

Study Guide

Module 203 – Level 2

Pigments and Their Properties

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Summary

This foundation level module describes and classifies various pigments used in the Coatings Industry, both by type and physical form.

The main properties of pigments are then considered, in particular, particle size and particle size distribution, are described in some detail, including the importance of oil absorption. The influences of particle size and size distribution on oil absorption are explained in some detail.

Several important aspects of pigment testing are also explained. These include pigment purity, tint strength and lightening power. This leads on to the optical properties of pigments. Colour principles, the nature of visible light and the optimum conditions needed for the assessment of colour are described along with the importance of colour standards. The problem of metamerism and how to minimise it are also described.

Finally, the module tackles the important area of health and safety and the hazards associated with the handling of pigments. Four types of pigment hazard are explained, and the section also covers the precautions, which must be taken to minimise any risk from these hazards.

Introduction to Module 203

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A number of important aspects of pigment testing are also explained. These include pigment purity, tint strength and lightening power. This leads on to the optical properties of pigments. Colour principles, the nature of visible light and the optimum conditions needed for the assessment of colour are described along with the importance of colour standards. The problem of metamerism and how to minimise it are also described.

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Structure of the Module

The module consists of a theory block of 4 sections, 1 CMA and 1 ASG.

The total study time will be approximately 7 hours, with additional time being required for the CMA and the ASG. Experience indicates that on average, the total time to complete this module will be of the order of 4 – 6 weeks.

Marks for the module are split as follows, CMA (20%), ASG (35%) and End Test (45%).

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.

You can wait until you have completed approx. three modules before sitting the end tests, as this will involve only one visit to the examination room, instead of approx. three.

Module Prerequisites

It will be a distinct advantage if students tackling this Module have already studied some science subjects to GCSE or GNVQ at an appropriate level.

A student should be currently employed within the Coatings Industry or be with a supplier to this Industry. Past relevant experience of employment within the industry would also be an advantage.

SAQs – Self Assessment Questions

Although these do not carry any marks for completion, nevertheless they are important to the student, as they show that the Section has been clearly understood.

The answers to SAQs may be found in Appendix 1.

CMA – Computer Marked Assessments

Full details of how to complete this important part of module 203 may be found in the general introduction, which accompanies all these modules.

ASG – Assignment

There is one ASG in Module 203. This is concerned with the measurement of the oil absorption of a pigment. The exercise should take 1 – 2 hours, and is fully described in Appendix 2 of the Module.

Module Objectives

When you have finished this module, you should be able to do the following:

Section 1 - Classify pigment types

- 1.1 Classify eight named pigments and extenders under the main headings of Inorganic and Organic pigments and the sub-headings of Natural and Synthetic pigments.

Section 2 - State the major properties of pigments

- 2.1 State the physical forms in which pigments may be available.
- 2.2 State the general properties of pigments as used in coatings systems.
- 2.3 Explain the importance of particle size and particle size distribution.
- 2.4 Understand the importance of pigment oil absorption and factors which affect it. Complete the ASG on this subject.
- 2.5 Determine the following pigment characteristics of supplied pigments using methods described in BS EN ISO 787 and BS 3483 and explain the significance of the results obtained:
 - moisture content
 - water-soluble content
 - tint strength of a pair of pigments
 - lightening power of a pair of pigments

Section 3 - Understand the optical properties of pigments

- 3.1 Define colour and illustrate, using a diagram, the three basic requirements of colour perception.
- 3.2 Describe the procedures for visual assessment concerning:
 - light
 - sample size
 - surface characteristics, and
 - eye fatigue
- 3.3 Understand the causes and types of Metamerism and how to avoid it.

Section 4 - Identify the four main hazards to health associated with the handling of pigments