AutoEvaluation of DSC Curves: The New OIT Function

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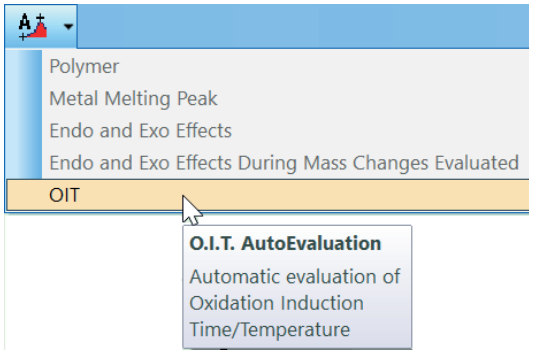
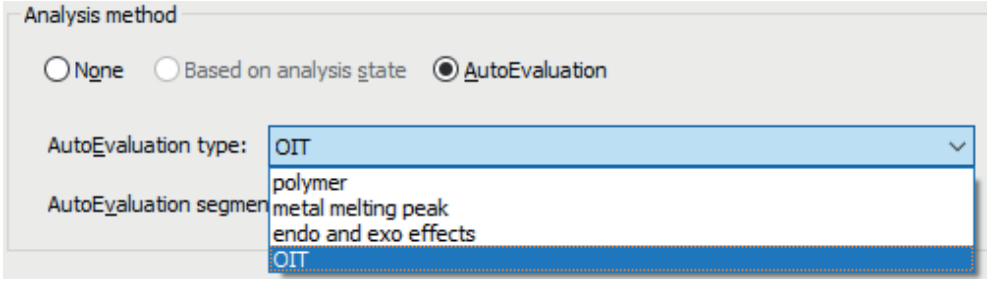
As of *Proteus*® version 9.0, a new *AutoEvaluation* function is available for DSC signals: OIT. The abbreviation OIT stands – depending on the temperature program – for Oxidative Induction Time or Oxidative Induction Temperature as described in detail, for example, in DSC standard ASTM D 3895 or ISO 11357-6. The function can be accessed via the icon shown in figure 1, via right mouse click on a DSC curve, or via the Evaluation menu.

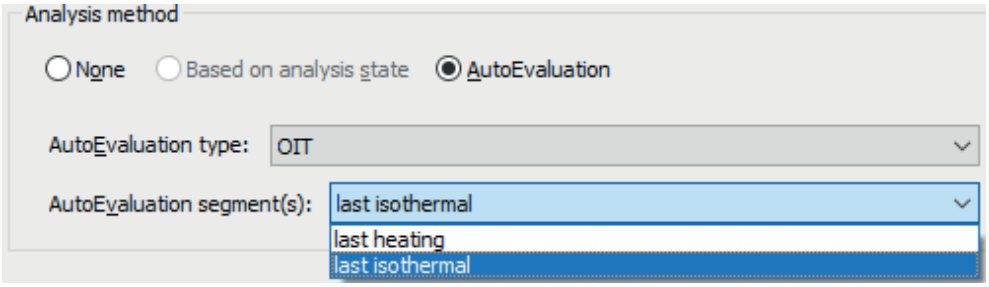


1 *AutoEvalution* software icon of DSC Curves in *Proteus*® analysis

In general, *AutoEvaluation* functions can also be incorporated into a measurement method which may be created either in the *Proteus*® measurement or analysis software (see figures 2a and 2b). When such a method was used, *AutoEvaluation* will be carried out automatically as soon as a measurement is finished or a measurement is loaded into *Proteus*® analysis.



2a When creating a method, an *AutoEvalution* type can be selected



2b For each *AutoEvalution* type selected, the segments to be evaluated must be defined

