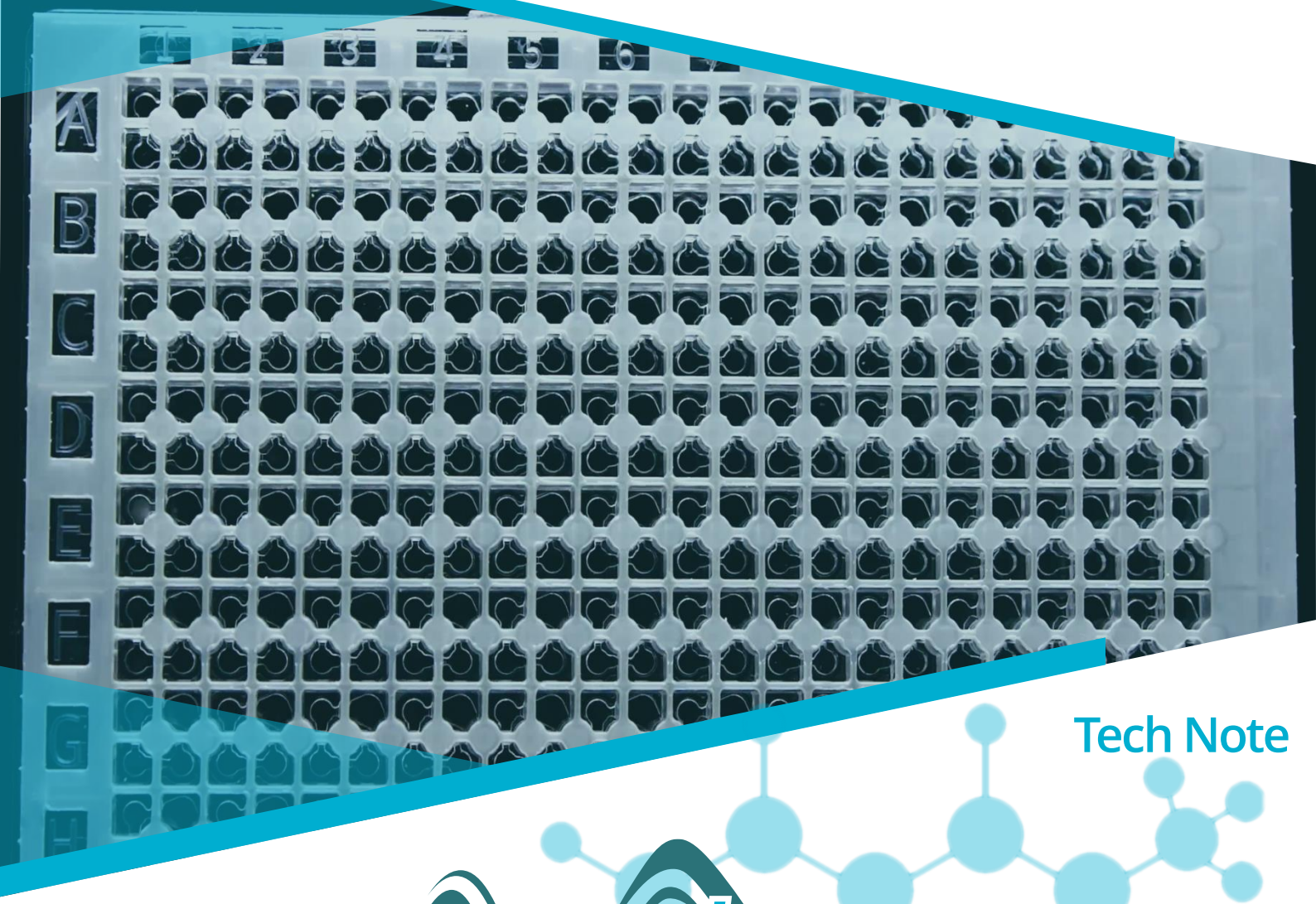

Tech Note

SpecPlate

# Study on evaporation protection and sample integrity with SpecPlate sealing foil

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This Tech Note examines sample integrity in SpecPlate and conventional multiwell plates, tested both sealed and unsealed on a lab bench and under a fume hood. Weight and absorbance measurement changes over time were analyzed to assess evaporation and sample integrity.

## Introduction

When working with toxic, volatile or highly potent samples, it is important that they are well protected and ready for measurement. The SpecPlate offers increased protection against evaporation due to its very small contact surface between the sample and the ambient air. In addition, the use of the SpecPlate sealing film provides reliable protection against contamination. Due to the special design, the samples are enclosed in the measuring structures, but the light path for the photometric measurement remains free (see picture on cover page).

