Octane Number Requirement Survey of 1959~1973

Japanese Passenger Cars*

by the Subcommittee of Octane Number Requirement Survey, Gasoline Division,
Product Section of the Japan Petroleum Institute

Annual survey of Octane Number Requirement (ONR) has been performed by the Japan Petroleum Institute under the sponsorship of the Petroleum Association of Japan since 1959. The data have been accumulated with 1655 cars (**Table 1**) with primary reference and full

boiling range reference fuels including unleaded ones.

A lot of informations have been obtained on the knocking characteristics of domestic passenger cars concerning with future unleaded gasoline. The details of the results will be reported in SAE.

Following results are presented in this paper.

(1) Changes of ONR for Primary Reference Fuel. (**Fig. 1**)

(2) ONR with leaded and unleaded fuels. (**Table 2**)

(3) Relationship between ONR and fuel compositions. (**Table 2**)

(4) Distribution of engine running conditions for maximum ONR, such as engine speed, manifold vacuum and so on. (**Fig. 2**)

Table 1 Number of Tested Cars Classified by Engine Displacement

Displacement (cc)	Number of Car Tested	% to Total
less than 360	115	6.9
450~ 900	142	8.6
1,000~1,300	411	24.8
1,400~1,700	554	33.5
1,800~2,000	420	25.4
2,600~3,000	9	0.5
Rotary Engine	4	0.3
Total	1,655	100

Fig. 1 Changes of ONR for Primary Reference Fuel (New Cars)

Fig. 2 Distribution of the Engine Speed for Maximum Octane Number Requirement (Excluding the cars which have less than 360 cc displacement)

Table 2 Comparison of ONR with Type of Reference Fuels (Research Octane Number)

Reference Fuels	Primary Reference		Reformed Type				Mixed Type			
			Leaded		Unleaded		Leaded		Unleaded	
	50	90	50	90	50	90	50	90	50	90
Model Year	% Cars Satisfied									
1971	93.2	99.9	94.9	100.0	—	—	94.5	99.4	93.8	99.7
1972	91.7	97.0	—	—	92.9	97.8	92.2	97.5	92.3	97.8
1973	90.8	95.1	—	—	92.4	96.7	—	—	91.9	96.3

* Received January 9, 1975.

Table 3 Comparison of ONR between Automatic Transmission and Manual Transmission Cars, both of them were equipped with the Same Engine Models (Primary Reference Fuel)

		Transmission Type			
		Manual		Automatic	
% Cars Satisfied		50	90	50	90
Model	A	88.3	90.2	88.5	90.5
	B	91.8	96.0	89.6	91.5
	C	96.3	98.3	92.2	95.8
	D	92.7	96.4	88.7	92.0

(5) Correlation of compression ratio with ONR for primary reference fuel. (**Fig. 3**)

(6) Comparison of transmission types of passenger cars for ONR. (**Table 3**)

(7) Knocking characteristics of passenger cars including high speed range.

Fig. 3 Relationship between Compression Ratio and ONR

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