Although many different instruments for coagulation tests are available (see Section 41 on automation) and in use throughout the world, the manual tilt-tube technique is still employed successfully by many centres. Even where automation is in use, it may be necessary to perform some tests manually because of the incompatibility of occasional samples and the particular instrument in use. This may be the case in the presence of grossly elevated plasma lipid concentrations, in the analysis of icteric samples, or where the clot formation pattern in the sample differs markedly from normal samples, particularly when the fibrinogen concentration is markedly reduced.

Manual clotting tests are best performed in glass tubes. A convenient size is 75 × 10 mm. Different types of glass can be used successfully, but they may influence the clotting times obtained, particularly in screening tests such as activated partial thromboplastin time (APTT). If the source (manufacturer or composition) of test tubes is changed, the possibility that results have been influenced should be considered. This could be done by comparing a small number of tests, such as APTT, with the two types of tube. If systematic differences are present, a new normal range should be established. Washing of test tubes for re-use should be avoided when possible.

Because of the many variables and possible sources of contamination associated with manual techniques, these should involve duplicate tests. In any case, if clotting times of duplicate tests differ by more than 10%, the test should be repeated.

When using manual tilt-tube technique, the following features are important:

- Reagents must be pre-warmed to 37°C for at least five minutes before use in clotting tests.
- Mixtures of test plasma and reagent should be mixed immediately after addition of the last component of the mixture by rapid controlled shaking of the test tube for one to two seconds, and a stop-watch started simultaneously.
- The mixture should then be tilted through 90° three times every five seconds under observation while recording the clotting time. This procedure is shown in Figure 6.1, opposite.
• The test tube should be immersed in a 37°C (±0.5°C) water bath between tilting operations so that the base of the test tube is approximately 3-4 cm below the surface, to help maintain the temperature of the incubation mixture as close to 37°C as possible.

• The clotting mixture should be scrutinized visually under an Anglepoise lamp or similar light source and the clotting time recorded.

Figure 6.1. Manual tilt-tube technique for tests of coagulation