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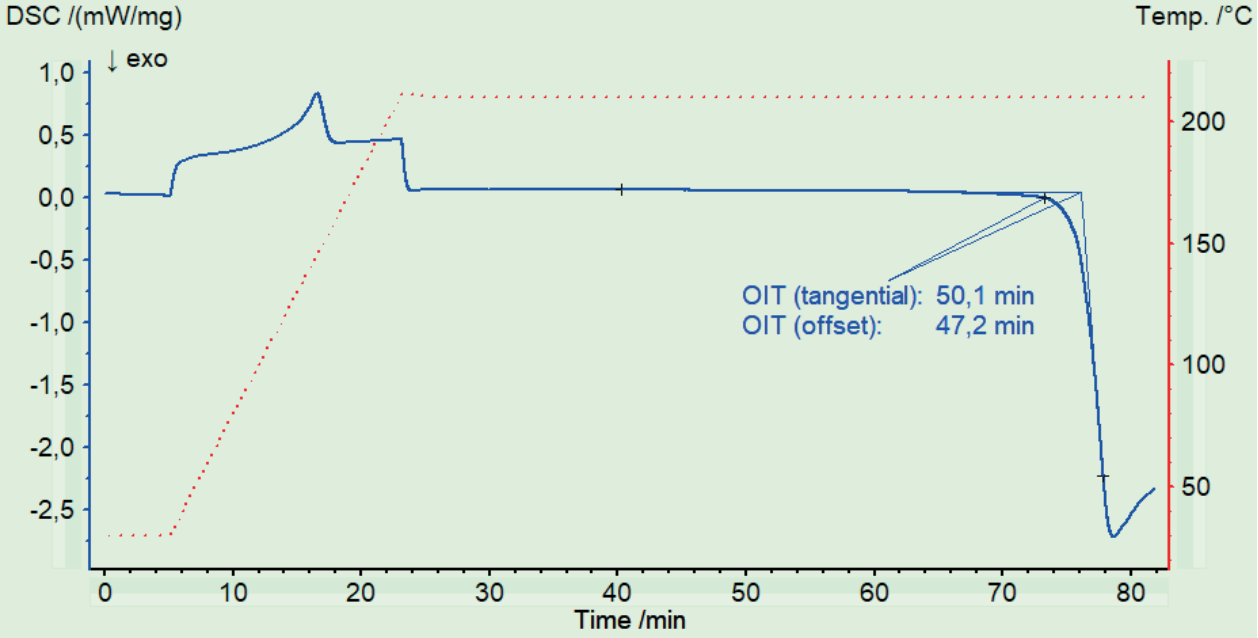
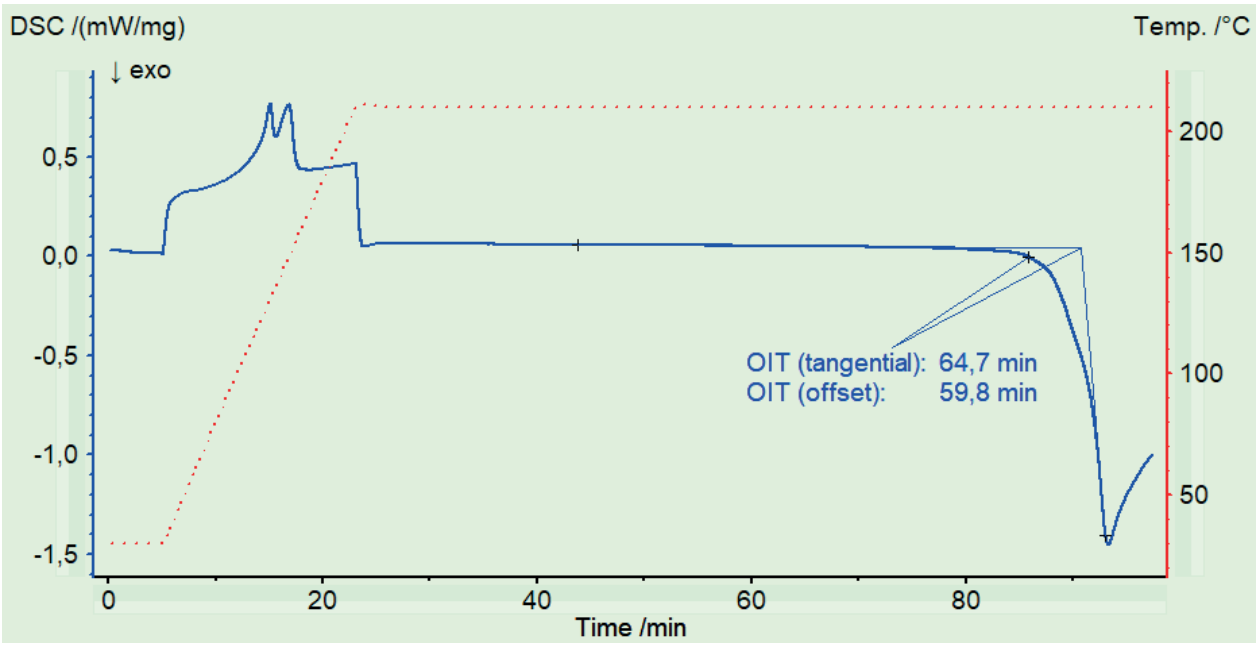
Shown in figures 3a and 3b are Oxidative Induction Time (OIT) measurements on two different polymers; *AutoEvaluation* was applied, respectively. The OIT times, which can also be evaluated manually, are beginning from the start of the last (isothermal) segment, where the gas atmosphere was switched to an oxidative one.



