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# Preparation of solubility curve using Paracetamol

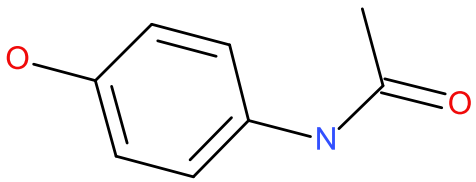
## Experiment

Using Crystal16, we created a solubility curve (Van't Hoff curve) using Paracetamol as a sample compound.

*Information on sample compound

### Paracetamol (Acetaminophen)

CAS No.: 103-90-2
Chemical formula : C8H9NO2
Molecular weight: 151.169
Solubility: 14 mg/mL (25°C); Literature value




## 1. Preparation of measurement sample

The following four samples (solvent: water) for measurement were prepared. The basis (weight) value should be the amount by which a solution can be obtained within the measurement temperature range (2°C to 85°C), with reference to the solubility mentioned above.
The temperature at the precipitation time is also measured so the precipitation should also be detected within the above temperature range.
After the preparation was completed, the sample was set in Reactor A of Crystal16.

| 1. 40.0 mg/mL | 2. 70.0 mg/mL | 3. 100.0 mg/mL | 4. 150.0 mg/mL |
|---|---|---|---|

## 2. Selection of measurement conditions

Start at 2°C. Raise the temperature at 5°C/min to 85°C. Then, lower the temperature 4°C/min. Agitation speed: 700 rpm. Measurement time is 55 minutes. The actual measurement was carried out using an inert gas with a dew point indication at -10°C.

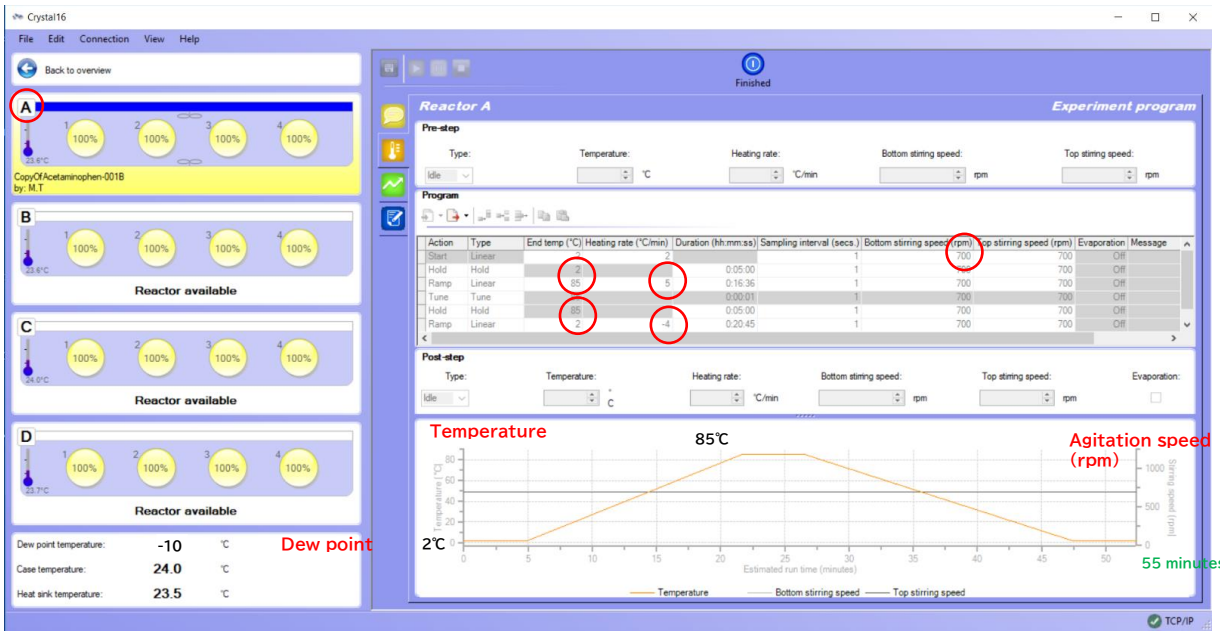



Figure 1: Measurement condition selection screen

# 3. Measurement results

The dissolution and precipitation phenomena of the samples at 4 concentrations in a 55-minute measurement are shown here.

