APPLICATION NOTE

DEVELOPMENT OF PHARMACEUTICAL PRODUCTS

The stability of pharmaceutical products is one of the key parameters for good quality product in order to make sure that it is safe for the patient (product dose, risk of embolism, etc.). Moreover, the large range of product forms available (dispersion, cream, aerosol, *etc.*) and storage conditions make the stability tests long and tedious. Finally, the important number of components in these products leads to a complex interpretation of the data obtained *via* classical analytical techniques.

Application 1: Development of nanodrug

× **Common method:**

Drug delivery is using more and more nano-carriers in order to improve the targeted release and therefore avoid side effects as much as possible. When developing a new formulation it is important to have as much information as possible on the product in order to be able to anticipate possible stability issues. However, bottle tests do not give much information on the instability taking place and it is therefore necessary to use other analytical techniques. Particle size analysers usually require important dilution and this can be a problem in the understanding of the physico-chemical interactions taking place.

× **Turbiscan® method:**

The Turbiscan enables to identify and monitor destabilisation phenomena (migration or particle size variation) in complex systems as it measures macroscopic parameters directly related to the concentration and the particle size of the system. The coupling of transmission and backscattering detectors enables to work on all kind of systems, shall they contain very small particles (nano range), shall they be diluted of concentrated. Therefore, it helps explaining the destabilisation mechanism by determining which instability is taking place in the system and to evaluate its intensity in an objective and traceable way.

Using the Turbiscan, product developments are not only shortened but also documented and contain many information helping the formulator to understand his products.

Application 2: Long term stability analysis

× **Common method:**

The stability analyses of pharmaceutical products are done by visual observation of samples stored at low (+4°C), ambient and high (+35 to +50°C) temperatures during up to several years, depending on the temperature. The subjectivity of these tests, which highly depend on the operator, and their lack of traceability lead to tedious and sometimes poor quality results. Moreover, as it is necessary to wait all this time before releasing a new formulation to the production, the development times are long.

Stability tests are therefore subjective and constitute a long time process that is more and more incompatible with the requirements of the development.

× **Turbiscan® method:**

The Turbiscan AGS is a fully automated ageing station, which enables to store samples at three different temperatures (from ambient to +60°C) and to perform analyses on its own (from the measurement to the data processing). The analysis is done *via* a Turbiscan LA*b* that identifies and quantifies instability phenomena. Once a correlation has been established between the Turbiscan® and the classical techniques, a warning level can be set in the software, detecting automatically the products that are not fulfilling the requirements. Detection of instability can be done in less than two weeks.

Using the Turbiscan AGS, the stability tests of pharmaceutical products are accelerated up to 50 times, enabling to increase the development capacity for new products and to improve their reliability.

APPLICATION NOTE

Application 3: Aggregation of drug suspensions

× **Common method:**

It is difficult to avoid completely the sedimentation of the particles, because of obvious density differences between solid drug and water. However, if it is not a problem to shake the vial before use (eye drop, vaccine, etc.), it can become a problem if the particles are aggregated at the bottom and cannot be redisperse easily. This packing phenomenon can be quite difficult to measure when the test is done only through visual observation.

× **Turbiscan® method:**

The Turbiscan can be used to assess the packing of a sediment in addition to the information obtained on its re-dispersibility. The shape of the sedimentation profiles described whether there is packing or not. This dispersibility analysis is performed by measuring the sample before any sedimentation has occurred and after re-dispersion of the settled suspension. If the backscattered level measured is the same in both cases, we can conclude that the sediment is not aggregated and can be re-dispersed easily.

The Turbiscan enables to get a quick and objective measurement of the sedimentation behaviour of suspension drugs.

The Turbiscan finds applications in the whole field of a pharmaceutical products, from the nano-systems, to the emulsions (simple or multiple) or suspensions. It is a flexible and useful technique, which enables to shorten the analyses and to perform objective and traceable measurements.