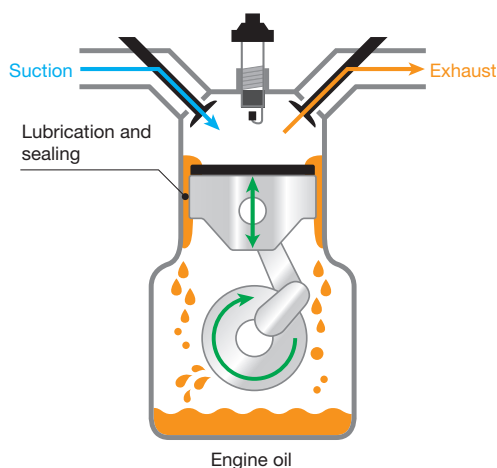




# Keeping the Viscosity of Engine Oil Stable

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In order to help solve the global warming problem that continues to intensify, reduction in CO<sub>2</sub> emissions from automobiles is an unavoidable issue. As CO<sub>2</sub> emissions reduction targets are being announced by various countries, this article introduces products that facilitate the fuel efficiency of automobiles and contribute to the reduction in CO<sub>2</sub> emissions.



## Engine oil can be considered the blood of engines

The automotive industry has taken various measures to reduce CO<sub>2</sub> emissions, including engine performance improvement, aerodynamic improvements, and reduction in vehicle body weights. Improvement in engine oil performance is one such measure.

If we compare the automobile engine to the human heart, engine oil can be considered the blood that circulates through the engine. It maintains the airtightness between piston and cylinder to reduce energy loss and also improves fuel efficiency, in addition to preventing abrasion and seizing of the metallic parts that move at high speeds. An engine oil consists of the base oil made of mineral oil (and/or) synthetic oil, as well as additives. While there are various roles the additives play, adjustment of oil viscosity is one of the important roles of the additives.

## Oil viscosity protects the engine and affects fuel efficiency

Viscosity refers to the level of difficulty of flow due to the stickiness of the fluid. Fluids become loose and decrease in viscosity when the temperature is higher, and grow highly viscous when the temperature is lower.

For engine oils, low viscosity improves fuel efficiency at low temperatures, such as when starting the engine, but if the viscosity decreases too much at high temperatures, such as when driving at high speed, the oil film thickness

decreases and the engine protection performance deteriorates.

However, if the viscosity decreases too much at higher temperatures, such as when driving at high speed, the oil film thickness decreases and engine protection performance deteriorates. Therefore, oils with less viscosity change caused by temperature are considered high-performance oils.

Changes in viscosity through temperature are expressed by a viscosity index. Larger index value indicates smaller viscosity changes due to temperature changes. Since an oil with a large viscosity index does not decrease significantly in viscosity under high temperatures, it can achieve both fuel efficiency and engine protection.

## VII 'ACLUBE' Series -reduction in viscosity change due to temperature

It is the viscosity index improver (VII) that reduces the change in viscosity in concurrence with temperature changes when added to engine oil. Its main component is an oil-soluble polymer. When added to an oil, the chain of atoms (molecular chain) extends at higher temperature and covers the viscosity decrease of the oil at high temperatures, while the molecular chain shrinks at low temperatures and functions to prevent an increase in viscosity. There are 2 types of this VII, the OCP type and the PMA type. Even though the OCP type is lower in cost, it easily dissolves in oils, and has the disadvantage of increasing the viscosity of the oil, with the molecular chain remaining spread even at low temperatures. Meanwhile, the PMA type features an appropriate solubility in the oil so that the molecular chain shrinks at low temperatures and suppresses viscosity at a low level. Due to increasing needs for fuel efficiency, PMA types have grown in demand in recent years.

The 'ACLUBE' Series by Sanyo Chemical is a VII of this PMA type. Thanks to its unique design, it is capable of keeping oil viscosity under low temperatures lower than the products of other manufacturers while maintaining the protective performance under high temperatures, thus enabling further fuel efficiency improvement. In May 2020, we

added new grades that can be used in GF-6. We have a lineup of products that meet various needs, including ‘ACLUBE V-6010,’ which achieves low cost with reduction in the amount needed, ‘ACLUBE V-6050,’ which excels in fuel efficiency improvement, and ‘ACLUBE V-7010,’ which can be used in the lowest viscosity oil specification 0W-16.

## Contributing to the energy issues and climate change measures indicated by SDGs

At present, the ‘ACLUBE’ Series has the largest domestic (JAPAN) share and the second largest international share for PMA types; it is a product that positively contributes to energy issues and climate change measures indicated by SDGs through fuel efficiency improvement and CO<sub>2</sub> emission reduction in automobiles around the world.

The number of automobiles owned throughout the world is expected to further increase in the future. Vehicles with internal combustion engines, including hybrids, are still considered to dominate the market, even though some will shift to electric vehicles. Today, when further reduction in CO<sub>2</sub> emissions is clamored for



In engine room

because of intensifying global environmental issues, even further performance improvement is demanded in VIIIs, which contribute to fuel efficiency improvement of automobiles. Sanyo Chemical will continue to develop products with higher performance and release them into the market in the future.

### ■ An example of ‘ACLUBE’ Series

		Support for GF-6			Support for GF-5
		ACLUBE V-7010	ACLUBE V-6050	ACLUBE V-6010	ACLUBE V-5000 (our conventional product)
Recommended oil grade		0W-16	0W-20	0W-20	xW-30/40
Amount of addition (%)		6.3	12.2	7.8	6.5
HTHS viscosity (mPa·s) <sup>*1</sup>	150℃	2.3	2.6	2.6	2.9
	100℃	4.40	4.65	4.86	6.05
Kinematic viscosity (mm <sup>2</sup> /s) <sup>*2</sup>	100℃	6.36	8.40	8.02	9.15
	40℃	26.6	33.1	31.8	39.2
	Viscosity index	206	246	241	227

\*1 : ASTM D4683 \*2 : ASTM D445

Please contact our sales office if you wish to use our products. In addition, please be sure to read the “Safety data sheet” (SDS) before using the product. Suitability and safety in the application for which the product is to be used must be determined as the responsibility of the user.