

# Natural waxes

## Release agent for plastic

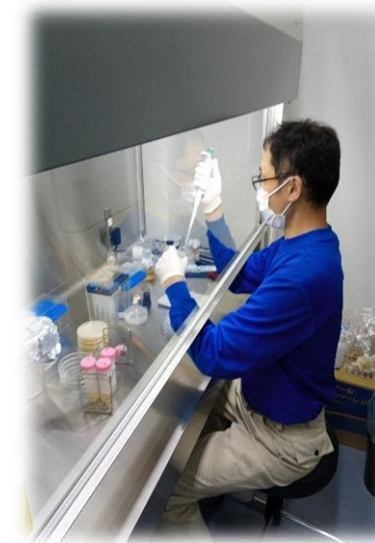
- ✓ Sustainable material
- ✓ Biological material
- ✓ Eco-friendly / Green material

- Company profile (P3~6)
- Natural wax list (P7~14)
- Release agent for plastic (P15~24)



| Company       | TOA KASEI CO., LTD.                                                                                            |
|---------------|----------------------------------------------------------------------------------------------------------------|
| President     | Takeshi Asai                                                                                                   |
| Found         | 10 <sup>th</sup> March in 1913                                                                                 |
| Established   | 29 <sup>th</sup> August in 1952                                                                                |
| Location      | Osaka head office<br>Tokyo office<br>Seoul office<br>Aikawa wax factory<br>Higashi-Osaka warehouse             |
| Certification | ISO9001, 14001                                                                                                 |
| Features      | ▪ Our wax has been approved for severe quality application like semiconductor encapsulant, cosmetics and food. |

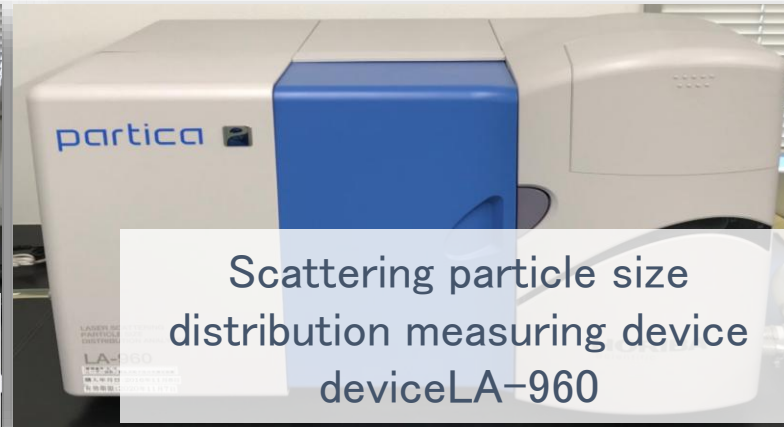
## Aikawa wax plant



- Careful selection of raw materials by quality control
- Up to 1200t/a can be produced
- Can be refined and processed with original technology and equipment
- Responding to a wide range of individual customer needs



Thermal Analyzer  
DSC 6200 TG/DTA 6200



Scattering particle size  
distribution measuring device  
device LA-960



Gas chromatography  
GC-2010 Plus Plus



Spectrophotometer  
UV-1850



Granulator

|      |                                                                 |
|------|-----------------------------------------------------------------|
| 1913 | Opened joint-stock company “Matsunami sho-ten”                  |
| 1982 | Increased capital stock to 10 million JPY                       |
| 1993 | Opened Tokyo branch                                             |
| 2000 | Established Aikawa factory                                      |
| 2007 | Passed <b>ISO Certification 14001</b>                           |
| 2012 | Passed <b>ISO Certification 9001</b>                            |
| 2013 | Our Centennial anniversary                                      |
| 2015 | Received award as an Excellent Corporation from East Tax Office |
| 2020 | Established Higashi Osaka warehouse                             |

