

What Does Synthetic Lubricant Mean?

It was easy to answer this question 10-15 years ago. At that time synthetic hydrocarbons (PAO – polyalphaolefin) were the bulk of the synthetic basestocks used in lubricant formulations for automotive and industrial applications. Often these synthetic lubricants included synthetic esters (the reaction product formed between organic acids and alcohols) to improve seal compatibility.

Ten to 15 years ago, the term partial-synthetic lubricant was used to describe mixtures of synthetic basestock (PAO – up to 30%) with conventionally refined petroleum oils produced by the solvent extraction refinery process.

In the 1980's, highly refined, very pure and colorless, hydrocracked petroleum oils entered the U.S. market. They offered significantly higher levels of performance than conventionally refined oils in automotive and industrial lubricant formulations. Early on, these basestocks were described as semi-synthetic basestocks.

After a federal court ruled that hydrocracked oils are also “synthetic”, a lot of “synthetic lubricant” formulations were introduced on the market formulated with this high performance petroleum oil basestocks. Costs for these basestocks are less than the traditional “synthetics” but more than conventionally refined petroleum oils. Except for extreme high and low temperature characteristics, these hydrocracked oil formulations are the practical equivalent of PAO's in most automotive and industrial lubricant applications.

The American Petroleum Institute (API) developed a classification or grouping of lubricant basestocks to better show the differences between the different types. Each type of lubricant basestock is included in one of five groups as summarized below:

Group	Saturate level (wt.%)	Sulfur content (wt.%)	Viscosity Index (VI)	Comment
I	<90	>0.03	$80 \leq VI < 120$	Conventional petroleum oil
II	≥ 90	<0.03	$80 \leq VI < 120$	Hydrocracked
III	≥ 90	<0.03	≥ 120	Hydrocracked & isomerized
IV	Polyalphaolefins (PAO)			
V	All other stocks not included in group I, II, III or IV. (Esters, PAG, silicones, etc.)			

In the API classification, all the oils except Group I can legally be called “synthetic”, but there are different chemical properties and characteristics associated with each group II through V.

Source: Universal Lubricants Inc., Technical Services Department
January, 2005
0501.1