## Material

- SpecPlates (PHABIOC 400100)
- SpecPlate Sealing foil (PHABIOC 400101)
- UV-Star 96 Well (Greiner Bio-One 655801)
- Platesealer (Greiner Bio-One 676001)
- Orange G (Carl Roth 0318.1)
- Water

## Methods

Four SpecPlates and four standard 96-well plates were filled with aqueous Orange G solution. The SpecPlates were filled with 36 µL per measuring structure, and the standard plates with 150 µL per well. The Orange G solution had a concentration of 250 mg/L for use in the SpecPlates and a concentration of 60 mg/L for use in the standard plates. Two of the plates were sealed with the respective sealing foil. All plates were initially weighed. Absorbance was measured (t = 0) at 492 nm in a plate reader (Tecan Spark®). One sealed and one unsealed plate of each type were placed on the lab bench and in the fume hood with constant air stream, respectively. After every 30 minutes for 4 hours, the plates were weighed and measured again in the plate reader.

## Results & Discussion

With the unsealed standard plates placed on lab bench and fume hood, a uniform weight loss and thus evaporation of the sample can be observed from the beginning. After 4 hours, a loss of 1.13 g and 1.6 g, respectively, of the sample is already observed. This results in evaporation rates of 0.28 and 0.40 g/h respectively. Sealing the plates significantly reduced sample evaporation (lab bench 0.06 g/h, fume hood 0.02 g/h).

With the unsealed SpecPlates, the observed absolute evaporation loss is noticeably lower, resulting in a weight loss of the sample of 0.39 g on the bench and 0.44 g in the fume hood after 4 hours. This corresponds to evaporation rates of 0.10 g/h or 0.11 g/h. The use of the SpecPlate sealing foil further reduces evaporation losses to 0.01 g and 0.06 g and evaporation rates to 0.003 g/h and 0.014 g/h on the bench and in the fume hood (see Table 1).

*Table 1*

| ***Evaporation loss after 4 h*** | without foil | | | | with foil | | | |
|---|---|---|---|---|---|---|---|---|
| | Bench | | Fume hood | | Bench | | Fume hood | |
| | in g | in g/h | in g | in g/h | in g | in g/h | in g | in g/h |
| **Standard Plate** | 1,31 | 0,28 | 1,61 | 0,40 | 0,23 | 0,06 | 0,14 | 0,04 |
| **SpecPlate** | 0,38 | 0,10 | 0,44 | 0,11 | 0,02 | 0,003 | 0,86 | 0,014 |

Comparing the evaporation rates over a 24-hour period, we see that the rate of the SpecPlate, for example, is only one-third of the rate measured with the standard plate for the unsealed plates on the lab bench (0.07 g/h compared to 0.21 g/h). The other 24-hour comparison values are shown in Table 2.

*Table 2*

| ***Evaporation loss after 24 h*** | without foil | | | | with foil | | | |
|---|---|---|---|---|---|---|---|---|
| | Bench | | Fume hood | | Bench | | Fume hood | |
| | in g | in g/h | in g | in g/h | in g | in g/h | in g | in g/h |
| **Standard Plate** | 5,15 | 0,21 | 10,36 | 0,43 | 1,30 | 0,05 | 1,93 | 0,08 |
| **SpecPlate** | 1,62 | 0,07 | 1,79 | 0,07 | 0,07 | 0,003 | 0,10 | 0,004 |

The evaporation of the sample has a direct influence on the absorbance measurement. After one hour, the measured values in the unsealed SpecPlate were still within 1% deviation of the values measured at the start of the test. In the sealed SpecPlate, the measured values remained below 1% deviation even after 6 hours; only after 24 hours was a deviation of more than 1% observed (1.1% in the 100 µm measuring chamber, 1.4% in the 2000 µm measuring chamber). The larger deviations are initially observed in the chambers that are directly connected to the inlet or outlet (see Figure 1). The intermediate chambers continue to show a smaller deviation from the initial value.

