2 General approach to using surfactants in formulations

2.1 Introduction

There can be two quite different approaches to formulation because of the very different requirements of the market. There are basically two different market conditions:

1. Where there is a large volume market and the formulation will be sold for several years without significant change, e.g. a household detergent
2. Where the market is small and subject to change

In the first situation the potential profit on a single product can be very large and hence a detailed technical program can be initiated. Planned experiments on end effect, storage stability and environmental acceptability with comprehensive testing of various surfactants and of hundreds of formulations is feasible. Detailed examination of the properties of the surfactant is possible, new methods of analysis can be devised and more information is often obtained than that possessed by the supplier. The formulator then becomes to a large degree independent of the technical help from the supplier.

The picture is very different in the second situation. The potential profit is so much smaller that technical work has to be limited. The formulation is always required quickly, if not by the customer then at least by one’s own sales staff. The resources are generally very much more limited. The overall result is that the formulator becomes very dependent upon the supplier. His main contact from the supplier comes via a sales representative and the technical literature published by the company. The formulator will be hoping that someone can tell him all that the formulation requires together with all safety data and environmental acceptability. However in the case of surfactants, the formulator’s major problem is finding and choosing the supplier. As surfactants are often similar in effect, most suppliers will be promoting a particular surfactant. This product might well be the best product in that supplier’s range but is it the most cost effective product available on the market? In the first situation above, the technical department have the time and resources to search for the best surfactant. In the second situation, the formulator is dependent upon his own (sometimes literally) knowledge and in extreme circumstances has to make decisions in a matter of days.

The information in this book will not enable formulations to be quickly
made up but should help the formulator in choosing the right family of surfactants and posing the right questions to suppliers in order to identify the best surfactant to use.

There will be a reason for a new or modified formulation. This reason should be firmly established with other members of the company, e.g. the marketing department before commencing work as this reason can and does restrict the choice of surfactant. The most common reasons are:

- Meeting a new market requirement in terms of a completely new product
- Changing the physical characteristics of the formulation
- Improving the functional efficiency of a product
- Reducing costs of a formulation to meet competition
- Avoiding problems of human toxicity
- Avoiding problems of environmental acceptability
- Avoiding a patent

However the exact reason for the need of a new formulation may not be clear in detail or quantifiable. 'It doesn't work' or 'it's too expensive' are often the reasons given by the marketing department. They, however, have their problems and it is likely that the customer has been vague with them. There is no substitute for a meeting with the end user, even if the need is for a cheaper product, in order to identify the critical requirements of the product as seen by the user. Thus after the reason, i.e. the overall objective, is established, there is the need to establish the technical and economic target. The main factors are:

- The end effect (or function) desired and the conditions of use
- The costs to be met
- The physical form
- Restriction on safety in manufacture, handling, transport and use

The end effect and costs are generally related, a high cost product can be sold if it is very efficient, i.e. used in smaller quantities than the cheaper formulation.

In the case of changing an existing formulation, the situation can often arise that the original formulation has been unchanged for many years, the original formulator has retired and there are no detailed records of the development work leading to the formulation. This situation often arises where a company places great importance on the confidentiality of the formulations. Particularly where a formulation contains more than one surfactant, the functions performed by each individual surfactant may not be at all clear. There is now considerable evidence to show that mixtures of different surfactants do show synergistic properties so, if mixtures are present, not only must the properties of each surfactant be identified but also the interaction between them. When there is a need to change a complex formula, it may be simpler to start from basics rather than modify by trial and error.