

Study Guide

Module 201 – Level 2

General Overview of Coatings

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Summary

This foundation level module provides a general overview of paints, lacquers, varnishes, inks, powder coatings and related products used for coating surfaces. It defines what we mean by coatings technology and refers to the scientific principles on which it is based before introducing the various divisions of surface coatings. It then gives the reasons for using coatings before describing the functions of different types. Details of the components or raw materials used to make these coatings are then provided together with the properties these contribute. Reference is made to the growing importance of waterborne coatings.

The transformation from a liquid (or powder) state to an applied and cured film is explained in some detail together with a general review of the main methods of application.

The importance of health, safety and environmental issues involved in the coatings industry is explained, and reference made to relevant legislation on this subject. In particular, the annex at the back of the module, the Registration, Evaluation, Authorisation of Chemicals (REACH) which has had a major impact on the industry.

Module 201 is one of a series of 9 level 2 modules. Following a successful completion of this module, you may proceed to study further modules, selected on the basis of your needs, and leading to a technical certificate in coatings technology

Structure of the module

The module consists of a theory block of 5 sections, 1 CMA and 1 ASG. The theory block is split into four sections, which are not of equal length but should take, on average, about 2 hours to go through.

The module is designed to take about 10 hours of study for the theory block. This excludes the time taken to write up your report for the Assignment.

The 'Assignment' is explained in Appendix 2. A mirror module with an Assignment more suited to the printing industry is available under reference 201 ink.

If you have any problem with these discuss alternatives with either your Mentor or tutor.

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

Marks for the module

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|-----------------|-----|
| CMA answers | 20% |
| ASG | 35% |
| End Test (TMA)* | 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.

Module Pre-requisites

The main prerequisite, for persons taking this first Foundation Level module, is an interest in surface coatings. They will, preferably, be considering employment, be employed or had recent employment in the coatings or a related industry.

Module Objectives

Section 1.

Explain what is meant by coatings technology, state reasons for using coatings & describe the range and types of coatings and substrates commonly encountered.

- 1.1 Describe what we mean by paint technology and list the types of scientific principles upon which it is based. Define what we mean by paint.
- 1.2 List six functions of surface coatings.
- 1.3 Construct a diagram to show the sub-divisions of surface coatings into paints, powder paints, inks, metallic & inorganic coatings.
- 1.4 Describe common and contrasting features of paints and inks.
- 1.5 Explain the functions of the following types of coating: -primer, sealer, size, undercoat, surfacer, top or colour coat.

Section 2.

Explain the types of material used in coatings, their basic function and their main properties.

- 2.1 List the components of a surface coating composition.
- 2.2 **Describe** the functions of the components identified in 2.1.
- 2.3 Define convertible & non-convertible media and list some of the most widely used convertible media.
- 2.4 Understand the classification of media into categories based on the physical state.

Section 3.

Understand the mechanism of film formation.

- 3.1 Illustrate and Explain the mechanism of film formation by: -
 - a) Loss of volatile components by evaporation.
 - b) Loss of volatile components and coalescence.
 - c) Room temperature curing by oxidative polymerisation.
 - d) Room temperature curing by chemical reaction.
 - e) Thermal curing by oven.
 - f) Curing by radiation.
- 3.2 Explain the advantages & disadvantages of accelerating or retarding the drying and curing of coatings.
- 3.3 Define powder coatings and explain the difference between thermosets & thermoplastics with regard to stoving.

3.4 Compare the drying rates and/or curing modes of film formers. (ASG)

Section 4.

Understand the relative merits and usage of principal classes of media systems.

4.1 Formulation of coatings

4.2 Review & compare the relative merits and applications of non-convertible & convertible non-aqueous solution media.

4.3 Review & compare the relative merits and applications of non-aqueous and aqueous solution media.

4.4 Review of aqueous and non-aqueous dispersion media.

4.5 Review and compare the relative merits and applications of liquid solventless and powder media.

Section 5.

Understand the importance of Health, Safety & Environmental issues within the coatings industry & be aware of related legislation.

5.1 Understand the importance of Health, Safety & Environmental (HSE) issues within the coatings industry.

5.2 Be aware of HSE legislation relevant to the coatings industry.