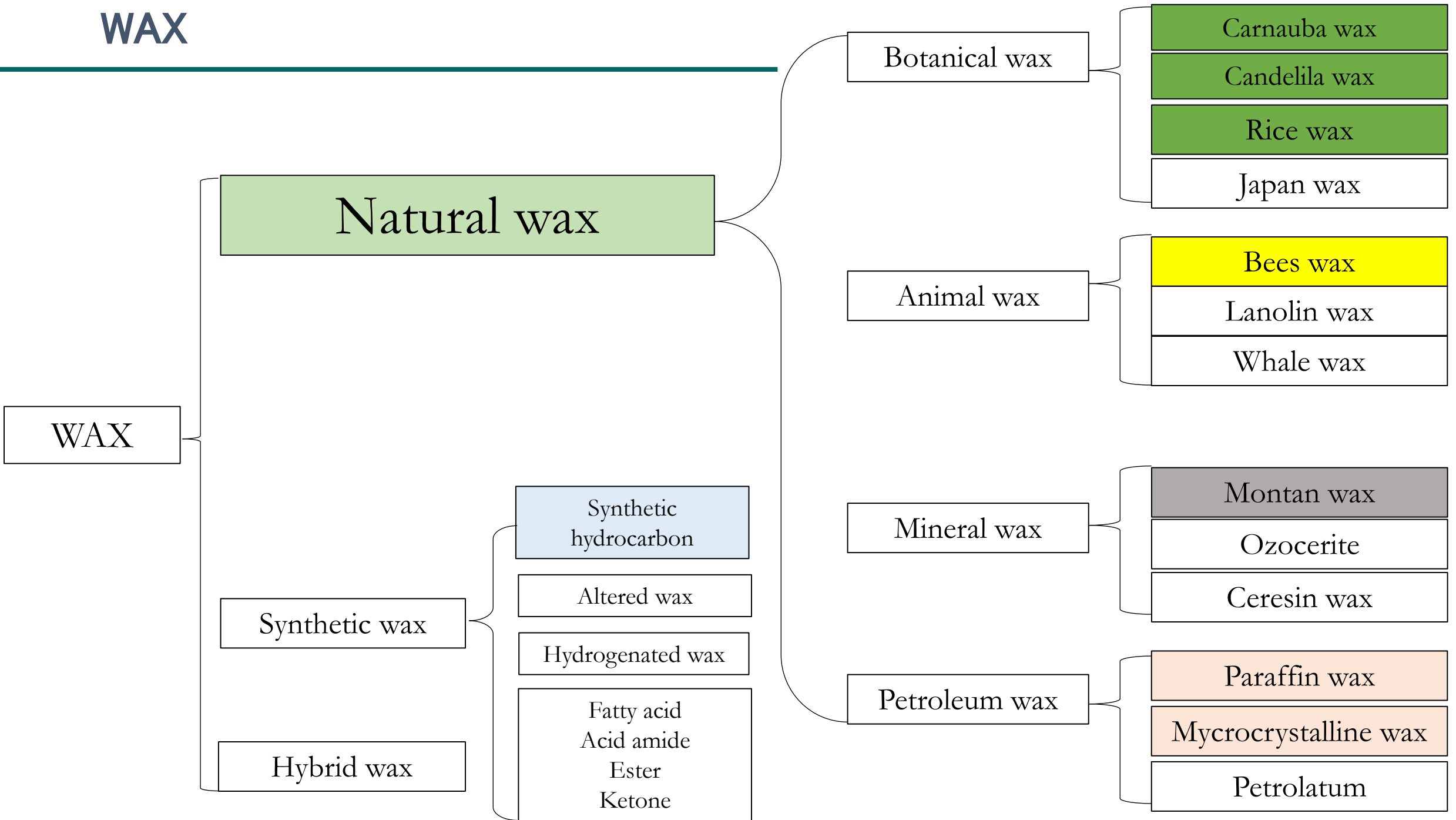
## Main Customers



## Main Partners



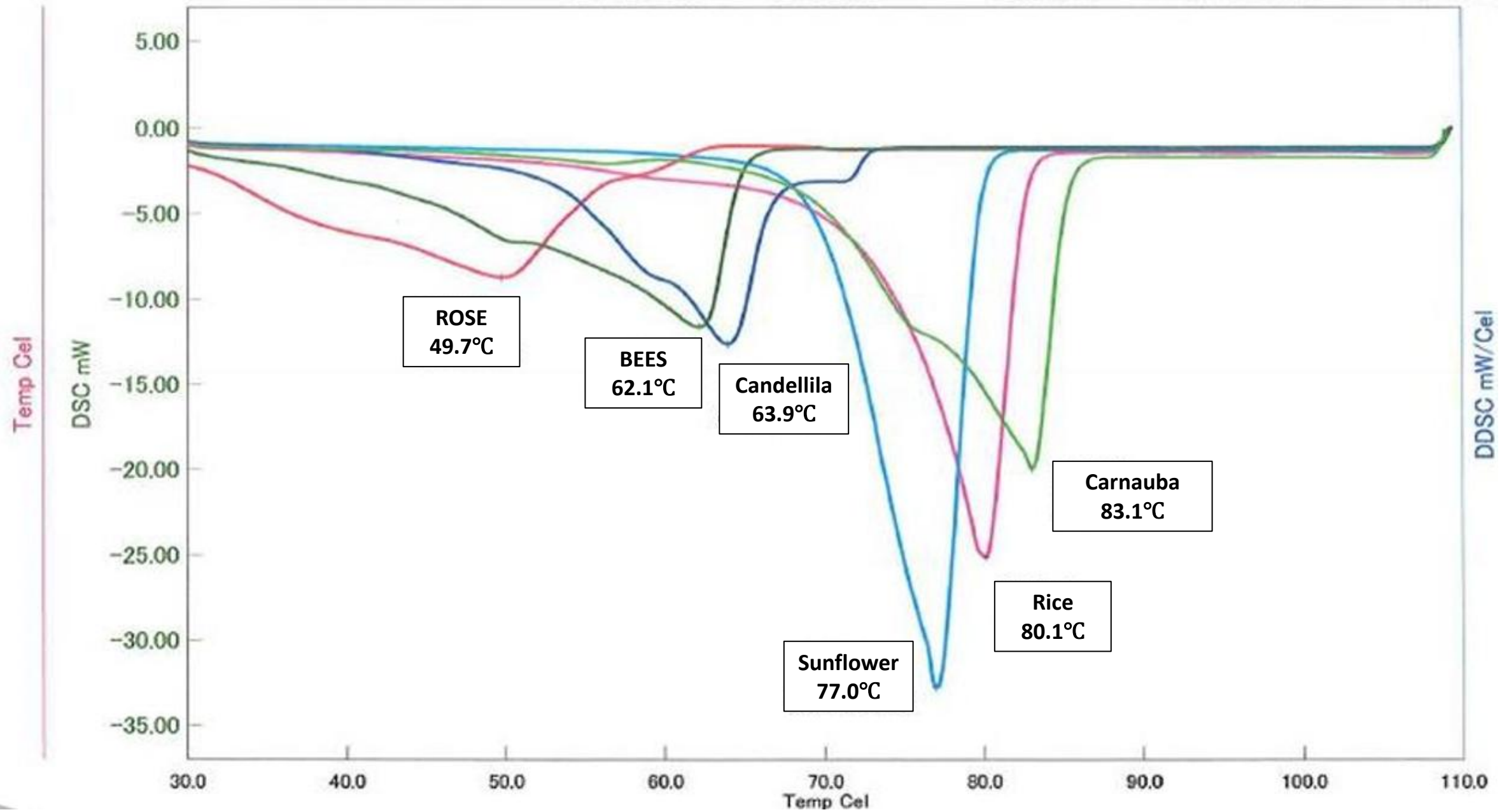
# WAX



# Compositions of natural wax

|                        | CANDELILLA WAX                                                                                                                                                                                                                                                               | CARNAUBA WAX                                                                                                                                                                                                                                                                                                                                                                                                                                           | RICE WAX                                                                                                                                                                                                                                                                                                                                                                                                                                       | JAPAN WAX                                                                                                                                                                                                                                                                                                                      |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ESTER</b>           | <p>24~30% <math>C_{42} \sim C_{56}</math></p> <p>ALCOHOL : <math>C_{30}</math>、<math>C_{32}</math>、<math>C_{34}</math></p> <p>FATTY ACID : <math>C_{16} \sim C_{34}</math></p> <p>MAINLY <math>C_{20}</math>、<math>C_{32}</math>、<math>C_{33}</math>、<math>C_{34}</math></p> | <p>80~85% <math>C_{48} \sim C_{64}</math></p> <p>ALCOHOL <math>C_{20} \sim C_{34}</math></p> <p>MAINLY <math>C_{30}</math>、<math>C_{32}</math>、<math>C_{34}</math></p> <p>50%~60% <math>C_{32}</math></p> <p>FATTY ACID : <math>C_{14} \sim C_{34}</math></p> <p>MAINLY <math>C_{20}</math>、<math>C_{22}</math>、<math>C_{24}</math>、<math>C_{26}</math>、<math>C_{28}</math></p> <p>30~35% HYDROXY ACID<br/>ESTER IT COUSES<br/>IMPROVING EMULSIVE.</p> | <p>93~97% : mainly <math>C_{32}</math></p> <p>ALCOHOL <math>C_{22} \sim C_{36}</math><br/>(MAINLY <math>C_{26}</math>、<math>C_{28}</math>、<math>C_{30}</math>)</p> <p>FATTY ACID <math>C_{16} \sim C_{34}</math></p> <p>MAINLY <math>C_{22}</math>、<math>C_{24}</math>、<math>C_{26}</math></p> <p>LITTLE QUANTITY <math>C_{28}</math>、<math>C_{30}</math>、<math>C_{32}</math></p> <p>OTHERS:<br/>CYCLIC ALCOHOL ESTER<br/>FATTY ACID ESTER</p> | <p>MONOBASIC ACID<br/>GLYCERIDE<br/><u>90~91%</u></p> <p><math>C_{16}</math>、<math>C_{18}</math>、<math>C_{20}</math>、<math>C_{24}</math>、<br/>72~82% <math>C_{16}</math></p> <p>OTHERS <math>C_{18:1}</math>、<math>C_{18:2}</math></p> <p>DIBASIC ACID<br/>GLYCERIDE<br/><u>3~6.5%</u><br/><math>C_{20} \sim C_{22}</math></p> |
| <b>FREE FATTY ACID</b> | <p><u>10~20%</u> <math>C_{20} \sim C_{35}</math></p> <p>(ALMOST <math>C_{30}</math>、<math>C_{32}</math>、<math>C_{34}</math>)</p>                                                                                                                                             | <p><u>3~4%</u> <math>C_{16} \sim C_{32}</math></p> <p>MAINLY <math>C_{20}</math>、<math>C_{26}</math>、<math>C_{28}</math>、<math>C_{30}</math></p>                                                                                                                                                                                                                                                                                                       | <p><u>4~7%</u></p> <p><math>C_{16}</math>、<math>C_{18}</math>、<math>C_{18:1}</math>、<math>C_{18:2}</math><br/>(MAINLY <math>C_{16}</math>)</p>                                                                                                                                                                                                                                                                                                 | <p><u>3. 7~5.6%</u></p> <p><math>C_9</math>、<math>C_{16}</math>、<math>C_{18:1}</math>、<math>C_{18:2}</math><br/>(MAINLY <math>C_{18:2}</math>)</p>                                                                                                                                                                             |
