While the word synthetic often can be a negative term, implying something artificial or cheap, in lubrication, just the opposite is true. Synthetic lubricants, overall, have superior performance characteristics compared to their petroleum counterparts (see Table I). While they may be more expensive, in this case, "synthetic" means improved.

Defining synthetic lubricants In general, the synthetic designation applies to products whose basestocks have been manufactured as opposed to being extracted from naturally occurring petroleum. Synthetic lubricants are different from conventional petroleumbased oils because their molecular structures are custom designed and tailored to meet specific performance criteria.

Most petroleum-based and synthetic lubricants consist of a basestock and various additives selected to improve or supplement the lubricant's performance. The basestock is the primary component—*usually 70% to 90%*—of the finished lubricant. Its structure and stability determines the flow characteristics of the oil, as well as its temperature range, volatility, lubricity and cleanliness. Since the basestock is the dominant component, one way to make a better lubricant is to start with a better basestock.

Basestock categories
The following list highlights the various types of basestocks used to formulate synthetic lubricants along with their principal applications.

- Polyalphaolefins and dialkylated benzenes provide performance similar to mineral oils and are compatible with them. They are used as hydraulic fluids and gear, bearing lubricants and compressor lubricants.
- Dibasic acid and polyol esters readily accept additives, which make them excellent compressor lubricants.
- Polyglycols are used primarily for lubricating gears and bearings.
- Phosphate esters provide fire resistance. Silicones are nontoxic, fire resistant and water repellant.

ADVANTAGES AND DISADVANTAGES OF SYNTHETIC LUBRICANTS

Advantages	Disadvantages
Reduces energy consumption	Costs more than conventional lubricants
Keeps surfaces clean of deposits	Phosphate esters may be a toxicity risk and expensive to dispose of
Reduces viscosity thinning	May cause seals to shrink or swell
Extends oil drain intervals	Ester-based synthetics may degrade in the presence of water
Resists severe conditions	Some synthetics are not compatible with other fluids
Improves fire resistance and thermal stability	Some additives are difficult to keep in solution

Keep in mind that the products shown on this chart are general guidelines for comparison purposes only. They do not infer that performance is interchangeable. If you are considering a lubricant substitution for a specific application, you MUST consult the respective formulator(s) to ensure proper performance.

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