

## **Intermediate Ink Module 315**

# **Ink Manufacture**

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### **Summary**

1. This module describes the way in which printing inks are manufactured and discusses the way in which the complex mixtures of raw materials are blended together in specific formulations. It also covers the quality control required to ensure that the final properties of the finished ink are within the limits of the specification suitable for a variety of different printing applications.
2. Emphasis will be placed on the methods used to obtain effective pigment dispersion into the grinding vehicle concentrating on the different types of equipment available for producing liquid and paste inks.
3. The module will also discuss trends in ink manufacture, along with the different types of equipment used at each stage of manufacture.

## **Introduction to Module 315**

This module describes the way in which different printing inks are manufactured and discusses the complex mixture of the raw materials that are blended together in a specific formulation to obtain the final properties required for different types of us printing application.

Emphasis will be placed on the methods used to obtain effective pigment dispersion into the grinding vehicle, and how that vehicle is chosen concentrating on the different types of equipment available for producing liquid and paste inks.

The module will also show how to scale up a laboratory formulation and determine the best method of manufacture for that ink.

Module 315 is one of a series of 22 modules at the Level 3 covering the Ink and Paint Industry from substrates through manufacturing and formulation to ancillary products.

All formulae contained within the module should be considered as examples and must not to be considered as commercially viable products. The BCF cannot accept responsibility for the performance of these formulations and the liability for all formulations derived from information contained within the module remain solely with the formulator. Machinery descriptions and diagrams are generic, and specific training should be undertaken for whichever equipment the student is using. Of course, appropriate health and safety precautions should be taken with any equipment and should be advised at the point of use.

## **Module Pre-requisites**

It is essential for students tackling this intermediate module to have already studied selected modules at foundation level, in particular, modules 204 and 209.

Chemistry and physics at GCSE, advanced level or equivalent would also be advantageous.

A student should be currently employed within the coatings industry or by a supplier to this industry.

However, any relevant experience within the industry would be advantageous.

## **Structure of the module**

The module consists of a theory block of 6 sections, 1 Computer marked assessment (CMA) and 1 Practical Attendance Exercise (PAX).

The total study time will be approximately 10hrs, with additional time being required for the CMA and the PAX Experience indicates that on average, the total time to complete this module will be in the order of 4 – 6 weeks.

Marks for the module are split as follows, CMA (20%), PAX (35%) and TMA (45%). For full certification, the CMA and the PAX must be completed satisfactorily, as well as the TMA or 'End Test'.

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.

We advise that you await the completion of three modules before sitting the TMA papers. In this way, you will only need to attend the test centre once instead of three times. Sitting an individual module test may be allowed under certain circumstances. Please contact the your tutor for further information.

## **SAQ – Self Assessment Questions**

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

The answers to S.A.Q.s may be found in Appendix 1.

## **PAX – Practical Attendance Exercise**

You are required to carry out the PAX in Module 315. Please discuss with your tutor, the PAX which is available for this module.

A reminder of how to fill in a PAX is given in the general introduction to the module.

## **CMA – Computer Marked Assessment**

The C.M.A. may be found on the website. Full details of how to complete this important part of the Module may be found in the general introduction to this module.

## **Module Objectives**

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

### **Section 1 Manufacturing processes**

- 1.1** Summarise different types of ink systems and their manufacture.
- 1.2** Explain the Manufacture of oleo-resinous systems.
- 1.3** Discuss the manufacture of UV curable inks and the need for temperature control.
- 1.4** Explain the manufacture of Polymer/ Solvent Resin Systems  
(Flexographic/Gravure Ink (Liquid Inks) and most screen inks)

### **Section 2 Basic stages of manufacture**

- 2.1** Discuss the importance of accurate weighing.
- 2.2** Explain why thorough premixing is essential.
- 2.3** Demonstrate the uses of different types of milling equipment. (PAX)
- 2.4** Explain why some inks have to be filtered.

### **Section 3 Types of Mixing Equipment used within the Industry**

- 3.1** Identify the different mixers used in ink manufacture and discuss their specific applications.
- 3.2** Identify and explain High-speed Mixing
- 3.3** Discuss the relationship between the size of the mixing head and the vessel diameter needed to obtain optimum mixing efficiency.

### **Section 4 Theory of manufacture including pigment dispersion**

- 4.1** Explain the general principles of the manufacture of pigmented systems
- 4.2** Explain the principles of pigment dispersion in liquid and paste inks.
- 4.3** Discuss manufacturing costs and how they relate to the finished product.

### **Section 5 Quality control in ink manufacture**

- 5.1** Explain the importance of quality control in ink manufacture.
- 5.2** Identify what short term ink testing is appropriate and explain why these rapid tests must be carried out.
- 5.3** Discuss the need for different types of rheological testing equipment.
- 5.4** Explain why longer term ink testing is required.

## **Section 6    Modern production trends**

- 6.1** Explain why computerisation is important in ink manufacture
- 6.2** Compare the different cost bases used to manufacture small and large batches of ink.
- 6.3** Discuss the pros and cons of ink plant maintenance.
- 6.4**            Discuss future requirements & possible trends.