3a Examplary results of *AutoEvaluation* of an Oxidative-Induction Time (OIT) measurement on a polymer. Standard shape where the tangential result is preferred (see text)



3b Exemplary results of *AutoEvaluation* of an Oxidative Induction Time (OIT) measruement on a polymer. "Leading edge" shape where the offset result is preferred (see text)

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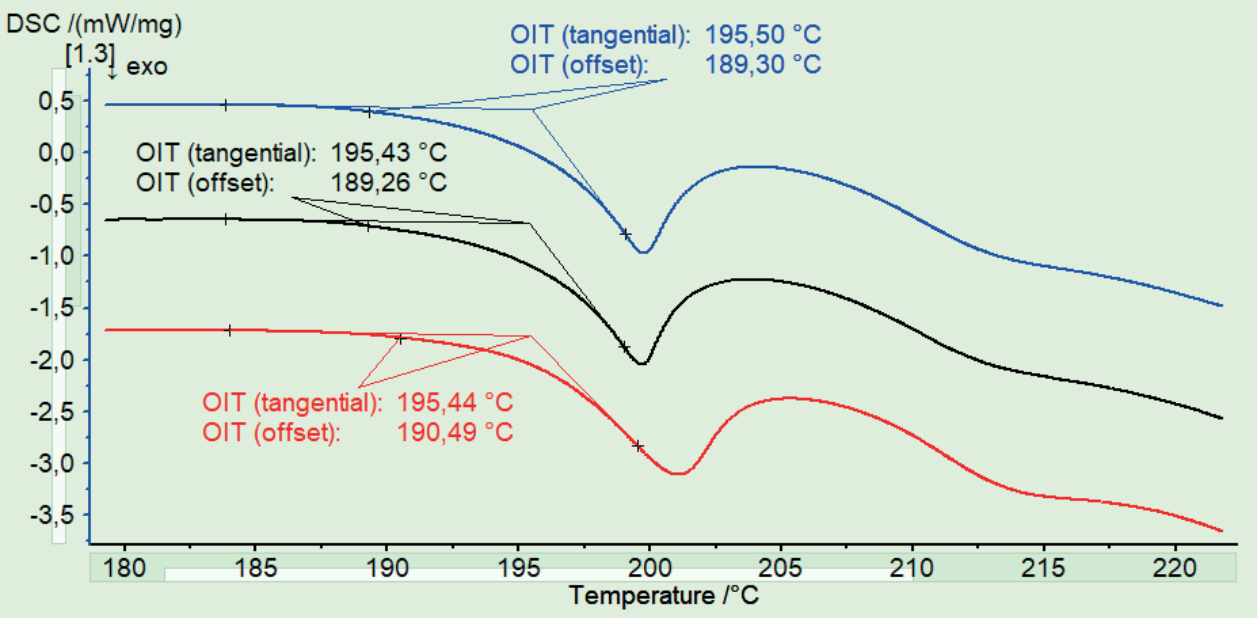
Figure 4 displays Oxidative Induction Temperature (OIT) measurements. Three samples of the same polymer material were heated to 230°C at 5 K/min. *AutoEvaluation* was in this case applied for all measurements at once, revealing the oxidative induction temperatures.

A further innovation regarding OIT evaluation in general is the choice between two results displayed in figures 3 and 4: OIT values calculated from the tangential and/or from the offset method (see DSC standard ASTM D 3895 or ISO 11357-6). The usual OIT (tangential) value, which results from the intersection of the left and right tangent, is preferred if there are no fore effects. The OIT (offset) value, which is recommended in case of fore effects ("leading edges"), is the point where the DSC curve is 0.05 mW/mg below the left tangent. Of course, the tangents can be recalculated manually in any case.



4 Examplary results of *AutoEvaluation* of Oxidative-Induction Temperature (OIT) measurements. The curves were shifted in y-direction for clarity.