| <b>FREE ALCOHOL</b>    | <p><u>10~15%</u> <math>C_{26} \sim C_{34}</math></p> <p>(MAINLY <math>C_{28} \sim C_{32}</math>)</p> <p>OTHERS:<br/>STEROL, NEUTRAL RESIN.<br/>ODD — NUMBERD ALCOHOL</p>                                                                                                     | <p><u>10~12%</u> <math>C_{16} \sim C_{32}</math></p>                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                | <p><u>1.2~1.6%</u></p> <p><math>C_{20}</math>、<math>C_{26}</math>、<math>C_{30}</math> etc.</p>                                                                                                                                                                                                                                 |
| <b>HYDROCARBON</b>     | <p><u>40~45%</u> <math>C_{28} \sim C_{33}</math></p> <p>(ABOUT 70% <math>C_{31}</math>)</p>                                                                                                                                                                                  | <p><u>1~3%</u> <math>C_{20} \sim C_{33}</math></p> <p>(MAINLY <math>C_{27}</math>、<math>C_{29}</math>、<math>C_{31}</math>)</p>                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                |

# DSC chart



- Rice bran wax is excellent in glossiness, plasticity, lubricity and formability.
- The wax has a narrow carbon range of ester. So differential thermal analysis shows a sharp endothermic reaction.

【Application】 Tonner / Release agent for plastic / textile auxiliaries

| Product name | Acid value<br>(mg/g) | Saponification<br>value(mg/g) | Iodine value<br>(g/100g) | Melting<br>point(°C) | Shape<br>Color/Others |
|--------------|----------------------|-------------------------------|--------------------------|----------------------|-----------------------|
| TOWAX-3F15   | 10 $\geq$            | 70~95                         | 13 $\geq$                | 77~83                | Light<br>Yellow       |
| TOWAX-3F17   | 10 $\geq$            | 70~95                         | 13 $\geq$                | 77~83                | Light<br>Yellow       |
| TOWAX-3F18   | 8 $\geq$             | 70~95                         | 15 $\geq$                | 77~83                | Light<br>Yellow       |
| TOWAX-3F19   | 10 $\geq$            | 70~95                         | 13 $\geq$                | 77~83                | Whitish               |
| TOWAX-3F20   | 58.7                 | 78.3                          | 10.2                     | 73.9                 | Light<br>Yellow       |



- Carnauba wax is most excellent in luster, glossiness, hardness and microcrystalline in natural waxes.
- The wax is also excellent in dispersibility and emulsifiability.

【Application】 Release agent for plastic and encapsulant, toner, thermal ink, paint, textile oil

| Product name | Acid value<br>(mg/g) | Saponification<br>value(mg/g) | Iodine value<br>(g/100g) | Melting<br>point(°C) |
|--------------|----------------------|-------------------------------|--------------------------|----------------------|
| TOWAX-131    | 10 $\geq$            | 78~95                         | 5~14                     | 80~86                |
| TOWAX-132    | 10 $\geq$            | 78~95                         | 5~14                     | 80~86                |
| TOWAX-143    | 10 $\geq$            | 78~95                         | 5~14                     | 80~86                |
| TOWAX-171    | 10 $\geq$            | 78~95                         | 5~14                     | 80~86                |



- Candelilla wax is excellent in  
gloss, hardness, tenacity, film thickness uniformity and moisture resistance.

【Application】 Additives for plastic and rubber, inked ribbon, floor polish, adhesive, food additives

| Product name | Acid value<br>(mg/g) | Saponification<br>value(mg/g) | Iodine<br>value<br>(g/100g) | Melting<br>point(°C) |
|--------------|----------------------|-------------------------------|-----------------------------|----------------------|
| TOWAX-4F2    | 12～22                | 43～65                         | 10～22                       | 68～73                |
| TOWAX-4P4    | 12～22                | 43～65                         | 10～22                       | 68～73                |



- Bees wax is excellent in emulsifiability, tenacity and microcrystalline.

