SYNTHETICS vs MINERALS

Oil is the lifeblood of your vehicle's engine. For decades conventional petroleum oils have been providing adequate protection for all of our vehicles.

The key word here is adequate. Petroleum oils, for the most part, have done an adequate job of protecting our engines from break down. If you change it often enough, you can be relatively sure that your car will last 100,000 to 150,000 miles without a serious engine problem - maybe even longer.

The real question is, why settle for adequate when something better has been available for
about 30 years?

Today's engines are built for better performance, and, although petroleum oils are designed for better protection and performance today than they were 10 or 20 years ago, there is only so much that can be done. Today's engines need high performance lubricants, and the only true ones available are synthetics.

Conventional petroleum oils are insufficient for use in today's vehicles primarily because they are manufactured from a refined substance, contain paraffins (wax), sulfur, nitrogen, oxygen, water, salts and certain metals. All of these contaminants must be refined out of the basestock in order for it to be useful for use within a lubricant.

Unfortunately, no refining process is perfect. Impurities will always remain when any refining process is done. It simply isn't economical to continue to refine the oil again and again to remove more impurities. If this was done, petroleum oils would cost as much as synthetic oils do.

There are many components of petroleum oil basestocks which are completely unnecessary for protecting your engine. They do absolutely nothing to enhance the lubrication properties of the oil. In fact, most of these contaminants are actually harmful to your oil and your engine.

Some of the chemicals in conventional petroleum lubricants break down at temperatures well within the normal operating temperature range of your engine. Others are prone to break down in these relatively mild temperatures only if oxygen is present. But, this is invariably the case anyway, especially since oxygen is one of the contaminants within petroleum basestocks.

These thermally and oxidatively unstable contaminants do absolutely nothing to aid in the lubrication process. They are only present in conventional petroleum oils because removing them would be impossible or excessively expensive.

When thermal or oxidative break down of petroleum oil occurs, it leaves engine components coated with varnish, deposits and sludge. In addition, the lubricant which is left is thick, hard to pump and maintains little heat transfer ability.

In addition, petroleum oils contain paraffins which cause dramatic oil thickening in cold temperatures. Even with the addition of pour point depressant additives, most petroleum oils will begin to thicken at temperatures 10 to 40 degrees warmer than synthetic oils.

As a result, petroleum lubricants will not readily circulate through your engine's oil system during cold weather. This may leave engine parts unprotected for minutes after startup. Obviously, significant wear can occur during this time frame.

Even when all conditions are perfect for conventional oils to do their job, they fall far short

of synthetic oils. Part of the problem is that (because of their refined nature) petroleum oils are composed of molecules which vary greatly in size. As the oil flows through your vehicle's lubrication system, the small, light molecules tend to flow in the center of the oil stream while the large, heavy ones adhere to metal surfaces where they create a barrier against heat movement from the component to the oil stream. In effect, the large, heavy molecules work like a blanket around hot components.

There is also another effect of the non-uniformity of petroleum oil molecules which reduces their effectiveness. Uniformly smooth molecules slip over one another with relative ease. This is not the case with molecules of differing size.
Theoretically, it might be somewhat similar to putting one layer of marbles on top of another (if this could easily be done). If the marbles were all of the same size, they would move over one another fairly easily. However, if they were all of differing sizes, the result would be much less efficient.

In the case of petroleum oils this inefficiency leads, ironically, to added friction in the system (the very thing that lubricants are supposed to reduce). Hence, petroleum oils are only marginally capable of controlling heat in your engine. Considering that motor oil does nearly 50% of the cooling of your engine, that's not a good thing. But,

This being said, petroleum oils are “adequate” for the purpose of protecting your engine, if you don't mind a shorter vehicle lifespan, inconvenient oil changes, or decreased engine
performance. Under normal circumstances, most vehicles lubricated with petroleum oil should run satisfactorily for 100,000 to 150,000 miles without serious incidence.

If you like the hassle of changing your oil regularly, and you are only looking for marginal performance for the next 100,000 miles or so, petroleum oils are definitely the way to go.

Assuming that you don't relish the idea of changing your oil every 2,000 miles or and are looking to keep your “pride and joy” in tip-top condition then these are the main areas where synthetic oils surpass their petroleum counterparts.

Oil drains can be extended
Vehicle life can be extended
Costly repairs can be reduced
Fuel mileage can be improved
Performance can be improved

Synthetic basestock molecules are pure and of uniform size. This is because synthetic basestocks are designed from the ground up with the sole purpose of protecting your engine. Nothing is added if it does not significantly contribute to the lubricating ability of the oil.
In addition, in top-quality synthetics, no component is added which might be contaminated with any substance that might lessen the lubricating qualities of the oil. In other words, manufacturers of these premium synthetics implement very strict quality control measures to insure no contamination.

Not only that, synthetic basestocks are designed so that the molecules are of uniform size and weight. In addition, synthetic basestock molecules are short-chain molecules which are much more stable than the long-chain molecules that petroleum basestocks are made of. This significantly adds to the lubricating qualities and stability of the oil.