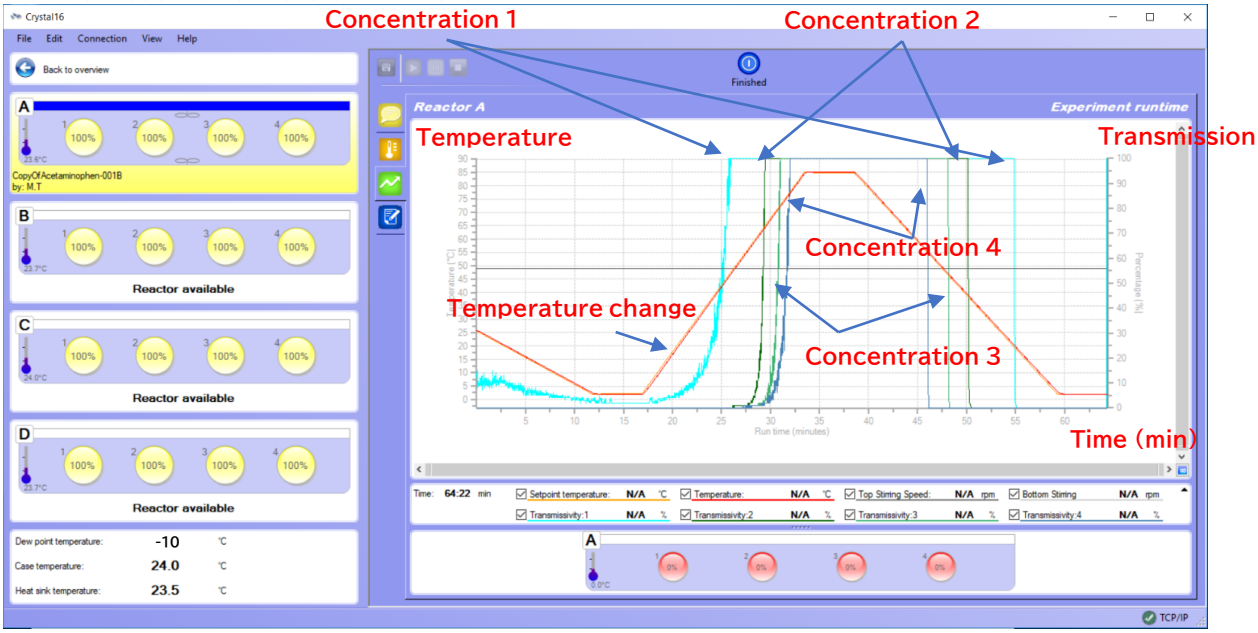



Figure 2: Display screen of measurement results

# 4. Data analysis (Crystalclear)

The raw data from the main unit was sent to the dedicated analysis software (Crystalclear) where data analysis was performed. Below are the results for the first of the four vials. The dissolution temperature and the precipitation start temperature were obtained. The same procedure was conducted for the remaining vials.

