

## Wax Appearance Temperature (WAT) determination of crude oils using the DSC technique

### Introduction

The wax appearance temperature (WAT), also known as the cloud point, is an important characteristic to evaluate the possible wax precipitation of a given fluid. It is defined as the temperature at which a crude oil first precipitates. In the petroleum industry, such wax depositions in pipelines and reservoirs can lead to many issues, including a reduced flow or even a blocked pipeline, with subsequent important production problems. Different techniques have been developed to measure the WAT of a crude oil but the method using DSC is commonly used for its rapidity, convenience and accuracy.

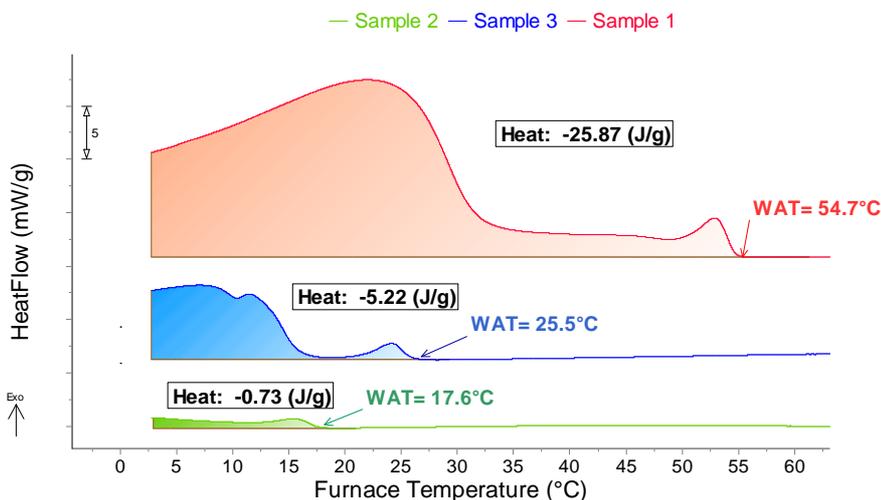


Figure 1 – Wax precipitation peaks of the three samples

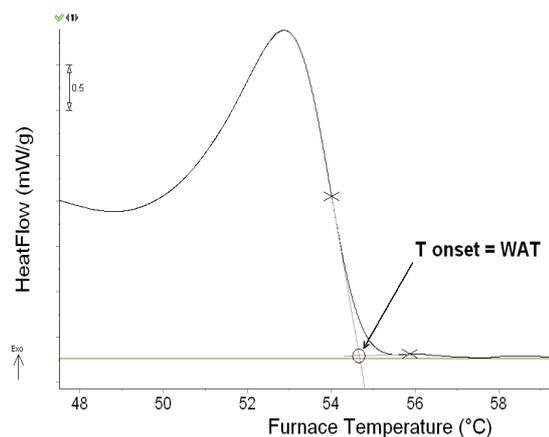


Figure 2 – WAT determination

### Experimental

Approximately 600 mg of three different oils were introduced in  $\mu$ DSC7 Evo batch vessels. After a heating phase up to 80°C, the samples were cooled down from 80°C to 0°C at 1°C/min. To calculate the WAT, the onset temperature of the first peak has been considered (intersection of the baseline and the tangent at the first peak inflection point), see figure 2.

### Results

For each sample, one or two exothermic peaks were recorded corresponding to the crystallization of waxes.

Sample	T <sup>o</sup> onset (WAT)	Heat (J/g)
1	54.7°C	-25,87
2	17.6°C	-0,73
3	25.5°C	-5,22

Table 1 – Results of peaks integrations

Providing the knowledge of the heat of crystallization of the “pure” waxes, Calisto™ data treatment software can determine the percentage of converted wax versus temperature.

$\mu$ DSC7 evo  
-45 °C to 120°C



www.setaram.com  
sales@setaram.com

