ADDAPT
Chemicals BV

for tomorrow's
Technology

Tackifiers

for Lubricants and Greases

for tomorrow's
World

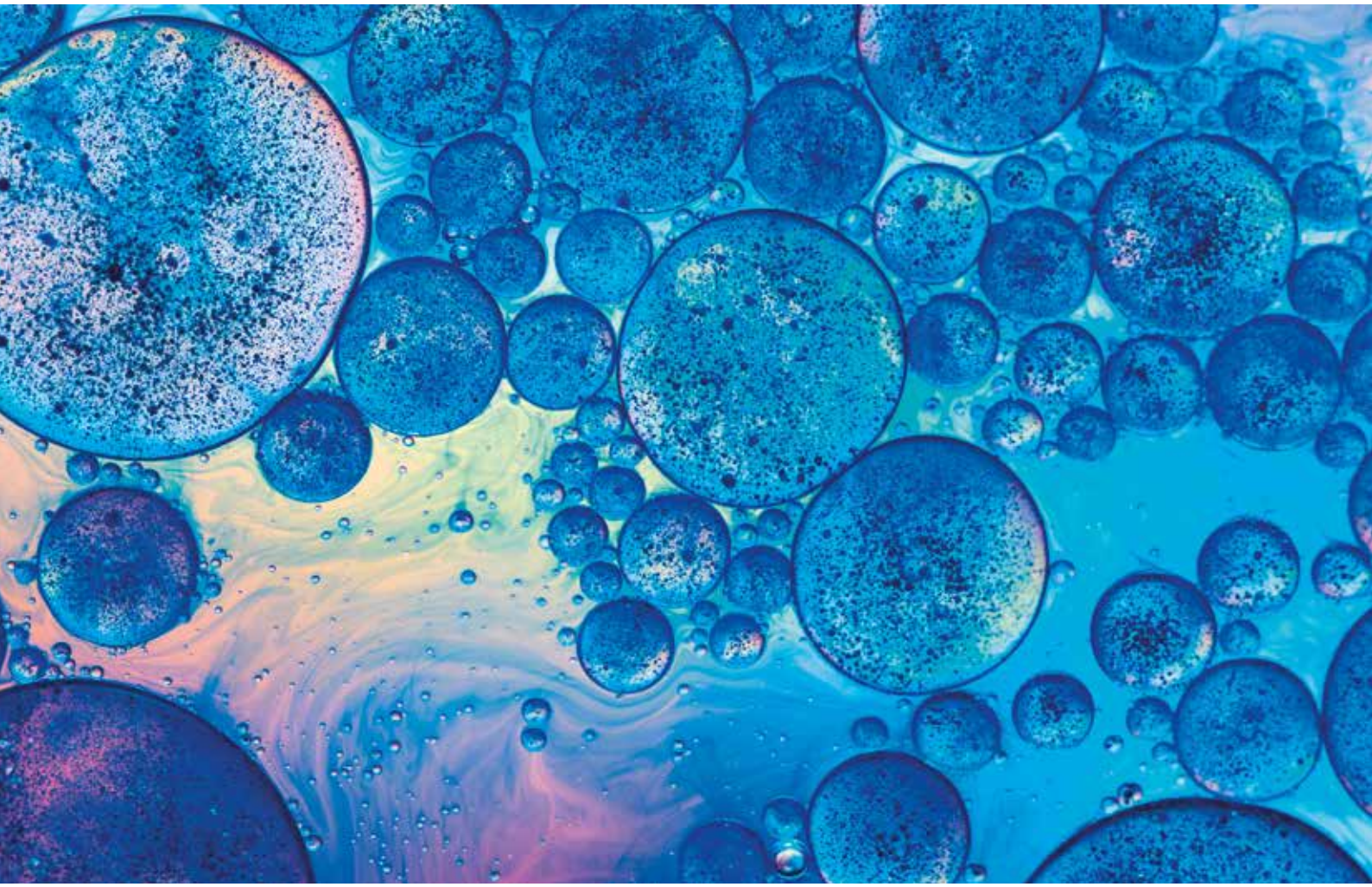
Introduction

Industrial and automotive fluids, on many occasions, require an additive that improves the adhesion and/or tackiness of the fluid to the surface, which is lubricated with a lubricant or grease.

PiB, natural rubber and latex dissolved in mineral oil or esters, are known to be excellent additives which provide such kind of properties. The production of these additives require high skill and care in order to avoid the breakdown of the chemical structure of these chemicals; i.e. large molecular weight molecules are normally shear sensitive and special precautions have to be taken to optimise production.