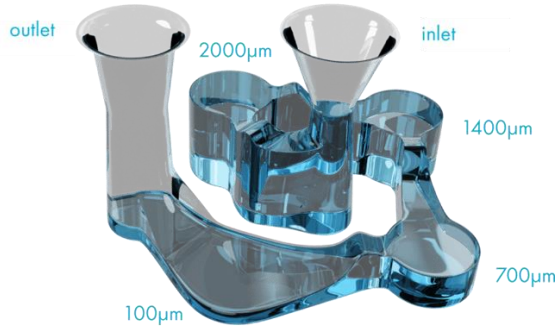



*Figure 1 SpecPlate measurement structure*

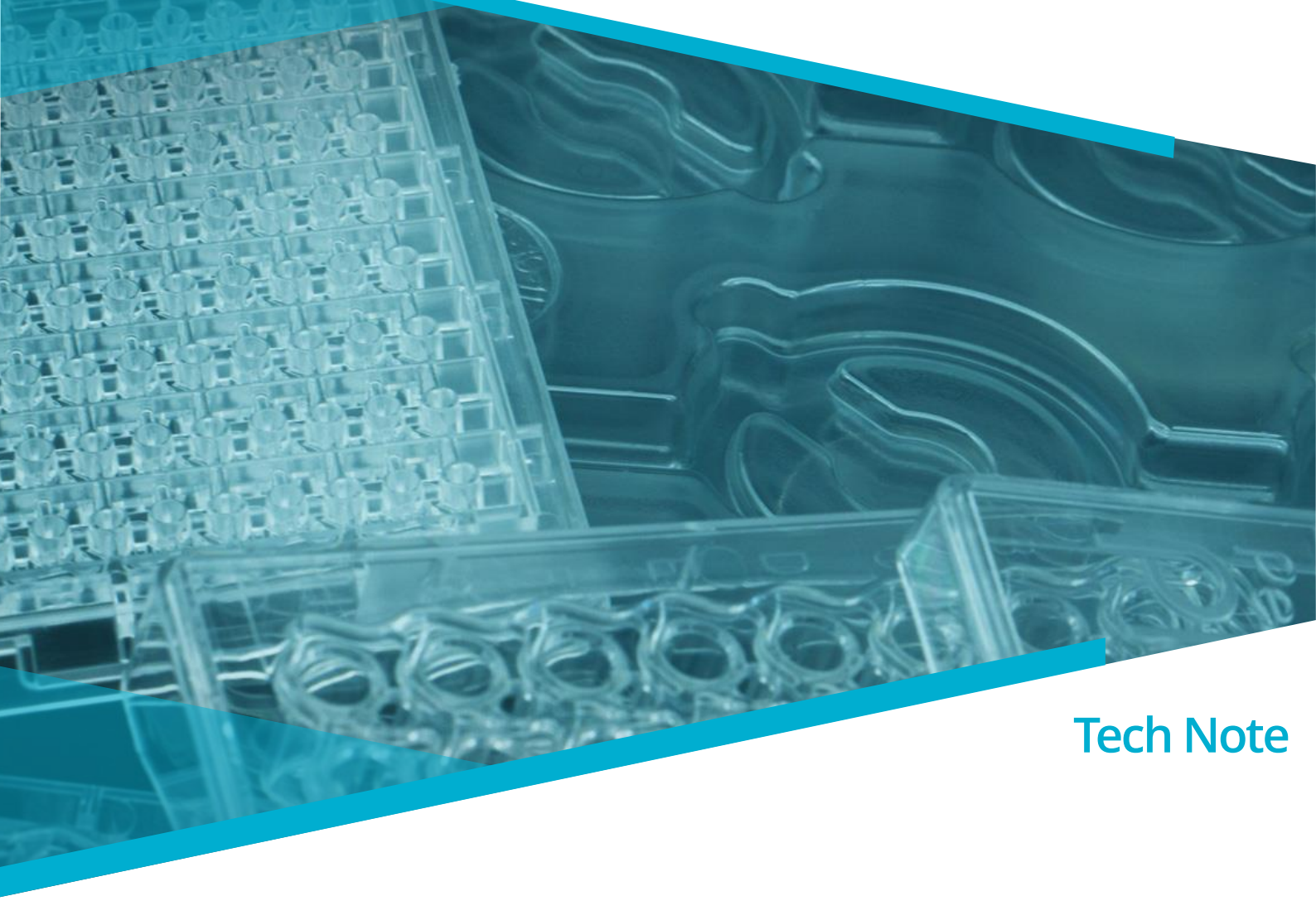
Looking at the sealed standard 96-well plate, it is noticeable that condensation forms on the inside of the foil after a short time, which affects the measurement.

## Conclusion

In this Tech Note we have shown that using the SpecPlate results in significantly lower evaporation rates due to the smaller air/sample exchange surface. This means that sample integrity and measurements are stable over a longer period. Due to the special shape of the SpecPlate sealing foil, which leaves the light paths for the measurement free, the condensation of the sample on the foil over time has no influence on the measurement result.

Therefore, the SpecPlate provides a reliable and efficient solution for maintaining sample integrity and accuracy in long-term measurements, which is especially important for toxic, highly potent, or volatile samples.

*Disclaimer: The results of this study were produced with SpecPlate pre-series models and will be updated with the series products.*



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***Version 1:*** *Changes, including technical, reserved. 01.08.2024*


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