Introduction

It goes without saying that a solvent will be chosen to do its job effectively and economically, and it is usually possible to choose a short list of solvents which will do this without requiring a large amount of experimental work provided that reference books, setting out the properties of commonly used solvents, are available.

Almost always the choice will lean towards a solvent that is already used on the site, or to one of which the researcher has experience.

Today, however, there are other criteria than solvent power and volatility which need to be considered. Regulations covering the exposure to solvent vapours of makers of the product and its users are much stricter than in times past and, as knowledge of the potential dangers improve, are likely to become even stricter. No longer is it possible to protect the makers and users by improved ventilation to draw the solvent fumes away and to discharge them, heavily diluted, into the atmosphere.

Solvents' effects on both high- and low-level ozone in the atmosphere are now unacceptable; although it is not widely appreciated by the general public that solvents contribute a large part of the volatile organic compounds (VOCs) in European industrial countries, as much as the whole arisings from road transport uses.

This has a significant influence on solvent choice, since any solvents that evaporate in industrial operations have either to be recaptured or destroyed rather than passing unchanged into the atmosphere. The economics of solvent choice may now allow an expensive solvent to be used many times over rather than a cheap one only once, always provided that the expensive one can be recovered in a fit state for reuse. A low-cost solvent may be difficult to destroy by incineration in an environmentally acceptable way, perhaps because its molecule contains chlorine, nitrogen or sulphur so that its disposal cost may exceed its purchase cost.

Another factor of considerable importance is the need to avoid changing the solvent to be used in a process. This even applies to the earliest stages of the development of a new product since the temptation to stay with a solvent that appears to be working well in the laboratory is great. The longer during the development stages that toxicity, environmental damage and overall economics are not considered in detail, the more difficult it is to make a change.

Once production is started long and difficult negotiations with regulatory bodies, which often need to re-approve an altered process, may be involved and a change of solvent becomes almost impossible.

All these considerations make the optimum selection of a solvent for a process a matter of importance. Fortunately much information is available in the literature concerning both the properties of the old solvents (e.g. benzene, carbon tetrachloride) which were often by-products of other processes and of the newer ones (e.g. tetrahydrofuran, dimethylacetamide) which are purpose-made for their desirable solvent effects.

This book is a collection of the physical properties of most commonly used solvents along with information on their behaviour in the environment during and after use and their health and fire hazards.