

Michael E. Aulton

CHAPTER CONTENTS

| | |
|---|----|
| Introduction | 20 |
| Definition of terms | 21 |
| Solution, solubility and dissolution | 21 |
| Process of dissolution | 21 |
| Dissolution mechanisms | 21 |
| Energy/work changes during dissolution | 23 |
| Dissolution rates of solids in liquids | 23 |
| Factors affecting the rate of dissolution | 24 |
| Intrinsic dissolution rate | 26 |
| Measurement of dissolution rates of drugs from dosage forms | 26 |
| Solubility | 27 |
| Methods of expressing solubility and concentration | 27 |
| Expressions of concentration | 27 |
| Solubility of solids in liquids | 29 |
| Solubility of gases in liquids | 34 |
| Solubility of liquids in liquids | 34 |
| Blending | 35 |
| Distribution of solutes between immiscible liquids | 36 |
| Solubility of solids in solids | 36 |
| Summary | 37 |
| References | 37 |
| Bibliography | 37 |

KEY POINTS

- Dissolution rate and solubility are two separate properties. While a chemical with a fast dissolution rate often has a high solubility (and vice versa), this is not always the case. The differences are explained in the chapter.
- The process of dissolution involves a molecule, ion or atom of a solid entering a liquid phase in which the solid is immersed.
- The rate of dissolution is controlled either by the speed of removal of the molecule, ion or atom from the solid surface or by the rate of diffusion of that moiety through a boundary layer that surrounds the solid.
- Various factors influence the rate of diffusion of a solute through boundary layers. Some of these may be manipulated by the formulator.
- It is important for the formulator to be aware of the parameters which affect the solubility of a solid in a liquid phase.
- The dissolution rate and solubility of solids in liquids, gases in liquids and liquids in liquids are each important to pharmaceutical science and these are discussed.

Introduction

Solutions are encountered frequently in pharmaceutical development, either as a dosage form in their own right or as a clinical trials material. Additionally, almost all drugs function in solution in the body.