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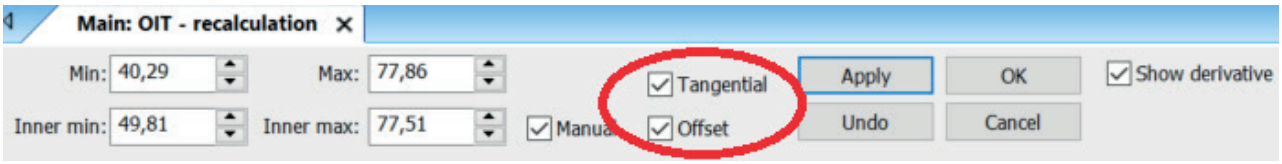
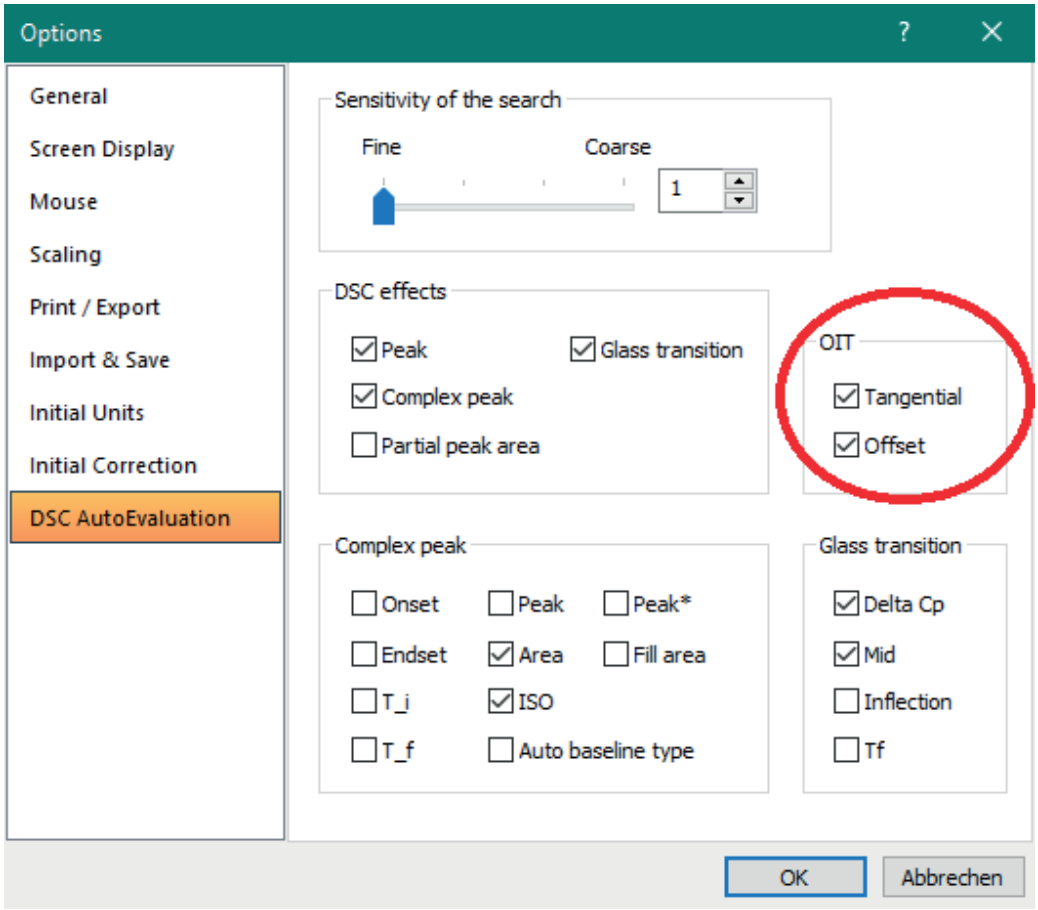
Which OIT results are displayed can be selected in the OIT evaluation dialogue (see figure 5) and also from the menu Evaluation/AutoEvaluation/Settings (see figure 6) in *Proteus*® analysis.



