

all compounded from vegetable, animal, or mineral oils, and in some cases in combination with about 5 per cent. by weight of graphite. Vegetable oils are very seldom used alone, as they possess low lubricating properties and also have a tendency to decompose at comparatively low temperatures and become thick and gummy. Animal oils have a somewhat higher lubricating value than vegetable oils, and are used to some extent in compounding with mineral oils, but are very seldom used alone, as they have a tendency to decompose in the presence of heat, liberating acids which attack metal and cause pitting, etc. For bearing lubrication, mineral oils which are compounded with animal fats frequently cause serious trouble where the oil is to be filtered and used over again, on account of its emulsifying (mixing) with entrained water, collected with the oil (condensation drips from piston rods, stuffing boxes, etc). This mixture is hard to separate, therefore a high grade of mineral oil that can be easily filtered and separated is best suited for automatic bearing lubrication.

By far the greater proportion of modern lubricants are made up of mineral oils which are products of crude petroleum and can be had in a wide variety, running anywhere from the lighter grades of sewing machine and typewriter oils up to the heaviest grades of grease.

Some of the qualifications of the good oils are as follows:—

1. Sufficient body to keep the rubbing surfaces separated by a thin film of oil.
2. Maximum fluidity or ability to flow, consistent with the body required.
3. Low co-efficient of friction and ability to carry away heat.
4. Freedom from corrosive acid and any tendency to oxidize, gum or decompose.
5. A high flash point or temperature of vaporization and a low freezing point.

Some of the methods used by engineers in specifying oils are by their specific gravity, viscosity, flash point, burning point, cold test, acidity, and friction test.

The SPECIFIC GRAVITY or density of an oil is the ratio by weight of a given quantity of an oil as compared with the same volume of water. This is usually determined by a hydrometer, or in the oil trade is usually designed by a special scale known as Beume. The relation of the specific gravity to the Beume scale is given by the following expression:

$$\text{Specific Gravity} = \frac{140}{130 + \text{degrees Beume}}$$