【Application】 Release agent for transparent plastic, cosmetic, lost-wax casting

| Product name | Acid value<br>(mg/g) | Saponification<br>value(mg/g) | Iodine value<br>(g/100g) | Melting<br>point(°C) |
|--------------|----------------------|-------------------------------|--------------------------|----------------------|
| AR-100       | 10 $\geq$            | —                             | 3 $\sim$ 15              | 78 $\sim$ 85         |



- We could narrow material properties with natural waxes in comparison to synthetic waxes.
- Customizing our wax products to meet each customer's request.

| Product name | Acid value (mg/g) | Saponification value(mg/g) | Iodine value (g/100g) | Melting point(°C) | Features                                                                                                                  |
|--------------|-------------------|----------------------------|-----------------------|-------------------|---------------------------------------------------------------------------------------------------------------------------|
| TOWAX-125    | $8 \geq$          | 75~95                      | $15 \geq$             | 79~85             | <ul style="list-style-type: none"><li>▪ Natural wax base</li><li>▪ low viscosity , hard</li></ul>                         |
| TOWAX-541    | $10 \geq$         | —                          | 3~15                  | 78~85             | <ul style="list-style-type: none"><li>▪ Natural wax base</li><li>▪ High heat-resistance</li><li>▪ Low viscosity</li></ul> |



# Release agent for resin

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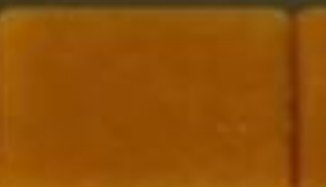
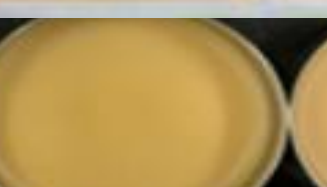


- ✓ Sustainable material
- ✓ Biological material
- ✓ Eco-friendly / Green material



# Release agent for resin

| Product name               | Composition                                      | Acid value<br>(mg KOH/g) | Saponifica<br>tion value<br>(mg KOH/g) | Iodine<br>value | Melting<br>point<br>(°C) | Others       | Features                                                                                                        |
|----------------------------|--------------------------------------------------|--------------------------|----------------------------------------|-----------------|--------------------------|--------------|-----------------------------------------------------------------------------------------------------------------|
| TOWAX-3F17                 | Rice bran wax                                    | 5.5                      | 77.3                                   | 7.6             | 79.3                     | FDA<br>REACH | <ul style="list-style-type: none"> <li>Highly purified grade</li> <li>Sharp melting point</li> </ul>            |
| <b>NEW</b><br>TOWAX-3F19   | Rice bran wax                                    | 8.8                      | 78.9                                   | 7.0             | 78.1                     | FDA<br>REACH | <ul style="list-style-type: none"> <li>Highly purified grade</li> <li><b>Whitish</b></li> </ul>                 |
| TOWAX-3F20                 | Saponified rice wax                              | 62.9                     | 76                                     | 11.5            | 75.3                     | REACH        | <ul style="list-style-type: none"> <li>Improving releasability comparing with refined rice bran wax.</li> </ul> |
| <b>NEW</b><br>X1-S060417-2 | Saponified rice wax                              | 9.5                      | 83.2                                   | 6.3             | 77.8                     | FDA<br>REACH | <ul style="list-style-type: none"> <li>Improving releasability to TOWAX-3F19</li> </ul>                         |
| <b>NEW</b><br>X1-S060417-3 | Rice bran wax<br>Carnauba wax                    | 12.1                     | 81.2                                   | 6.6             | 78.6                     | FDA<br>REACH | <ul style="list-style-type: none"> <li>Improving releasability to TOWAX-3F19</li> </ul>                         |
| TOWAX-541                  | Rice bran wax<br>Carnauba wax<br>Hydrocarbon wax | 3.5                      | 62.0                                   | 6.3             | 80.6                     | FDA<br>REACH | <ul style="list-style-type: none"> <li>Broad melting point</li> </ul>                                           |

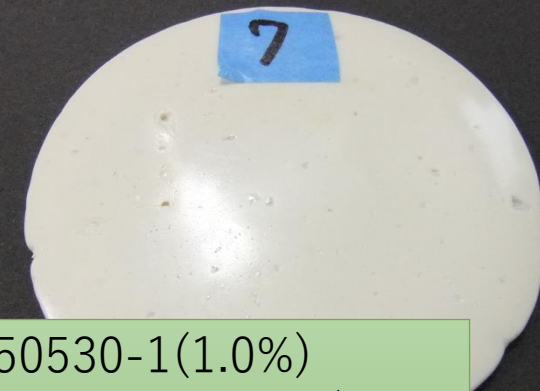
| Product                             | 175°C<br>Weight loss(3h) | 15min                                                                                | 1h                                                                                    | 2h                                                                                    | 3h                                                                                    |
|-------------------------------------|--------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| TOWAX-3F19<br>(Rice bran wax)       | 0.74%                    |    |    |    |    |
| TOWAX-3F17<br>(Rice bran wax)       | 0.37%                    |    |    |    |    |
| TOWAX-541<br>(Blended wax)          | 0.34%                    |   |   |   |   |
| TOWAX-3F20<br>(Saponified rice wax) | 1.95%                    |  |  |  |  |



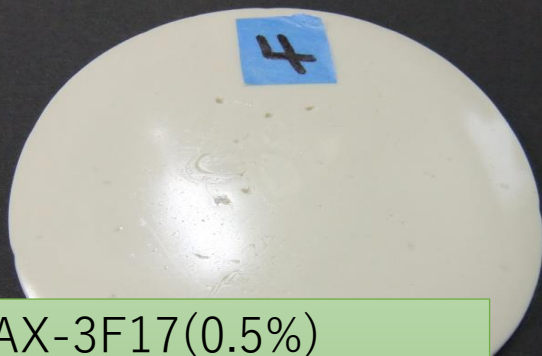
Bench mark wax  
"Montan wax OP type" (1.0%)



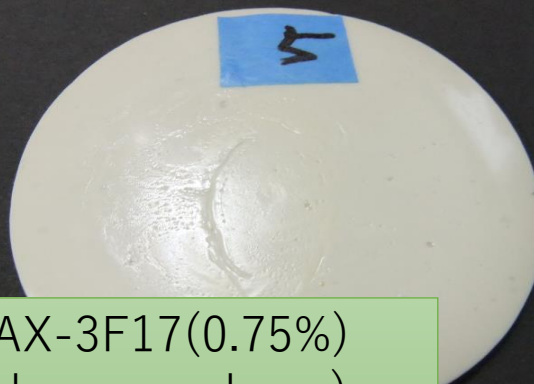
Carnauba wax (1.0%)  
TEST: NG(Blooming)