Every application has its own need for a tackifier. For this reason ADDAPT Chemicals BV developed a range of tackifiers. Correct choice of tackifier ensures optimised usage with the optimum of performance at the lowest treat level.

It is important to mention that an anti-mist additive (required in the cutting and grinding industry) normally does not have the tackifying properties that standard tackifiers exhibit. This finds its origin in the structure of the solid dissolved in the mineral oil. Anti-mist additives contain relatively low molecular weight solids. High molecular weight solids will block the filters of the circulating oil.



Product range for the lubricant industry

We introduce the following range of tackifiers to the lubricant industry:

Tac M 7	Light colour, high performing PiB in mineral oil
Tac M 8	Light colour, high solid containing tackifiers, medium viscosity
Tac M 9	Colourless, low viscous, high performing PiB
Tac M 55	Concentrated PiB solution in mineral oil
Tac E 60	Natural rubber dissolved in vegetable oil

Applications

Tackifiers find their application in many different areas. Some examples are shown below:

- Automotive chassis greases
- Industrial extreme pressure greases
- Automotive undercoating
- Bar and chain saw oil
- Pneumatic drill oil
- Aluminium forming fluids
- Slide way lubricants
- Oil based rust preventatives
- Water based preventatives
- Air compressor and cylinder lubricants
- Gear oils
- Spindle oils
- Machine oils
- Cutting oils (anti-mist grade)
- Textile machinery oil

It is important to know the final application in order to choose the correct grade. Spindle oils normally require a tackifier of very light colour and a very high tackifying property as well as low viscosity (**Tac M 7**). This is in contrast to applications where there is no colour specification required and high viscosity is desired.

Standard tackifiers should not be used where only anti-mist properties are required.

Viscosity is not the determining feature for tackifying properties. This is shown later on in this brochure where test results of **Tac M 7** (low viscous) are compared with tests result obtained from **Tac M 55** (high viscous).

Tackifying properties can be determined in different ways; we recommend the usage of the test procedure as shown on page 6.

Products

Tac M 55
Tac M 55 is the most general tackifier used in the lubricant industry. It has a similar performance, viscosity and colour as well known grades such as Paratac and Adichem C. Because of the colour (dark brown), this product is not suitable for spindle oil or other fluids which come in contact with textiles and are sensitive to dark coloured chemicals.

The tackifying performance is shown in the paragraph ‘Test methods’ and shows comparable performance of Tac M 55 with the performance of Adichem C.

Tac M 7
Tac M 7 is a medium viscous tackifier with very light colour. In spite of the low viscosity, the content of solids is similar to the standard grades. The low viscosity makes Tac M 7 an easy to handle tackifier; which does not have to be stored at higher temperatures, i.e. it can be handled without difficulties at room temperatures. This grade can be used in the spindle oil industry. Although the medium viscosity gives the impression that the tackifying properties are worse than the tackifying properties of a high viscous grade, the test result gives a strong indication that the tackifying properties of Tac M 7 are superior to the tackifying properties of all other commercial tackifier grades (see page 5 ‘Test methods’).

Application areas: all application areas as mentioned above (industrial fluids, cutting fluids).

Tac M 8
Tac M 8 is similar to Tac M 7, i.e. it shows the same colour as Tac M 7. The solid content is higher than the solid content for Tac M 7 and the viscosity is rated as medium. The tackifying properties are rated as very good in the tackifying test mentioned at the end of this brochure.

Tac M 9
Tac M 9 is a low viscous tackifier which is colourless and transparent. In spite of the low viscosity, the content of solids is similar to the standard grades. The low viscosity makes Tac M 9 a very easy to handle tackifier; it does not have to be stored at higher temperatures, i.e. it can be handled without difficulties at room temperatures. This grade has been developed mainly for the spindle oil industry. The tackifying properties of Tac M 9 are superior to the tackifying properties of all other commercial tackifier grades (see page 5 ‘Test methods’).

Application areas: all application areas as mentioned above (industrial fluids, cutting fluids) including spindle oils.

Tac E 60
Tac M 7 and Tac M 55 are based on mineral oil as solvent - carrier for the PiB. In several cases, the end-user prefers the fully formulated lubricant to be based on biodegradable ingredients. In this case the tackifier should also be based on biodegradable chemicals. Tac E 60 is a light coloured tackifier based on vegetable oils as solvent-carrier. The tackifier exhibits excellent tackifying properties, with tackifying properties between Tac M 55 and Tac M 7.

The test results obtained with Tac E 60 showed again that the viscosity of the tackifier is not the determining parameter of the tackifying properties of the resulting lubricant (Tac M 55 and Tac E 60 have similar viscosities at room temperature and at higher temperatures).

