

# CHEMICAL FORMULARY AND PRODUCT MANUFACTURING

## INTRODUCTION

Chemistry, as taught in our schools and colleges, concerns chiefly synthesis, analysis and engineering and properly so. It is part of the right foundation for the education of the chemist.

Many chemists entering an industry soon find that most of the products manufactured by his concern are not synthetic or definite chemical compounds, but are mixtures, blends or highly complex compounds of which he knows little or nothing. The literature in this field, if any, may be meagre, scattered or obsolete.

Even chemists with years of experience in one or more industries spend considerable time and effort in acquainting themselves with any new field which they may enter. Consulting chemists similarly have to solve problems brought to them from industries foreign to them. Sometimes industrialists who want to start new projects or diversify their units find it difficult to have already ideas or anticipate investment on machinery and equipment, raw materials and other expenditure and knowhow of the product. This course is the first major program of its kind in Ghana which offers just what you need to know for the manufacturing of any item of your choice.

With the advent of many small scale manufacturers in the Ghanaian industrial sector and the fact that many originated from non chemical executives and interested laymen, there is a definite need for an advisory body to educate on compilation of formulae, chemical compounding and treatment. This task has been taken up by ASQS. It is our interest to ensure that manufacturers and sellers of chemicals will acquire from this training course new formulation techniques and find new uses of raw materials for their products. Non chemical executives, professional men and interested laymen will make out of this training course "speaking acquaintance" with products which they may be using, trying or selling.

ASQS consultants have sort for and obtained the latest and best information on the topics and up to date compilation of formulae to be discussed in this program. This training course provides formulae tested and proven. The formulae given in this presentation will save chemists and allied workers much time and effort. The first part of this program is concerned with Chemical Formulary and Product Compounding. The former deals with the formulae and the latter with the steps for successful compounding. These include Figuring, Apparatus, Methods, Containers for compounding, Heating, Temperature Measurements, Mixing and Dissolving, Filtering and Clarification Decolorizing, Pulverizing and Grinding, Spoilage and Loss, Weighing and Measuring and Calculating cost etc.

The point next in importance is the packaging of the product manufactured. This section of the course provides requirements for packaging, labelling and tracing of products. This leads to the third point, the use of Good Manufacturing Practices (GMP) at all levels of production. The program is concluded with an introduction of delegates to the concepts of Standards, Models and Laws.

## Background

Chemical specialties are composed of pigments, gums, resins, solvents, oils, grease, fats, waxes, emulsifying agents, dyestuffs, perfumes, water, and chemicals of great diversity. To compound certain of these with some of the others requires definite and wellstudied procedures, any departure from which will inevitably result in failure. The steps for successful compounding are

given with the formulae. Follow them rigorously. If the directions require that (a) is added to (b), carry this out literally, and do not reverse the order. The preparation of an emulsion is often quite as tricky as the making of mayonnaise. In making mayonnaise, you add the oil to the egg, slowly, with constant and even stirring, if you do it correctly, you get mayonnaise. If you depart from any of these details: if you add the egg to the oil, pour the oil too quickly, or fail to stir regularly, the result is a complete disappointment. The same disappointment may be expected if the prescribed procedure of any other formulation is violated.

The point next in importance is the scrupulous use of the proper ingredients. Substitutions are sure to result in inferior quality, if not in complete failure. Use what the formula calls for. If a cheaper product is desired, do not prepare it by substituting a cheaper ingredient for the one prescribed: use a different formula. Not infrequently, a formula will call for an ingredient which is difficult to obtain. In such cases, either reject the formula or substitute a similar substance only after a preliminary experiment demonstrates its usability. There is a limit to which this rule may reasonably be extended. In some cases, substitution of an equivalent ingredient may be made legitimately. For example, when the formula calls for white wax (beeswax), yellow wax can be used if the colour of the finished product is a matter of secondary importance. Yellow beeswax can often replace white beeswax, making due allowance for colour, but paraffin wax will not replace beeswax, even though its light colour seems to place it above yellow beeswax.

And this leads to the third point: the use of good quality ingredients, and ingredients of the correct quality. Ordinary lanolin is not the same thing as anhydrous lanolin. The replacement of one with the other, weight for weight, will give discouragingly different results. Use exactly what the formula calls for: if you are not acquainted with the substance and you are in doubt as to just what is meant, discard the formula and use the one you understand. Buy your chemicals from reliable sources. Many ingredients are obtainable in a number of different grades: if the formula does not designate the grade, it is understood that the best grade is to be used. Remember that a formula and the directions can tell you only part of the story. Some skill is often required to attain success. Practice with a small batch in such cases until you are sure of your technique. Many examples can be cited. If the formula calls for steeping quince seed for 30 minutes in cold water, steeping for 1 hour may yield mucilage of too thin a consistency. The originator of the formula may have used a fresher grade of seed, or his conception of what 'cold' water means may be different from yours. You should have a feeling for the right degree of mucilaginousness, and if steeping the seed for 30 minutes fails to produce it, steep them longer until you get the right kind of mucilage. If you do not know what the right kind is, you will have to experiment until you find out. This is the reason for the recommendation to make small experimental batches until successful results are obtained. Another case is the use of dyestuffs of colouring lotions and the like. Dyes vary in strength; they are all very powerful in tinting value; it is not always easy to state in quantitative terms how much to use. You must establish the quantity by carefully adding minute quantities until you have the desired tint. Gum tragacanth is one of those products which can give much trouble. It varies widely in solubility and bodying power; the quantity listed in the formula may be entirely unsuitable for your grade of tragacanth. Therefore, correction is necessary, which can be made only after experiments with the available gum.

In short, if you are completely inexperienced, you can profit greatly by experimenting. Such products as mouth washes, hair tonics, and astringent lotions need little or no experience, because they are, as a rule, merely mixtures of simple liquid and solid ingredients, which dissolve without difficulty and the end product is a clear solution that is ready for use when mixed. However, face creams, tooth pastes, lubricating greases, wax polishes etc., whose formulation requires relatively elaborate procedure and which must have a definite final viscosity, need some skill and not infrequently some experience.