

THE REFINING PROCESS

In order to enhance the qualities of crude oil for the final lubricant base oil, crude oil is passed through a series of purification steps. The series of steps will be something closely resembling the following:

Desalting

Removal of salt contaminants from the crude oil to make the rest of the refining process easier.

Partial Vaporization

The crude oil is heated within a vaporization chamber which collects portions of the crude that have differing boiling points. Lubricating basestocks are the components with the highest boiling point.

Vacuum Distillation

The process by which lubricating basestocks are separated into fractions of differing molecular weights, and therefore, differing viscosity ranges.

Solvent Extraction

Solvents are added to each fraction obtained from the distillation process and the mixture is

allowed to settle into a phase containing aromatic compounds and a phase containing non aromatic compounds. The aromatic compounds are extracted from the basestocks before the next step in the refining process.

Up to 80% of the aromatic contaminants are removed through this method. This greatly improves thermal and oxidative stability and raises the viscosity index of the stock considerably.

Dewaxing

Wax is removed to improve low temperature fluidity. In cold temperatures wax contaminants will crystalize making the lubricant thick and difficult to pump. Methyl ethyl ketone (MEK) is added to the lubricant basestocks and the oil is cooled to just below the intended pour point of the basestocks. All wax crystals that form are removed via filtration.

Hydrofinishing or Clay Treatment

This is an optional component of the refining process reserved for more premium petroleum basestocks. Hydrofinishing uses a catalyst bed through which hydrogen and heated oil are passed. As these components pass through the bed, unstable components such as sulfur and nitrogen are removed. Clay treatment uses a different method to achieve a similar outcome. Both of these refining processes improve oxidation stability, thermal stability and color of the lubricant basestocks.

Hydrotreating

In some cases a more severe method is used in addition to regular hydrofinishing. Hydrotreating involves putting the lubricant basestocks through extremely high temperature and pressure extremes in the presence of a catalyst. This will convert any remaining aromatic hydrocarbon contaminants into usable non aromatic hydrocarbon molecules. The resulting hydrocarbon molecules are much more stable, and the resulting basestocks are very pure with very few contaminants. This process can be used in place of solvent extraction of aromatics and/or in addition to

solvent extraction. It is much more effective, achieving about 99% removal of aromatic contaminants as opposed to only about 80% for solvent extraction. Only super-premium petroleum basestocks will be manufactured using this method.

IMPORTANT NOTE

Crude oil comes from many sources and has a wide range of quality levels and contamination levels. The refining process above can only do so much. As a result, petroleum basestocks will have a wide range of quality levels.

To minimize these quality differences lubricant companies must exercise tremendous care in selecting crude oil stocks. In addition, the refining process must be done under the strictest of quality control measures.

As a result, those companies that exercise this care will charge more for their oil - they simply have to. So, if you are going to use a petroleum lubricant, keep in mind that you generally get what you pay for.

Although you're paying somewhat for the brand name, in most cases there is a reason that brand name oils are priced higher - they're of higher quality.

Just because you see the API on the bottle doesn't mean it's a "quality" oil - it only means that the oil in that container meets the absolute minimum specifications in order to adequately protect your engine. Just be careful what you use to protect your pride and joy!