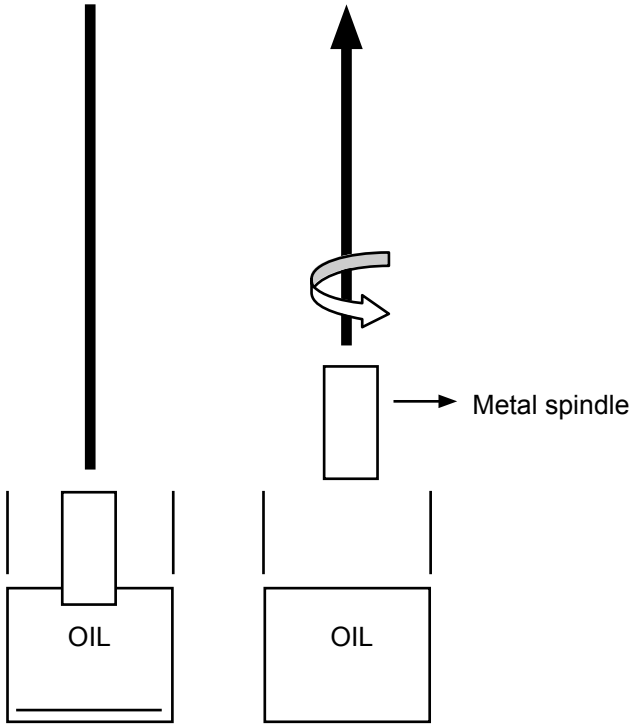
Application areas: chain saw oils, hydraulic fluids, greases and ester based cutting oils.

Test methods

In practice the so-called threadiness (ductility) is regarded as the most important criterion for the effectiveness of a tack improver. Several existing test methods measure threadiness; none is covered by any accepted standard.

The ADDAPT Chemicals BV in house method determines the amount of oil left on the surface of the Brookfield spindle after submerging the spindle in the tackifier containing mineral oil. The spindle rotates for 10 minutes at a high rpm before measuring the weight of the spindle. Depending upon concentration, base oil properties and temperature, the effectiveness of a tack improver can be assessed.

The viscosity of tack improvers should ensure easy incorporation. This way the shear stress, necessary in manufacturing, can be kept to a minimum, which is useful for the tack improvers. Tackifiers are generally sensitive to shear.



Brief description

In the next paragraph the details of the test method show how to reproduce the test data very accurately.

In brief it is a mineral oil solution which contains 0.1, 0.5 and 1.0 pbw of the tackifier. The technician should use the largest Brookfield spindle and after the spindle has been taken from the solution, the spindle is rotated for a fixed number of rpm at a fixed time. In case the tackifying properties are poor, the mineral oil will “spin off” from the spindle. In case of good tackifying properties, a considerable amount of lubricant will remain on the spindle surface in spite of the rotation.

Using this test method, which results in very good reproducible test data, independent of laboratory and operator, it has been found that only Tac M 15 is a very good anti-mist additive with very poor tackifying properties.

This test method also shows clearly that viscosity is not the determining parameter for tackifying properties. The type of solids, the blend of solids and the origin of the solvent carrier determine the final tackifying properties.

Test procedure

Scope
This method is designed to determine the extent to which a tacky additive increases the adhesiveness of a mineral oil. This is measured in terms of a percentage increase over the standard mineral oil.

Equipment

Stirrer	Analytical balance
Thermometer	Electronic stopwatch
Variable speed mixer	250 wide neck glass bottle
Tachometer	500 SN paraffinic mineral oil
No. 1 Brookfield spindle	Tackifier additive