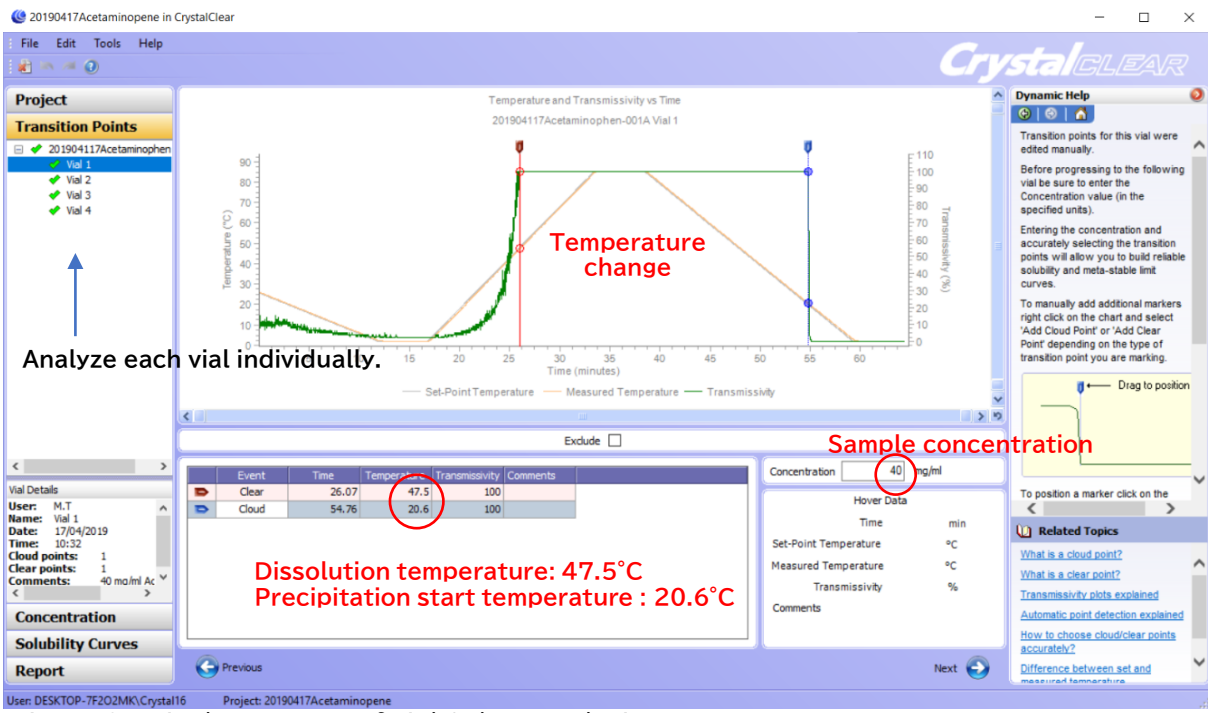



Figure 3 : Display screen of vial 1 data analysis

# Results

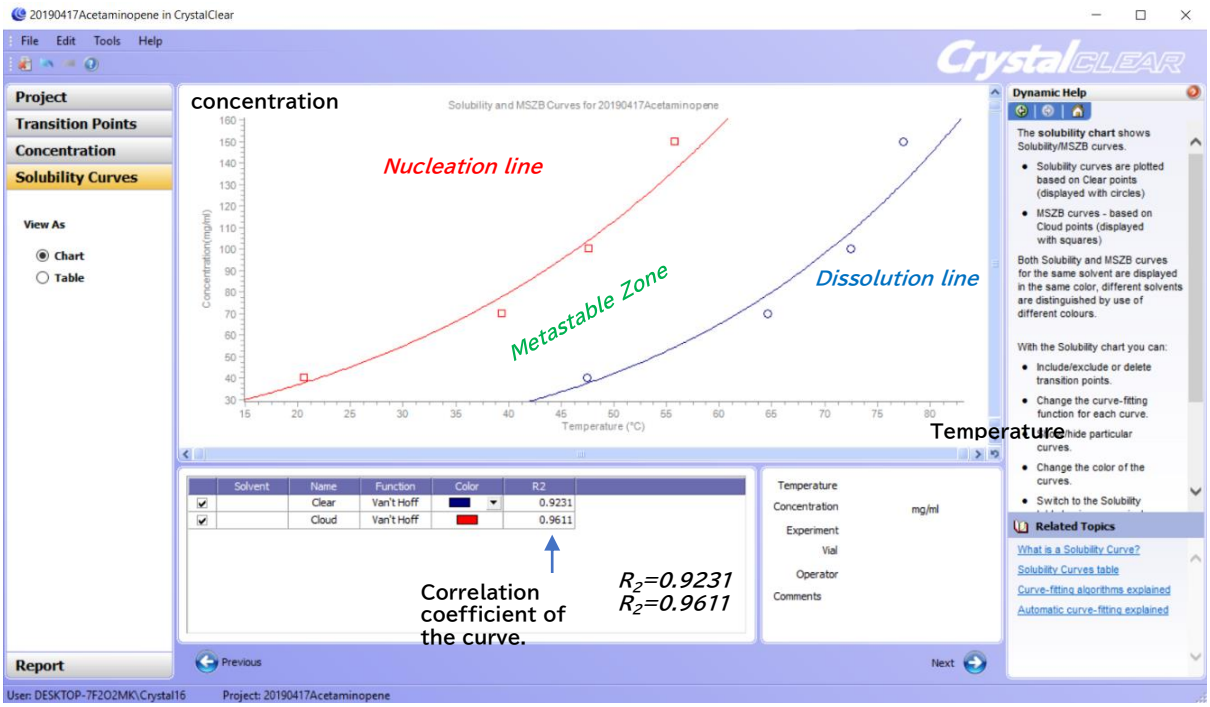



Figure 4 : Solubility curve for Paracetamol

# Report (Word format)

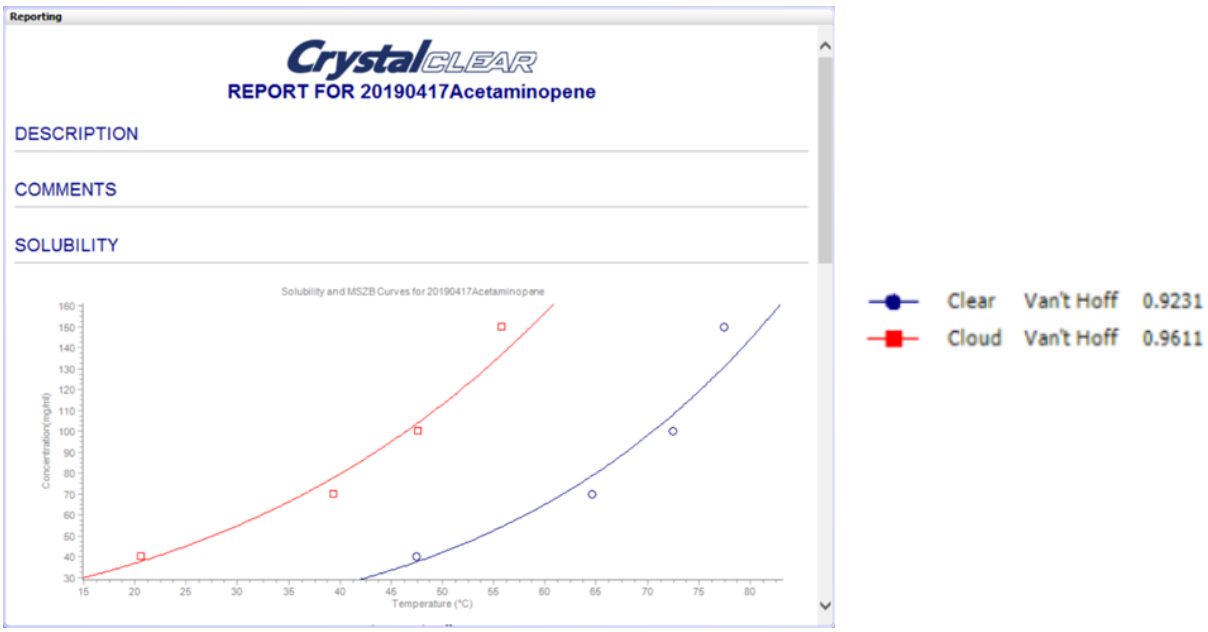



Figure 5 : Solubility and Meta-Stable Limit Curves

Reporting

## EXPERIMENT SUMMARY

The following experiments were used to create the presented solubility and/or meta-stable limit curves.

| Experiment | Vial | Concentration [mg/ml] | Solvent |
|---|---|---|---|
| 201904117Acetaminophen-001A | 1 | 40 | |
| 201904117Acetaminophen-001A | 2 | 70 | |
| 201904117Acetaminophen-001A | 3 | 100 | |
| 201904117Acetaminophen-001A | 4 | 150 | |

Sample concentration

## TRANSITION POINTS

Clear

| Concentration [mg/ml] | Temperature [°C] | Experiment | Vial | Time [min] |
|---|---|---|---|---|
| 40 | 47.5 | 201904117Acetaminophen-001A | 1 | 26.07 |
| 70 | 64.6 | 201904117Acetaminophen-001A | 2 | 29.50 |
| 100 | 72.5 | 201904117Acetaminophen-001A | 3 | 31.07 |
| 150 | 77.5 | 201904117Acetaminophen-001A | 4 | 32.04 |

Cloud

| Concentration [mg/ml] | Temperature [°C] | Experiment | Vial | Time [min] |