5 OIT evaluation dialog



6 Settings for *AutoEvaluation* accessible in the Evaluation/AutoEvaluation/Settings menu in *Proteus*® analysis

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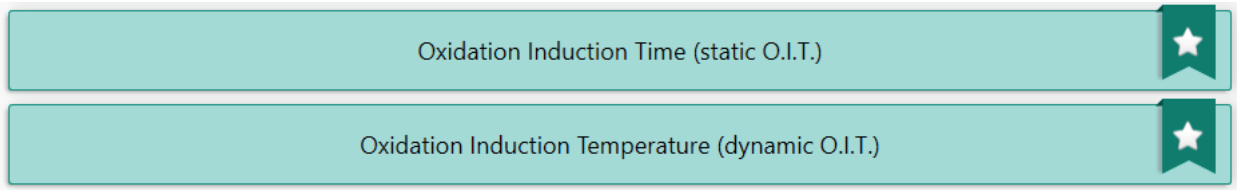
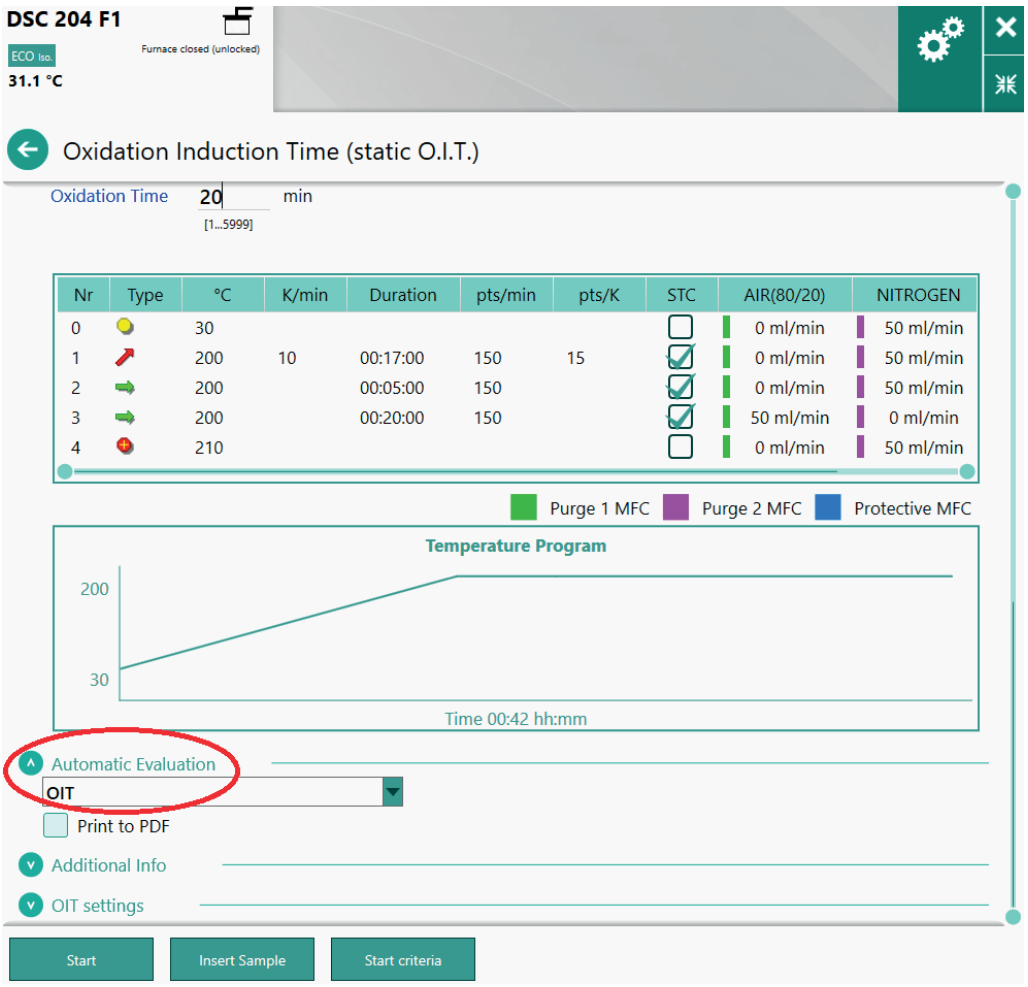
Finally, it should be noted that the *SmartMode* measurement software offers OIT Wizards (see figure 7) and also *AutoEvaluation* OIT (see figure 8).



7 OIT wizards available in the *SmartMode* evaluation software



8 OIT Wizard availalbe in the *SmartMode* measurement software with choice of *AutoEvaluation*

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