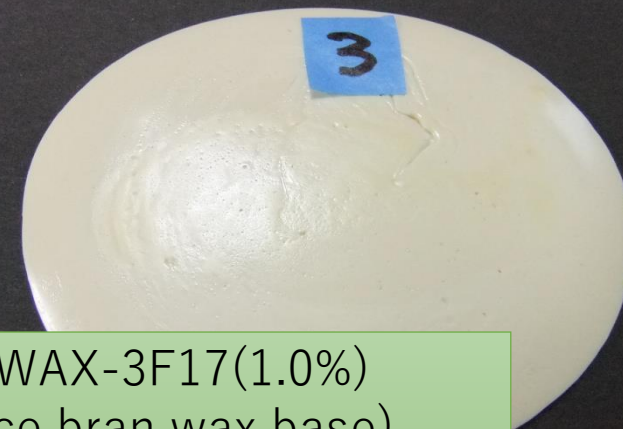
X1-050530-1(1.0%)  
(Rice bran wax base)  
TEST: OK



TOWAX-3F17(0.5%)  
(Rice bran wax base)  
TEST: OK

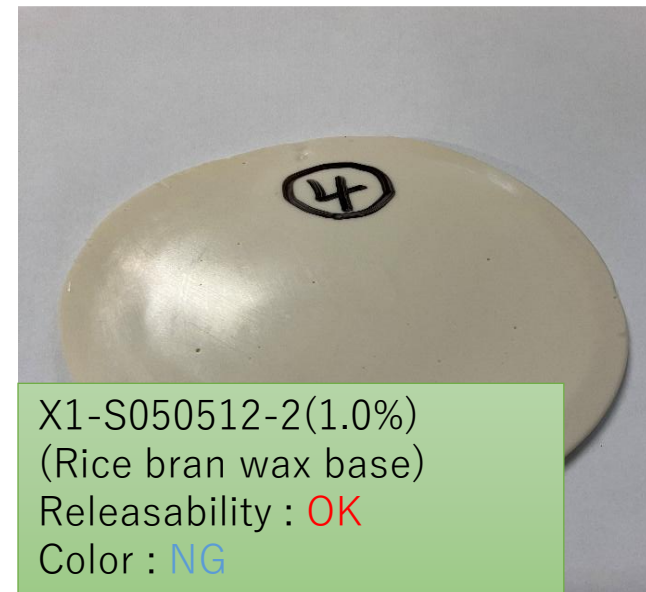
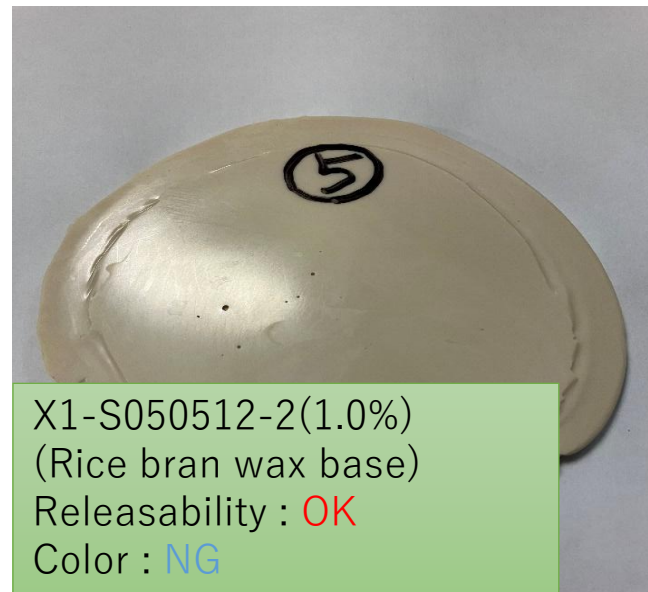
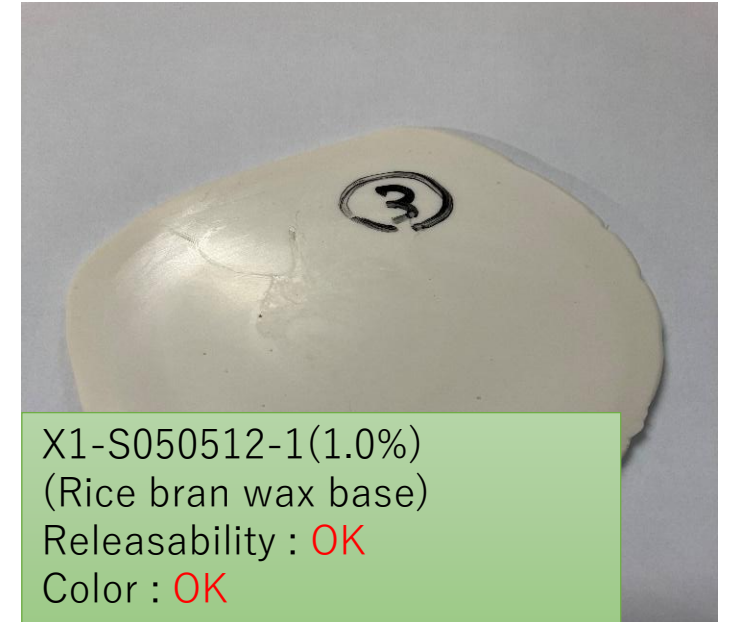
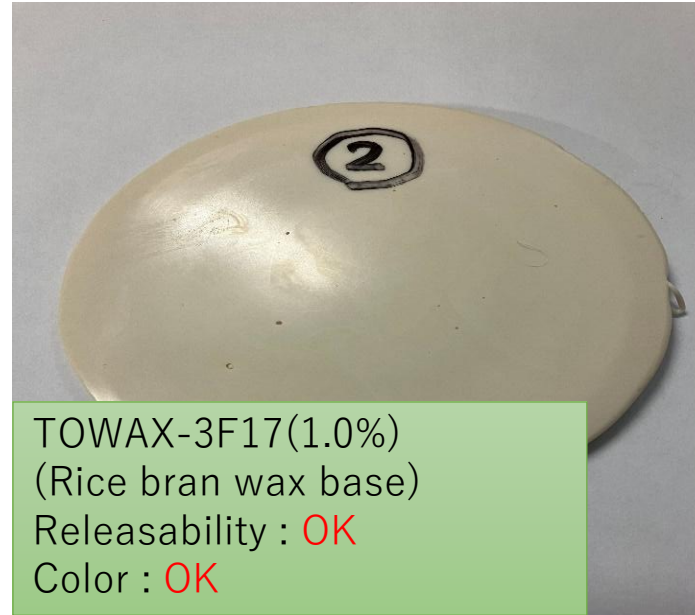


