

## THERMAL SOLUTIONS

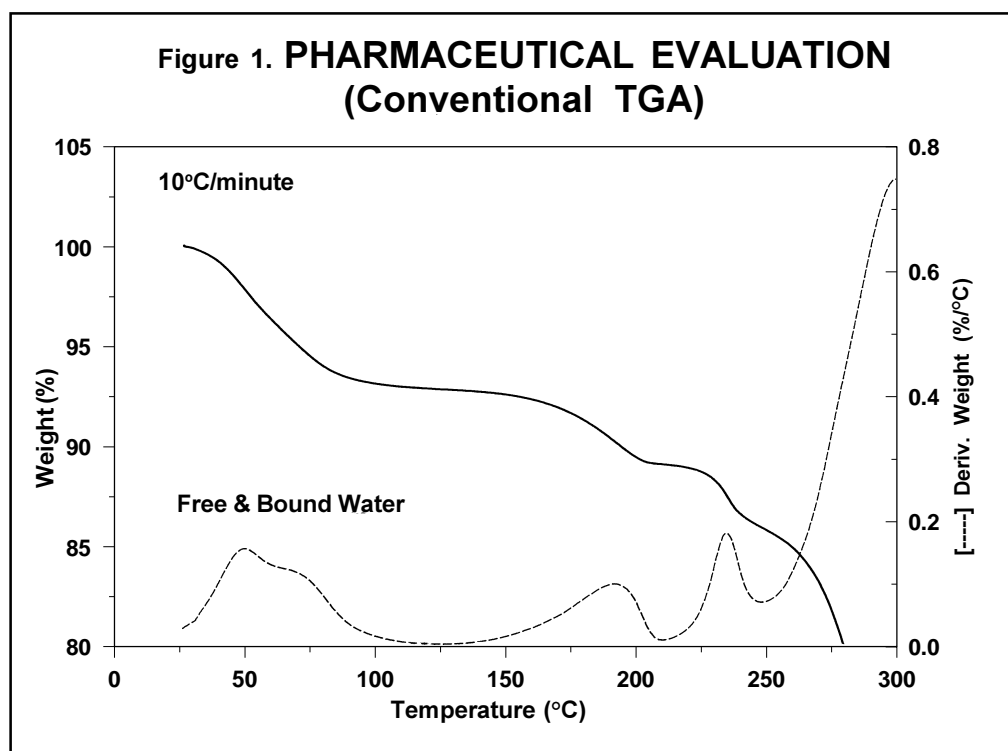
### SEPARATION OF FREE AND BOUND WATER IN PHARMACEUTICALS

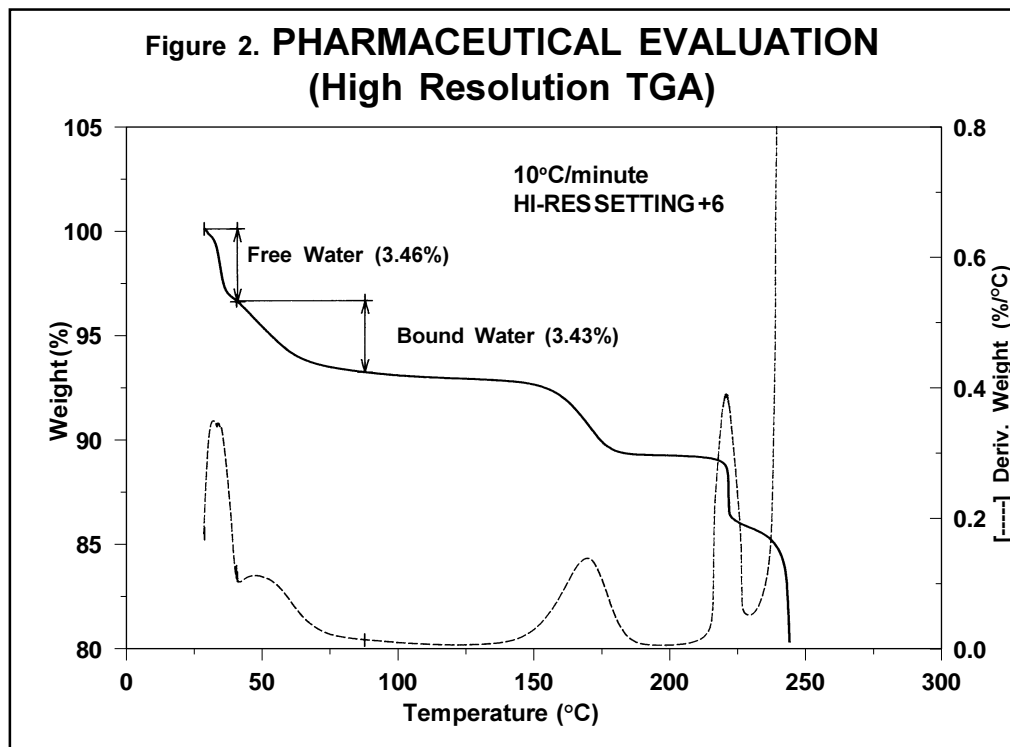
#### PROBLEM

The amount of moisture in pharmaceutical formulations is an important quality control parameter because it can affect their long-term stability and ultimate effectiveness as well as short-term processability. Techniques such as Karl Fischer titration, moisture evolution analysis (1,2), and thermogravimetric analysis (TGA) have been used for determining pharmaceutical moisture levels. However, these techniques often have trouble differentiating between “free” surface water (the source of problems) and bound water present in the chemical formulation.

#### SOLUTION

The resolution (separation) of successive weight losses in TGA can be improved by varying the heating rate during the experiment. This approach, called high resolution TGA (3), enables the weight losses associated with “free” and bound water to be separated and quantified as shown in Figures 1 and 2. Figure 1 represents the conventional TGA results at 10°C/minute. The derivative curve (broken line) indicates that there are two components associated with the weight loss below 100°C. However, separation and quantitation is difficult. Using high resolution TGA on the other hand, provides sufficient separation (Figure 2) to measure the surface water.





**REFERENCES:**

1. TA Instruments Applications Brief TA-114.
2. TA Instruments Applications Brief TA-116.
3. High Resolution TGA: Theory and Applications; TA Instruments Publication TA-023.

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