|---|---|---|---|---|
| 40 | 20.6 | 201904117Acetaminophen-001A | 1 | 54.76 |
| 70 | 39.4 | 201904117Acetaminophen-001A | 2 | 50.06 |
| 100 | 47.6 | 201904117Acetaminophen-001A | 3 | 48.00 |
| 150 | 55.8 | 201904117Acetaminophen-001A | 4 | 45.95 |

## FITTED CURVES

- Clear

| | |
|---|---|
| Function | Van't Hoff |
| Coefficients | exp(18.1932+(-4667.9117)/(x+273)) |
| Colour | |

← Dissolution

- Cloud

| | |
|---|---|
| Function | Van't Hoff |
| Coefficients | exp(15.6429+(-3526.0165)/(x+273)) |
| Colour | |

← Precipitation

## CRYSTAL 16 SOURCE FILES

The following table presents a summary of the Crystal 16 source files for this project:

| Experiment | User | Date/Time | Filename |
|---|---|---|---|
| 201904117Acetaminophen-001A | M.T | 17-Apr-2019 10:32:15 | 201904117Acetaminophen-001A.csv |

## REPORT GENERATION

This report was generated by the CrystalClear software package, a product of Avantium Technologies.
For support and purchasing queries related to CrystalClear please contact Avantium at www.avantium.com
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