TOWAX-3F17(0.75%)  
(Rice bran wax base)  
TEST: NG(Blooming)



TOWAX-3F17(1.0%)  
(Rice bran wax base)  
TEST: NG(Blooming)

# PBT resin plate sample



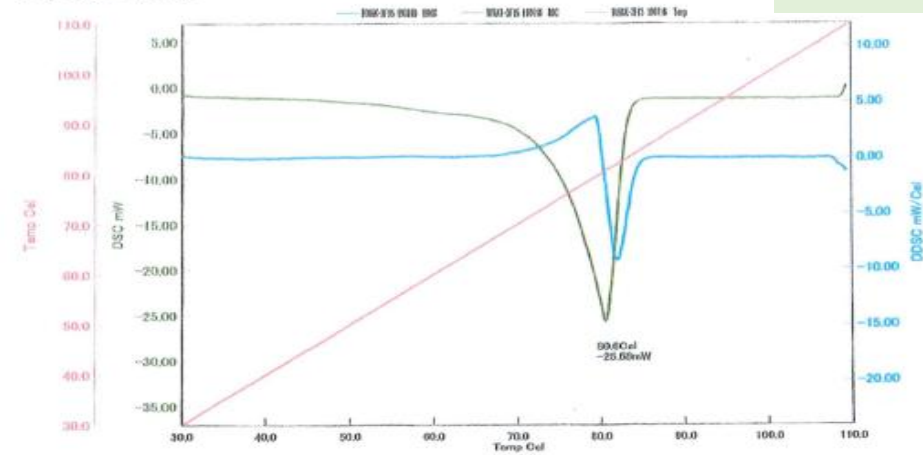
# DSC chart 1/2

モジュール: DSC  
データ名: TOWAX-3F15 190716  
測定日時: 2022/04/17  
測定場所: TOWAX-3F15 190716  
サンプル名: TOWAX-3F15 (10.250 mg)  
サンプル質量: 10.250 mg (10.000 mg)  
リファレンス名: blank  
リファレンス質量: 10.350 mg

温度プログラム:  
1\* 30 110 Cel/min 5 2 0.1

コメント:  
オペレータ: TA  
190716  
製品検査

TOWAX-3F15  
Rice bran wax

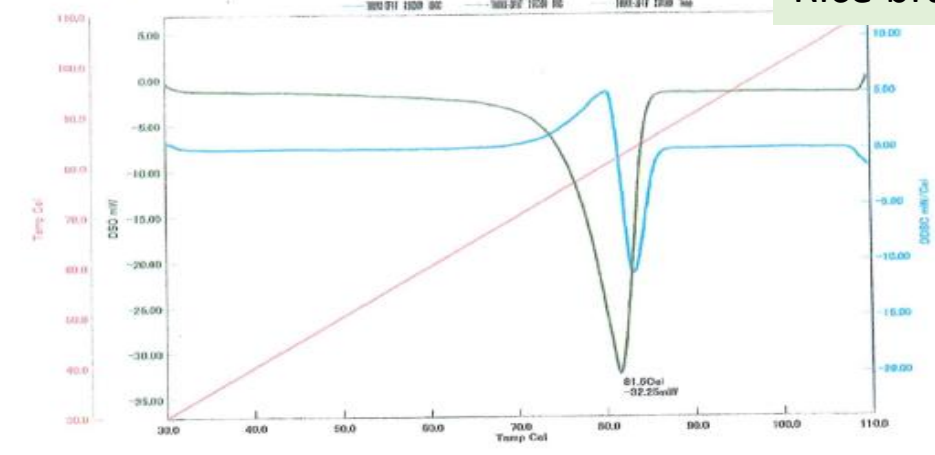


モジュール: DSC  
データ名: TOWAX-3F17 220309  
測定日時: 2022/05/24  
測定場所: TOWAX-3F17 220309  
サンプル名: TOWAX-3F17 (10.150 mg)  
サンプル質量: 10.150 mg  
リファレンス名: blank  
リファレンス質量: 10.450 mg

温度プログラム:  
1\* 30 110 Cel/min 5 2 0.1

コメント:  
オペレータ: TA  
220309  
製品検査

TOWAX-3F17  
Rice bran wax

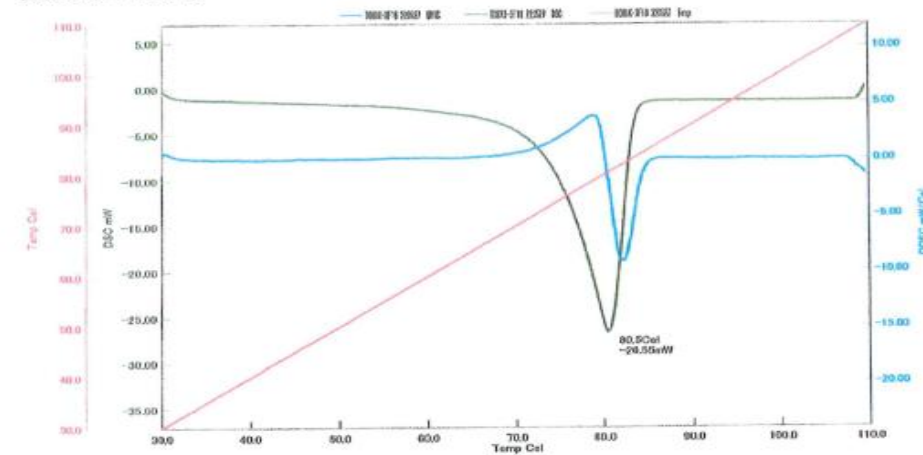


モジュール: DSC  
データ名: TOWAX-3F18 220539  
測定日時: 2022/06/02  
測定場所: TOWAX-3F18 220539  
サンプル名: TOWAX-3F18 (10.400 mg)  
サンプル質量: 10.400 mg (10.000 mg)  
リファレンス名: blank  
リファレンス質量: 10.600 mg

温度プログラム:  
1\* 30 110 Cel/min 5 2 0.1

コメント:  
オペレータ: TA  
220539  
製品検査

TOWAX-3F18  
Rice bran wax

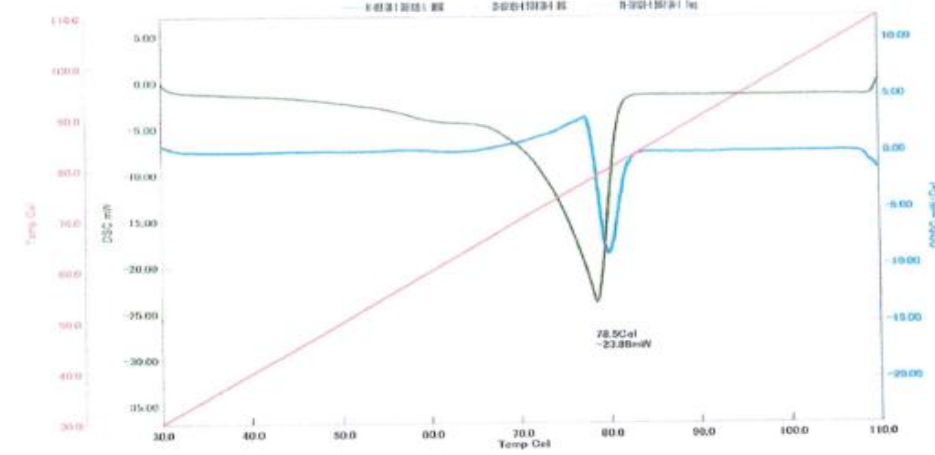


モジュール: DSC  
データ名: X1-051120-1 5051120-1  
測定日時: 2023/11/30  
測定場所: X1-051120-1 5051120-1  
サンプル名: X1-051120-1 (10.809 mg)  
サンプル質量: 10.809 mg  
リファレンス名: blank  
リファレンス質量: 10.350 mg

温度プログラム:  
1\* 30 110 Cel/min 5 2 0.1

コメント:  
オペレータ: TA  
2023/11/30  
製品検査

TOWAX3F19  
Rice bran wax



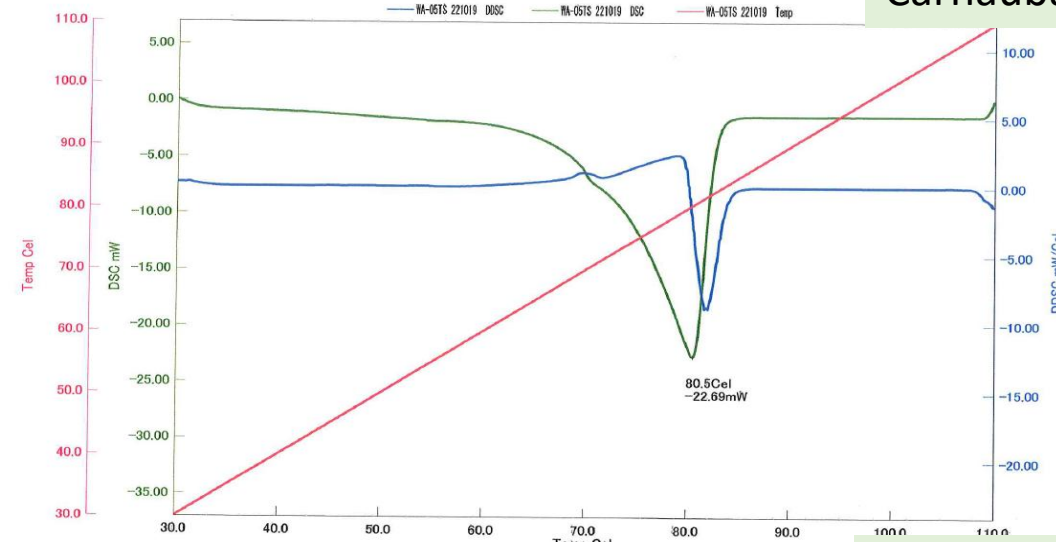
# DSC chart 2/2

モジュール: DSC  
データ名: TOWAX-125 221019  
測定日付: 2022/10/24  
サンプル名: TOWAX-125 221019  
サンプル質量: 10.690 mg  
リファレンス名: blank  
リファレンス質量: 10.000 mg

温度プログラム:  
1\* Cel Cel Cel/min min s  
30 110 5 2 0.1

コメント:  
オペレータ:  
パン: 7ルミ  
TOWAX-125  
製品検査

## TOWAX-125 Carnauba wax

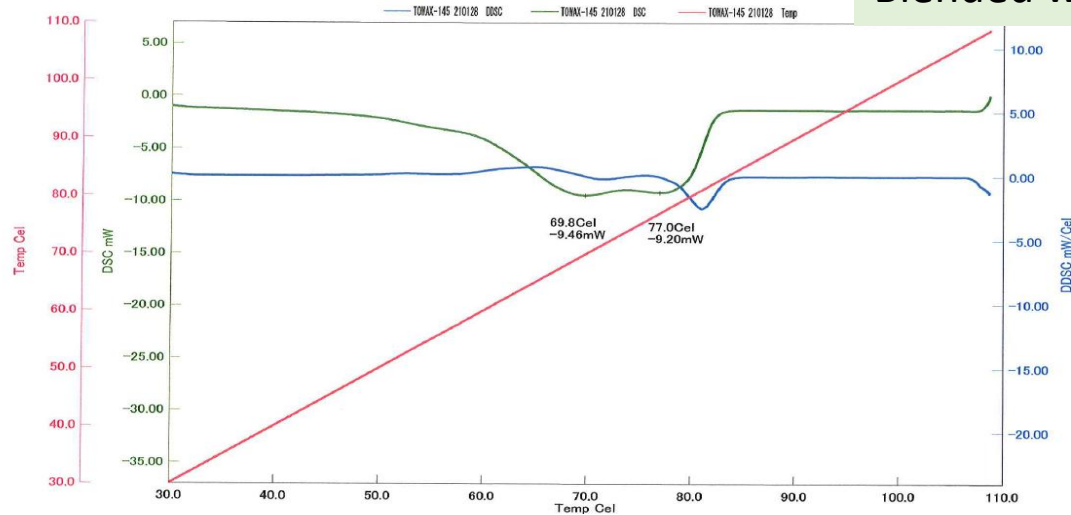


データ名: TOWAX-541 210128  
測定日付: 2021/01/29  
サンプル名: TOWAX-541 210128  
サンプル質量: 9.820 mg (10.000 mg)  
リファレンス名: blank  
リファレンス質量: 10.350 mg

温度プログラム:  
1\* Cel Cel Cel/min min s  
30 110 5 2 0.1

コメント:  
オペレータ:  
パン: 7ルミ  
TOWAX-541  
製品検査

## TOWAX-541 Blended wax

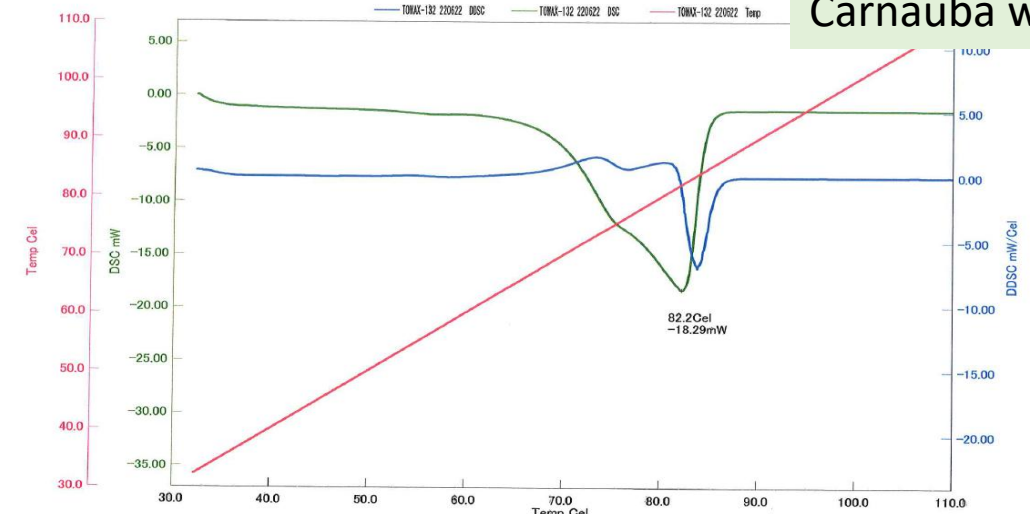


モジュール: DSC  
データ名: TOWAX-132 220622  
測定日付: 2022/06/22  
サンプル名: TOWAX-132 220622  
サンプル質量: 10.900 mg  
リファレンス名: blank  
リファレンス質量: 10.000 mg

温度プログラム:  
1\* Cel Cel Cel/min min s  
30 110 5 2 0.1

コメント:  
オペレータ:  
パン: 7ルミ  
TOWAX  
製品検査

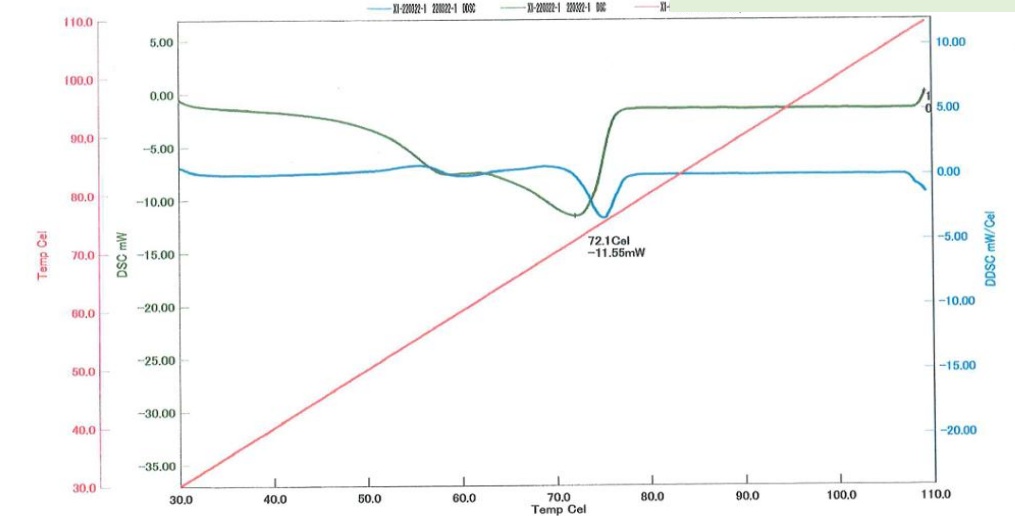
## TOWAX-132 Carnauba wax



モジュール: DSC  
データ名: X1-220322-1 220322-1  
測定日付: 2022/04/19  
サンプル名: X1-220322-1 220322-1  
サンプル質量: 9.970 mg (10.000 mg)  
リファレンス名: blank  
リファレンス質量: 10.650 mg

温度プログラム:  
1\* Cel Cel Cel/min min s  
30 110 5 2 0.1

## TOWAX-3F20 Saponified rice wax



# Heat wight loss (%)

|         | TOWAX-3F17<br>Rice bran wax | TOWAX-3F19<br>Rice bran wax | TOWAX-3F20<br>Saponified rice | TOWAX-132<br>Carnauba wax | X1-040728-1<br>Rice and PE wax |
|---------|-----------------------------|-----------------------------|-------------------------------|---------------------------|--------------------------------|
| 230°C   |                             |                             | 2.3                           |                           |                                |
| 240°C   |                             |                             | 3.5                           |                           |                                |
| 250°C   |                             | 2.4                         | 5.0                           |                           |                                |
| 260°C   | 2.1                         | 3.7                         | 7.0                           |                           |                                |
| 270°C   | 3.4                         | 5.5                         | 9.5                           |                           | 3.2                            |
| 280°C   | 5.3                         | 7.8                         | 12.7                          |                           | 4.5                            |
| 290°C   | 7.9                         | 11.0                        | 16.0                          | 2.3                       | 6.3                            |
| 300°C   | 11.2                        | 15.8                        | 19.2                          | 3.4                       | 8.6                            |
| 310°C   | 15.8                        | 23.8                        | 22.4                          | 4.8                       | 11.5                           |
| 320°C   | 24.3                        | 49.2                        | 29.6                          | 6.8                       | 22.7                           |
| 320.8°C |                             |                             |                               |                           |                                |
| 330°C   | 46.6                        | 62.6                        | 37.7                          | 13.0                      | 46.2                           |
| 338.1°C |                             |                             |                               |                           |                                |
| 340°C   | 62.8                        | 66.9                        | 50.3                          | 58.3                      | 62.3                           |
| 343.1   |                             | 67.3                        |                               |                           |                                |
| 346.0°C |                             |                             |                               | 65.3                      |                                |
| 348.9°C |                             |                             | 57.1                          |                           |                                |
| 348.9°C | 71.6                        |                             |                               |                           |                                |
| 350°C   |                             |                             |                               |                           | 68.5                           |
| 350.8°C |                             |                             |                               |                           |                                |
| 減量恒量    | 525.7°C/99.3                | 526.2°C/98.7                | 504.6°C/98.1                  | 535°C/98.8                | 548.2°C/98.4                   |

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