

Evaluation of solid dispersions by DSC

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Theory

The low water solubility of APIs is currently one of the biggest problems in drug formulation. A successful method for increasing the solubility of APIs in water can be a formulation of solid dispersions. The API is dispersed in a polymer carrier, the resulting dispersion being more soluble than the crystalline substance itself. The API may be present in the carrier in amorphous form (suspended) or molecularly dispersed (dissolved). Examples of polymeric carriers which can be used are poly(vinylpyrrolidone), hypromellose, copolymers of acrylic acid derivatives, polyethylene glycols, poloxamers, PLGA and others. Solid dispersions are classified according to the carrier used (crystalline carrier, amorphous carrier, surfactant polymer, water-insoluble polymer), dispersity (homogeneous or heterogeneous solid dispersions), preparation method (melting or dissolving followed by solvent evaporation).

Material and instrument

Polymer

API

Aids: aluminum crucible for DSC

Instruments: DSC 200 F3 Maia[®]

analytical balance $d = 0,0001 \text{ mg}$

Method

1. Prepare samples for DSC measurements:

On an analytical balance, weigh an aluminum crucible with a lid and record the weight.

Weigh about 10 mg of test material into the crucible and record the weight.

Calculate the weight of the test material.

2. Thermal analysis on DSC:

Place the measured and reference sample (empty cup) in the instrument.

In the instrument SW, select a measurement template with a temperature mode suitable for the material being tested.

Enter the required parameters and start the measurement.

3. Use SW Protheus Analysis to evaluate the T_g/T_m values and export the thermogram.

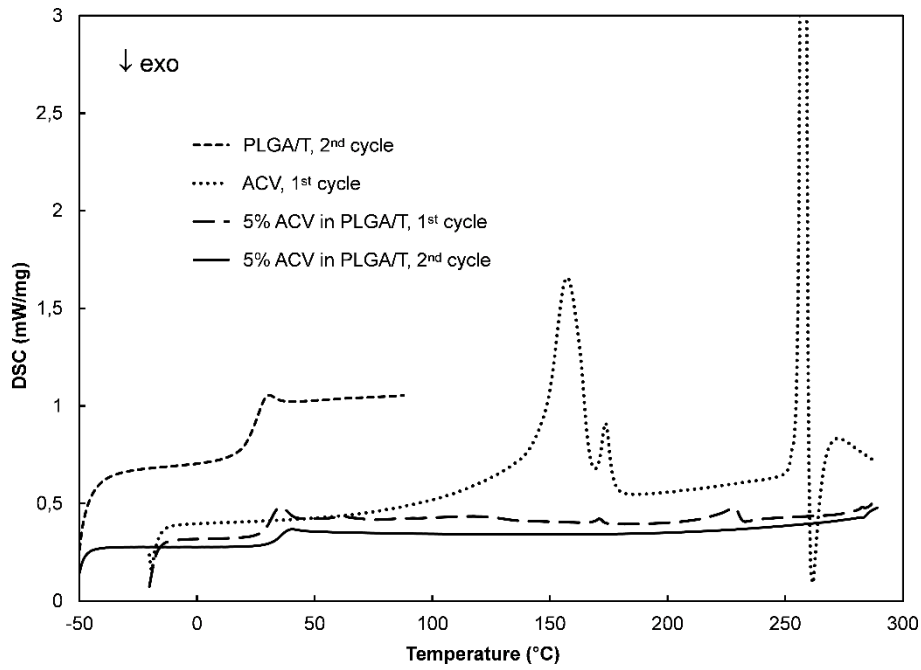


Figure 1. DSC scans of polymer (PLGA/T short-dashed line), drug (ACV dotted line), and solid dispersion (long-dashed and full line).

Conclusion

Compare the thermal characteristics of the drug, polymer carrier, and solid dispersion. Determine the form in which the drug is incorporated in the polymeric carrier. Explain the advantage of solid dispersions.

DSC measurement protocol

Student's name:

Instrument:

Sample:

weight of an aluminum crucible with a lid	
weight of an aluminum crucible with a lid and sample	
weight of the sample	

Temperature mode:

DSC scan: