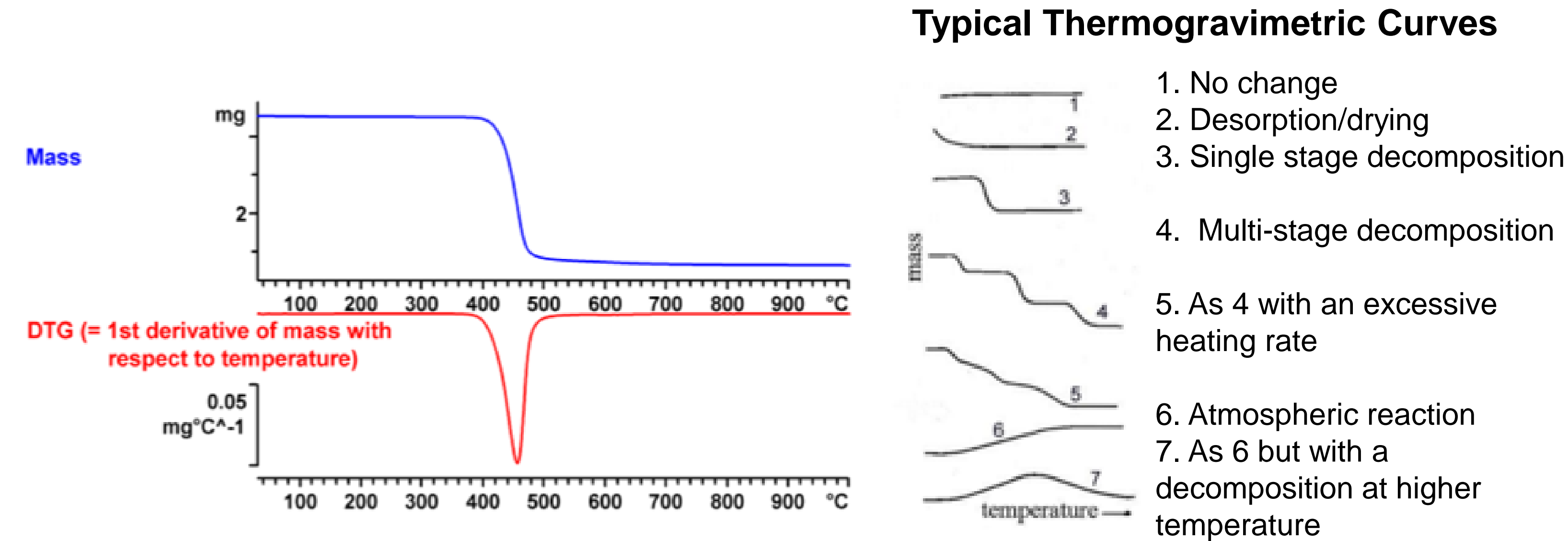


Mechanism Studies of the Thermal Decomposition of Hydrated Copper Nitrate and Copper Sulfate

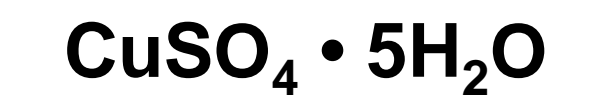
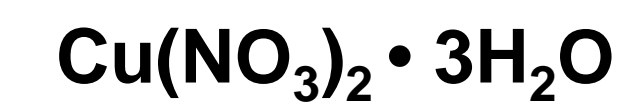
Justin Cournoyer and Nan Yi, Department of Chemical Engineering, University of New Hampshire, Durham, NH 03824

Basics

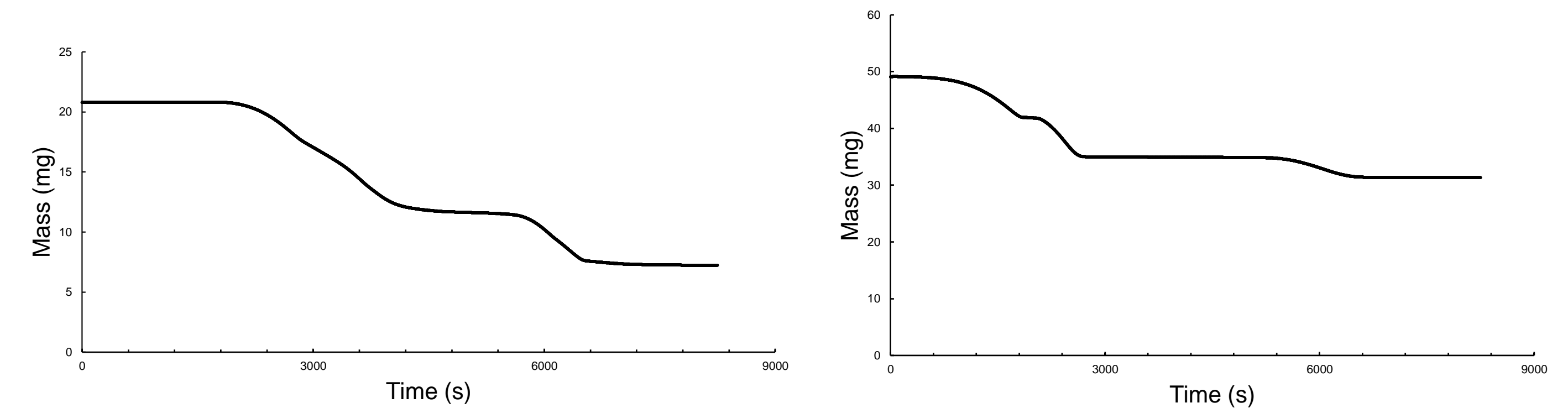
Thermogravimetric analysis (TGA) measures the mass of a sample as it is submitted to a selected temperature program in a defined atmosphere.



Results and Discussion

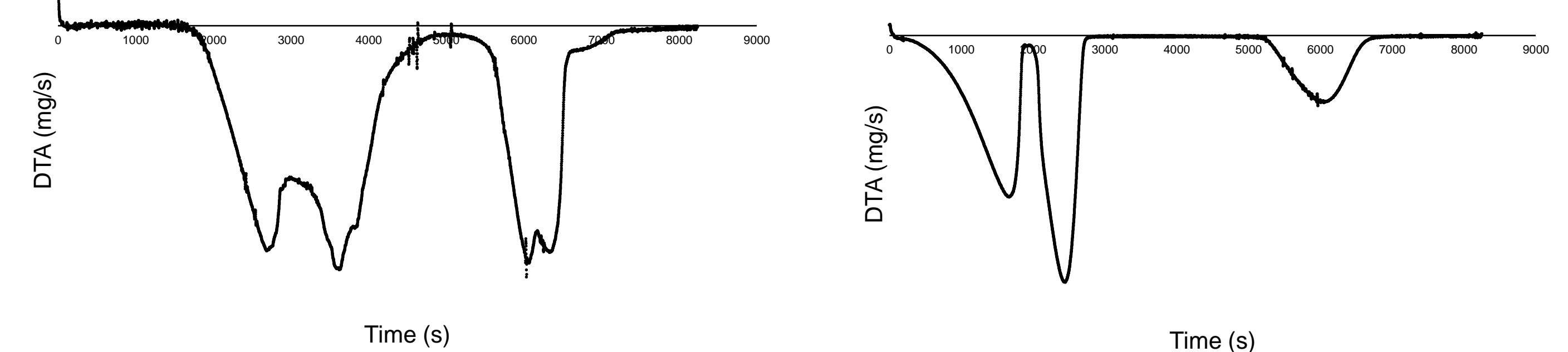


Mass versus time

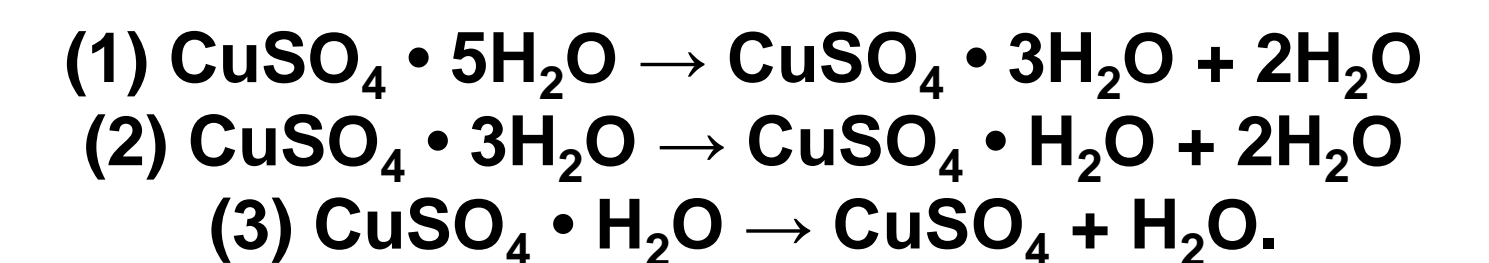
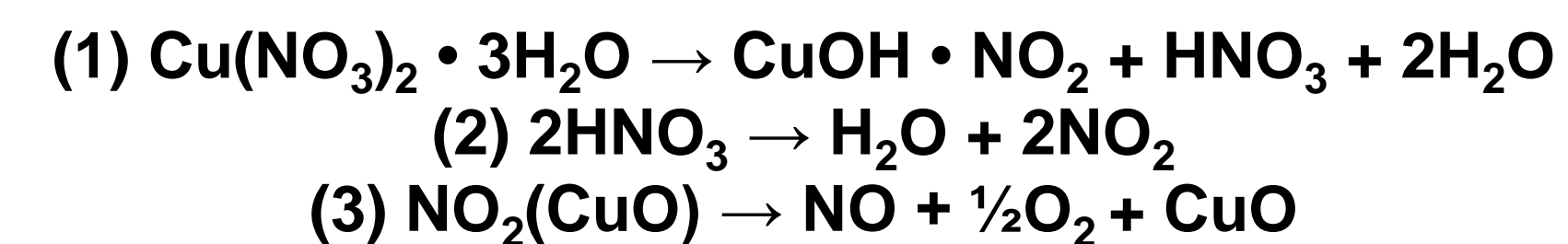


Reaction Conditions: Heating from 20°C to 300°C at 2°C./min. Nitrogen: 30mL/minute.

Differential thermal analysis



Proposed Mechanism^{1,2}



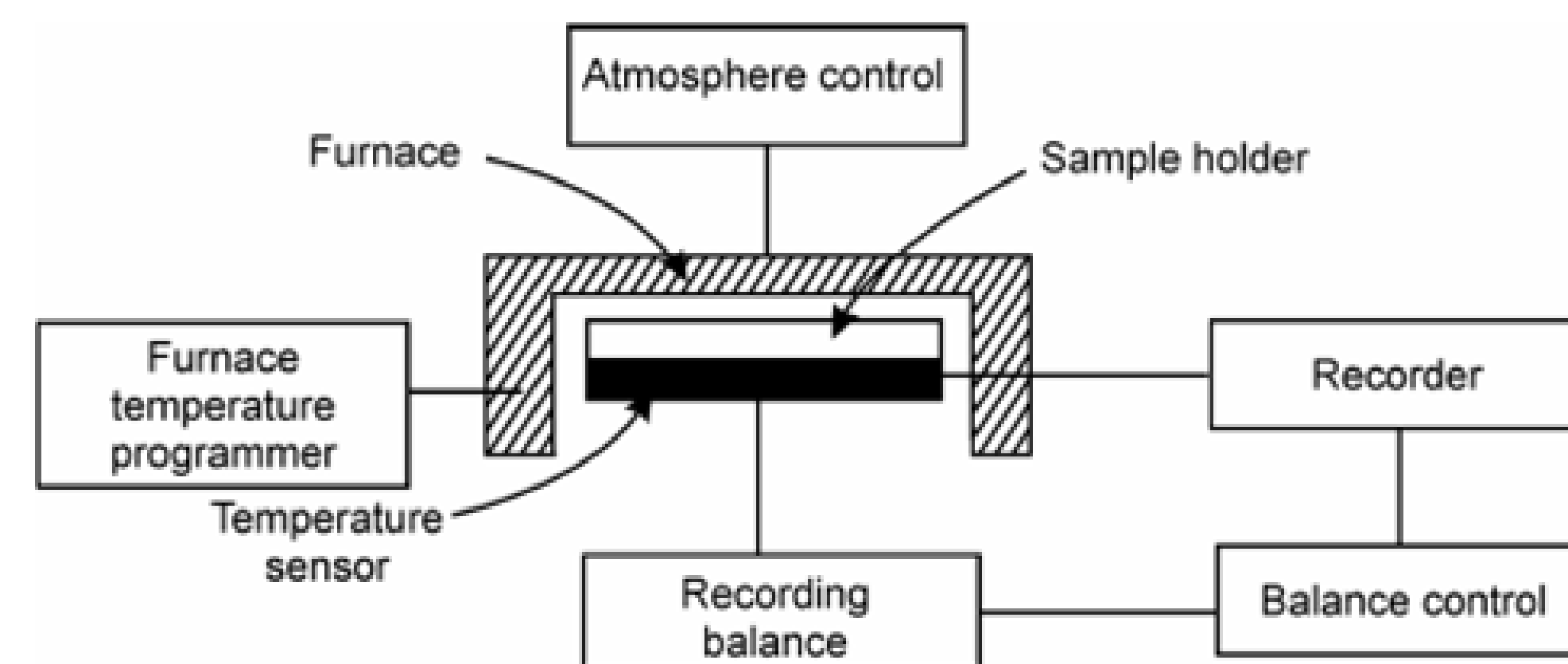
TGA is applied to gain fundamental understanding on the thermal decomposition mechanisms for copper nitrate and copper sulfate.

- The decomposition of copper sulfate was simple: losing two waters during each of its first two weight losses before losing its final water during a third loss.
- The decomposition of copper nitrate was found to be more complicated, with less defined peaks.

Instrument Overview



Mettler Toledo TGA with STARe System



Applications:

TGA could be used to gain understanding of any process with an accompanying change in mass, including:

- Dehydration
- Phase changes
- Study of polymers
- Catalysis-calcination/adsorption



References

- (1) Schubnell, Markus. Dehydration of Copper Sulfate Pentahydrate. *Collected Applications Thermal Analysis Tutorial Kit*. 1998, 21.
- (2) Z. Ding; W. Martins; R. L. Frost. Thermal Activation of Copper Nitrate. *Journal of Materials Science*. 2002, 21, 1415-1417.