EXTENDED OIL DRAINS
Stable Basestocks
Synthetic oils are designed from pure, uniform synthetic basestocks, they contain no contaminants or unstable molecules which are prone to thermal and oxidative break

down.
Moreover, because of their uniform molecular structure, synthetic lubricants operate with less internal and external friction than petroleum oils which have the non-uniform molecular structure. The result is better heat control, and less heat means less stress to the lubricant.

Higher Percentage of Basestock
Synthetic oils contain a higher percentage of lubricant basestock than petroleum oils do. This is because multi-viscosity oils need a great deal of pour point depressant and viscosity modifying additives in order to be sold as multi-viscosity oils.
Synthetic oils, require very little in the way of pour point depressants and viscosity modifiers. Therefore, synthetic oils can contain a higher percentage of basestock, which actually does most of the lubricating anyway. More basestock leads to longer motor oil life.

Additives Used Up More Slowly
Petroleum basestocks are much more prone to oxidation than synthetic oils, oxidation inhibitors are needed in greater supply and are used up very quickly. Synthetic oils do oxidize, but at a much slower rate therefore, oxidation inhibiting additives are used up much more slowly.
Synthetic oils provide for better ring seal than petroleum oils do. This minimizes blow-by and reduces contamination by combustion by-products. As a result, corrosion inhibiting additives have less work to do and will last much longer than within a petroleum oil.

Excellent Heat Tolerance
Synthetics are simply more tolerant to extreme heat than petroleum oils are. When heat builds up within an engine, petroleum oils quickly begin to burn off. They volatize. In other words, the lighter molecules within petroleum oils turn to gas and what's left are the large petroleum oil molecules that are harder to pump.
Synthetics are resistant to this burn-off. They will tolerate much higher engine temperatures.

EXTENDED VEHICLE LIFE WITH FEWER REPAIRS
Heat Reduction
More often than not, vehicle life is determined by engine life. One of the major factors affecting engine life is component wear and/or failure, which is often the result of high temperature operation. The uniformly smooth molecular structure of synthetic oils gives them a much lower coefficient of friction (they slip more easily over one another causing less friction) than petroleum oils.
Less friction, of course, means less heat in the system. And, since heat is a major contributor to engine component wear and failure, synthetic oils significantly reduce these two detrimental effects.
In addition, because of their uniform molecular structure, synthetic oils do not cause the "blanket effect" which was mentioned earlier. Since each molecule in a synthetic oil is of uniform size, each is equally likely to touch a component surface at any given time, thus moving a certain amount of heat into the oil stream and away from the component. This makes synthetic oils far superior heat transfer agents than conventional petroleum oils.

Greater Film Strength
Petroleum motor oils have very low film strength in comparison to synthetics. The film strength of a lubricant refers to it's ability to maintain a film of lubricant between two objects when extreme pressure and heat are applied.
Synthetic oils will typically have a film strength of 500% to 1000% higher than petroleum oils of comparable viscosity. In fact, believe it or not, even though heavier weight oils typically have higher film strength than lighter weight oils, a 0w30 or 5w-40 weight synthetic oil will likely have higher film strength than a 15w40 or 20w50 petroleum oil. Thus, even with a lighter weight oil, you can still maintain proper lubricity and reduce the

chance of metal to metal contact when using a synthetic oil. Of course, that means that you can use oils that provide far better fuel efficiency and cold weather protection without sacrificing engine protection under high temperature, high load conditions. Obviously, this is a big plus, because you can greatly reduce both cold temperature start-up wear and high temperature/high load engine wear using the same low viscosity oil.

Engine Deposit Reduction

In discussing some of the pitfalls of petroleum oil use, engine cleanliness is certainly an issue. Petroleum oils tend to leave sludge, varnish and deposits behind after thermal and oxidative break down. They're better than they used to be, but it still occurs.

Deposit build-up leads to a significant reduction in engine performance and engine life as well as increasing the number of costly repairs that are necessary. Since synthetic oils have far superior thermal and oxidative stability than petroleum oils, they leave engines virtually varnish, deposit and sludge-free.

Better Cold Temperature Fluidity

Synthetic oils and other lubricants do not contain paraffins or other waxes which dramatically thicken petroleum oils during cold weather. As a result, they tend to flow much better during cold temperature starts and begin lubricating an engine almost immediately. This leads to significant engine wear reduction, and, therefore, longer engine life and fewer costly repairs.

IMPROVED FUEL MILEAGE AND PERFORMANCE

As indicated earlier, synthetic oils, because of their uniform molecular structure, are tremendous friction reducers. Less friction leads to increased fuel economy and improved engine performance.

Any energy released from the combustion process that would normally be lost to friction can now be transferred directly to the wheels, providing movement.

Vehicle acceleration becomes swifter and more powerful while using less fuel in the process.

The uniform molecular structure of synthetic oils has another performance enhancing benefit as well. In a petroleum oil, lighter molecules tend to boil off easily, leaving behind much heavier molecules which are difficult to pump. Certainly, the engine loses more energy pumping these heavy molecules than if it were pumping lighter ones.

Since synthetic oils have more uniform molecules, fewer of these molecules tend to boil off.

More importantly, when they do, the molecules which are left are of the same size and pumpability is not affected.