

## **Advanced Module 507**

### **Additives – Liquid Coatings, Modifiers and Drying**

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#### **Summary**

Module 507 is one of three advanced modules dealing with additives used in surface coatings. Additives can be considered to be materials which, when added to another substance, improve the overall properties or reduce undesirable properties. In most cases, the level of addition is less than one percent.

This module contains a comprehensive study of certain additives including why they are required and how they work.

In section 1 of the module, factors that affect the dispersion process are discussed. An explanation is given on how certain manufacturing problems are caused and how they can be avoided. Specific topics include “foams” wetting, dispersion, flooding and floating.

Section 2 describes materials that can be classified as stabilisers, with particular attention to “in-can” fungicides, and corrosion preventers.\*

In the final section, modifiers to the polymerisation process are discussed. In particular, we are referring to the drying process of oil- based alkyds. The drying mechanism is fully explained, and certain “driers” discussed, along with their function and approximate levels of use. Anti- skinning additives are also discussed in some depth.

\*It should be noted that additives that induce thixotropy (and therefore reduce settlement) are discussed briefly in this section. However, for students wishing to study the subject of “rheology” thoroughly, we would recommend module 508, which contains a greater “in- depth” study of this particular subject.

## Structure of the module

The module consists of a theory block, a Computer Marked Assessment, a Practical Attendance Exercise and an Assignment. The theory block is split into four sections, which are not of equal length but should take, on average, about 2.5 – 3.0 hours to go through. The module is designed to take between 10 to 12 hours of study made up of the theory block, a practical and the assignment. This time excludes the time taken to write up your reports for the practical attendance exercise and assignment.

**In sections 1 and 3 you will be asked to carry out a piece of experimental work and this practical attendance exercise is explained in Appendix 2.**

*The assignment is explained in Appendix 3 For this, you are required to carry out some investigative work and to prepare a report on the results.*

**You should discuss both the practical exercise and the assignment with your tutor.**

For full certification the CMA, the PAX and the ASG must be completed satisfactorily.

## Marks for this module

Computer Marked Assessments (CMA)	20%
Practical Attendance Exercise 1 (PAX 1)	10%
Practical Attendance Exercise 2 (PAX 2)	10%
Assignment (ASG)	15%
End Test (TMA)*	<u>45%</u>
TOTAL	<u>100%</u>

An overall mark of 50% or more is necessary for successful completion of the module, with students achieving at least 40% of the marks available in each element

## **Learning Objectives**

For each topic in the module, there are designated learning objectives. These objectives are listed in each section of the study material.

## **Prerequisites**

Persons studying Advanced level will need to have a good understanding of physics and chemistry and considerable experience in the coatings, or a related, industry. Most advanced students will have studied some modules at intermediate level.

Ideally, modules 302 and 303 should have been studied, as they introduce many of the subjects (contained within this module) at the intermediate level.

## **Module Objectives**

In the learning materials for individual lessons you will find individual numbered sections; these indicate the specific objectives to which they relate.

After studying the module, you should be able to:

### **Section 1. Modifiers to the Dispersion Process**

1.1 Explain problems present in the dispersion process

- (a) During manufacture
- (b) During application

1.2 Discuss how the following additives are used to counteract the problems identified in 1.1:

- (a) Foam Control agents
- (b) Wetting and dispersion agents
- (c) Anti-flotation agents

## **Section 2. Modifiers to Can-Life**

2.1 Explain the various problems present in maintaining the stability of a product

Discuss how the following additives are used to overcome these stability problems:

- (a) Stabilisers
- (b) Anti-settling agents and thickening agents
- (c) Moisture absorbers
- (d) Corrosion preventers

## **Section 3. Modifiers to Aid Film Polymerisation**

3.1 Explain the need for driers in convertible air-drying media

3.2 List the type of driers available

3.3 Explain the term “drier adsorption”

3.4 Discuss the term “catalyst” in relation to polymerisation of coating media. Give examples of primary driers that exhibit catalytic properties

3.5 Explain the function of secondary driers and give examples

3.6 Explain the function of anti-skin additives and give an example. \*

3.7 Determine suitable amounts of driers for various formulations

\*This could have been included under section 2, but is discussed in the “driers section” as it is usual to consider both driers and anti-skin additives at the same time.