

## Level 4 Modules: Intermediate

Module Title & Description	Module	Average Completion Time (Hrs)	BCF Member*	Non - Member*
<p><b>Solvents and Additives</b></p> <p>Module 403, is one of a series at Intermediate level dealing with the raw materials used in surface coatings. It introduces the solvents used in coatings and the additives or modifiers are used to control or modify the performance of coatings. Students requiring a more detailed study of additives should refer to the relevant Advanced level modules.</p> <p>This module begins by defining solvents, explains how they can be classified and then goes on to describe their characteristic properties.</p> <p>It then proceeds to a review of additives, starting with those used in the dispersion process of manufacture. Then, additives used to maintain product stability, after manufacture, are described, including both water- and solvent-based products. The general stability, skinning, pigment settlement, moisture absorbers and corrosion inhibitors are dealt with.</p>	403	10	£360	£525
<p><b>Media: Introduction and Manufacture of Media</b></p> <p>Module 404 introduces the different types of media used in surface coatings and how they may be classified. The formation of polymers is described and the mechanism of film formation by non-convertible and convertible media explained. A detailed description of some non-convertible media is given together with some information on their manufacture. This is supplemented by an overview of other non-convertible media.</p> <p>Two categories of convertible media are discussed in detail, including their manufacture. An overview of other convertible media is then provided.</p> <p>The final section contains an introduction to water-borne media and how resin polymers may be made water reducible.</p>	404	10	£360	£525
<p><b>Non-Convertible Media</b></p> <p>In this Intermediate Level Module naturally based and synthetic media are covered in some detail. After a discussion of the various film forming processes of non-convertible naturally based media ranging from shellac, nitrocellulose, plastisols and bitumens their properties and typical uses are outlined. The synthetic media described in this Module include acrylics, vinyl copolymer resins and emulsions.</p>	405	6	£360	£525
<p><b>Oils, Driers and Oleoresins</b></p> <p>In this Intermediate Level Module the major fatty acids found in various vegetable oils are listed. The properties of an oil are shown to derive from the particular combination of fatty acids they contain. Test methods to determine the properties of oils are given to enable them to be classified with regard to their drying potential.</p> <p>The importance of driers is stated and the composition and properties of the principal metallic derivatives of synthetic and Naphthenic acids given.</p> <p>Finally oleoresinous varnishes are discussed with the distinction between recent and synthetic hard resins being made.</p> <p>The formulae of resin is shown and the manufacture, composition and characteristics of hard resins obtainable from it are described. Some present day uses for these varnishes are given.</p>	406	8	£360	£525
<p><b>Convertible Media: Alkyds and Polyesters</b></p> <p>This Intermediate Level Module commences with the important topic of functionality and its significance to polymerisation.</p> <p>A polyester is described as the reaction product of polyfunctional acids and alcohols and examples given showing the difference between saturated and unsaturated resins.</p> <p>Alkyds are then discussed and their properties shown to relate to their oil content and the type of oil or fatty acid used. Their modification with vinyl monomers to give additional hardness and with polyamides to give thixotropy are described.</p> <p>Finally some important methods of introducing water solubility to resins and oils are described.</p>	407	13	£360	£525
<p><b>Acrylics and Aminos</b></p> <p>In this Intermediate Level Module thermoplastic and thermosetting acrylics are described. The monomers used to make these resins are listed and the significance of monomer choice on polymer hardness is shown.</p> <p>Of importance are the precaution that must be taken in handling and storage of acrylic monomers and these are given. The preparation of an acrylic resin is outlined and a typical plant to carry this out is illustrated.</p> <p>Also described are amino resins and their chemical structure..</p>	408	8	£360	£525

\* All Prices £ (ex VAT) as of October 2020

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<p><b>Epoxies and Urethane Resins</b></p> <p>In this Intermediate Module it is appropriate to discuss epoxy and urethane resin systems in two separate sections. One being one pack and the other two pack. Firstly the structure of an epoxy resin molecule is shown and the relationship between an epoxy ester and an oil based alkyd explained. This is followed by a description of urethane prepolymers and the reactions of isocyanates. The manufacture of urethane oils and moisture curing urethanes and typical uses follows. 2 pack applications of epoxy and urethane resins are then discussed. Reference is made to amine and amide curing of epoxies and the hydroxy containing materials capable of reaction with urethane prepolymers. The main characteristics and typical uses of such coatings are finally given.</p>	409	9	£360	£525
<p><b>Manufacture: Dispersion</b></p> <p>This module looks at the dispersion of pigments in media and at the techniques and mechanisms involved. Dispersion is the single most important and time-consuming operation in the manufacture of coatings. Poorly dispersed pigments produce an array of faults including settlement, poor opacity and low gloss in the finished product. The majority of investigative work in this area has been done using liquid coatings. Here we have included references to dispersion in coating powder media.</p>	417	8	£360	£525
<p><b>Manufacture: Flow</b></p> <p>Flow characteristics are of vital importance in coatings. The rheology of a formulation affects the efficiency of the dispersion process, the stability of the product and its packaging and transport. During application, flow has to be properly controlled to ensure that the coating is applied correctly and that the film then levels to give the desired finish. This module expands on the introduction to the subject made in Foundation Module 204 and investigates the key elements, which need to be controlled by formulators, production staff and users alike.</p>	418	10	£360	£525

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