropyl Alcohol	0.7962	81-82.2	1.3778	-	90.9		
Isopropyl Ether	0.6312	63-73.4	1.3718	-	94.5	3.6	^

Table II(B)31
EFFECT OF BLENDING

	100 O.N. from 91 O.N.		100 O.N. from 87 O.N.	
	Aniline Not Used (Vol. %)	Aniline 3% Also Added (Vol. %)	Aniline Not Used (Vol. %)	Aniline 3% Also Added (Vol. %)
Pynacoline	17.5	13	29	17
Isopropyl Ether	20	0	28	18.5
2-Methyl Pentanone	26	8	39	19.5
of Isooctane	45	4	over 56	40