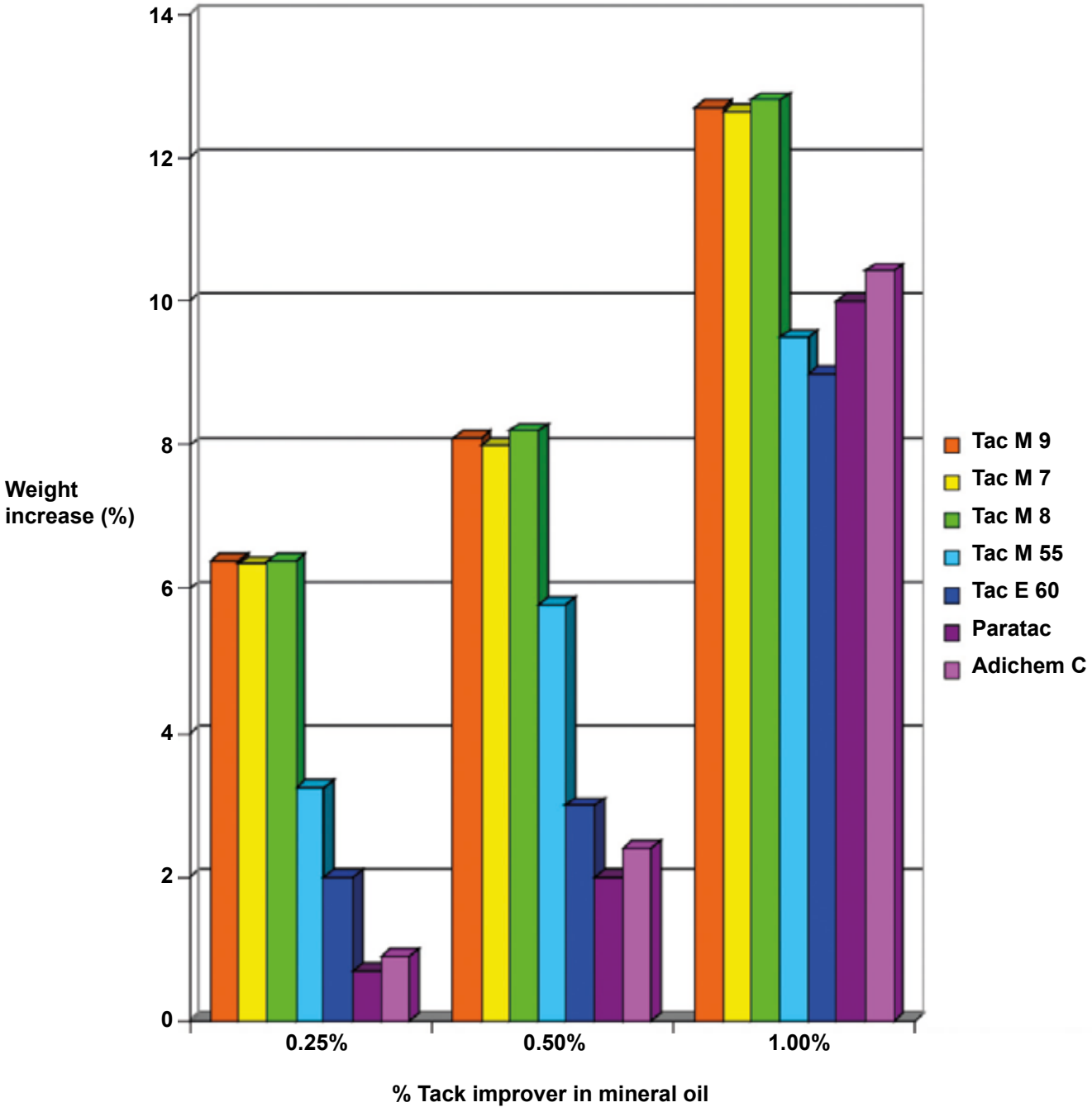
Method
Weigh into a 250-beaker glass the desired amount of tacky additive. Standard concentrations: 0.25, 0.50 and 1.00% these concentrations should be made up to 200 g with what ever mineral oil is desired (in this particular case 500 SN paraffinic). These solutions are mixed on the heater stirrer. The temperature must be strictly below 60 ºC and no air bubbles should be present.

Calibration
Insert the venture tachometer into the chuck of the variable speed mixer, tighten with a chuck key. Turn on the mixer and vary the speed dial to read 400 rpm on the tachometer.

Procedure

- Before testing any tacky additive a blank should be tested. A blank being the straight oil. Take a Brookfield no. 1 spindle and weight it four times in order to obtain a good average of the weight. Insert the spindle into the mixer.
- Transfer 100 ml of the test solution (a mineral oil) to a 150 ml beaker glass.
- Place the beaker glass in a water bath of 20 ºC and wait until the temperature of the mineral oil is exactly 20 ºC. Keep this temperature during the whole test procedure.
- Stir the solution for two minutes. Raise the spindle and allow it to drain for two more minutes.
- Rotate the spindle for ten minutes in an **empty** beaker glass.
- After this ‘ten minutes’ rotation in the empty beaker glass, remove the spindle from the mixer and place it on the balance and measure the weight of the spindle. Re-weight the weight five times in order to obtain a good average for the weight of the spindle after this stirring process.
- Calculate the weight increase of the spindle.
- Repeat this test five times; it enables one to obtain a good average of weight increase of the spindle by using a tackifier.

Test data


14
12
10
8
6
4
2
0
Weight increase (%)
0.25%
0.50%
1.00%
% Tack improver in mineral oil
Tac M 9
Tac M 7
Tac M 8
Tac M 55
Tac E 60
Paratac
Adichem C

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