

# CHEMISTRY AND TECHNOLOGY OF AGROCHEMICAL FORMULATIONS

Edited by  
D.A. Knowles



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## **Chemistry and Technology of Agrochemical Formulations**

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## **3 Formulation of agrochemicals**

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### **3.1 Introduction**

Farmers and growers in all the main agricultural areas of the world rely very substantially upon crop protection chemicals to help them meet the ever-increasing demand for food and other materials such as natural fibres. The consumer continues to seek higher quality and greater variety of produce. Simple dusting powders and spray oil formulations have been used for many years to protect growing crops from weeds, pests and diseases. However, since the 1940s the chemical industry has endeavoured to satisfy the demands of farmers and growers for increased crop yield and quality by the continuous development and introduction of crop protection chemicals into the international market place. Today, there is an effective herbicide, insecticide or fungicide to combat almost every significant problem faced by the modern farmer and grower.

This development has led to a need for a wide range of product formulations, additives and process technology to accommodate the variety of physical and chemical properties of the pesticide active ingredients. For example, water-soluble active ingredients may be prepared as aqueous solutions or powder formulations, whereas oily liquid active ingredients are usually formulated as hydrocarbon solvent-based emulsifiable concentrates. Active ingredients which have very low solubility in either water or hydrocarbon oils may be formulated as suspensions, powders or water-dispersible granules [1].

In the 1980s and 1990s, pressure from government authorities and the consumer highlighted a need for products and formulations which are safer and more convenient to use, more effective at much lower application rates, less toxic to non-target species and more environmentally friendly.

By far the most important method of application of agrochemicals is by spraying, usually with water but occasionally with oils as the principal carrier. Formulations are also made for direct application to the soil or for treating seeds before planting, and for protecting stored crops from various pests and diseases (fungi, insects or rodents), which in some countries could destroy as much as 30–40% of the harvest.

Pesticidal active ingredients encompass a broad range of chemicals, each with its unique chemical and physical properties and mode of action. The main categories of pesticides are herbicides, insecticides, fungicides, plant

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