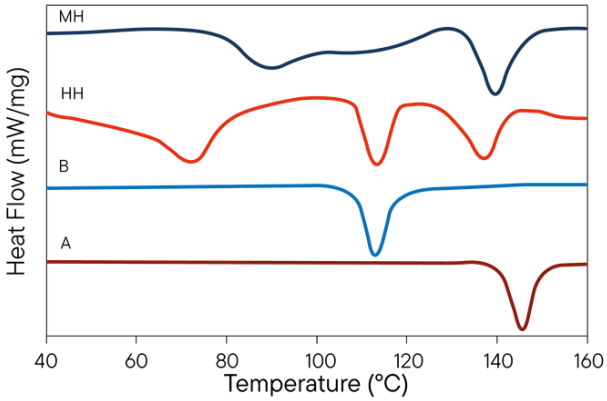
Thermal Analysis of Praziquantel Hydrates

DSC L63 Analysis of Heat-Induced Solid-State Transformations

Praziquantel (PZQ) can exist in different polymorphic and hydrated solid forms, which strongly influence its pharmaceutical properties and dissolution behavior. In this study, the LINSEIS DSC L63 was used to investigate the thermal behavior of praziquantel Forms A and B as well as its hemihydrate (HH) and monohydrate (MH). The DSC measurements reveal characteristic dehydration, phase transformation and melting events, enabling the different solid forms and their thermally induced transformations to be distinguished.

Measurement Setup

- Instrument: LINSEIS DSC L63
- Material: Praziquantel (PZQ)
- Temperature Range: 30–170 °C
- Heating Rate: 10 K/min
- Atmosphere: Nitrogen
- Gas Flow: 50 ml/min
- Application: Pharmaceutical Polymorph & Hydrate Analysis



The DSC thermograms clearly distinguish the thermal behavior of the different praziquantel solid forms.
Key observations include:

- MH dehydration starts at approx. 78 °C
- HH shows dehydration from approx. 60 °C
- HH subsequently transforms via Form B to Form A
- Characteristic melting events distinguish Forms A and B

The characteristic thermal transitions enable reliable differentiation and characterization of the praziquantel solid forms.

Interpretation

The observed behavior can be attributed to:

- Loss of crystal-bound water
- Different crystalline structures
- Heat-induced polymorphic transformations

This results in:

- Clear differentiation of solid forms
- Identification of dehydration pathways
- Reliable assessment of thermal stability

Industrial Relevance

DSC analysis of pharmaceutical solid forms supports:

- Pharmaceutical development
- Polymorph screening
- Hydrate characterization
- Thermal stability assessment
- Process optimization
- Quality control

Conclusion

The LINSEIS DSC L63 enables reliable characterization of the thermal behavior of different praziquantel solid forms. Distinct dehydration, phase transformation and melting events allow the hydrate and anhydrous forms to be clearly differentiated. In particular, the measurements reveal different transformation pathways for the hemihydrate and monohydrate, demonstrating the importance of DSC for understanding the thermal stability of pharmaceutical polymorphs and hydrates. These insights support solid-form selection, process development and quality control in pharmaceutical applications.

Source:
Salazar-Rojas, D., Kaufman, T.S., Maggio, R.M.
A study of the heat-mediated phase transformations of praziquantel hydrates. Evaluation of their impact on the dissolution rate.
Heliyon, 8 (2022), e11317.
Adapted from differential scanning calorimetry measurements performed using a LINSEIS PT1000 (now designated as LINSEIS DSC L63).