



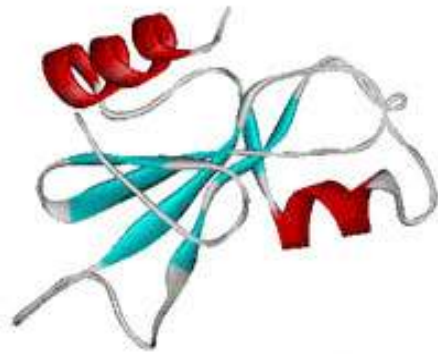
Ultrasensitive calorimetry – An overview

Calorimetry – The Universal Detector

- Heat is generated or absorbed in every chemical process
 - Conformational change
 - Protein interactions
- Free in solution method
- No secondary labeling or immobilisation necessary

Differential Scanning Calorimetry

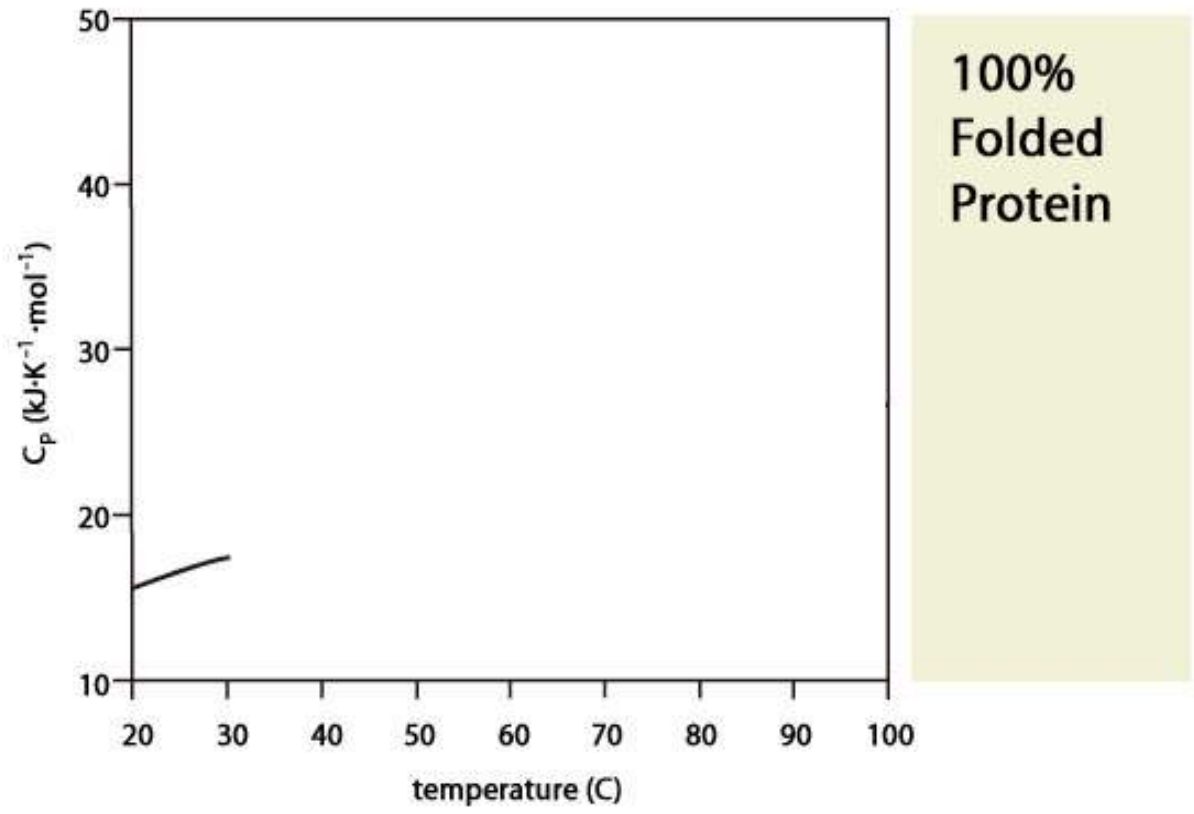
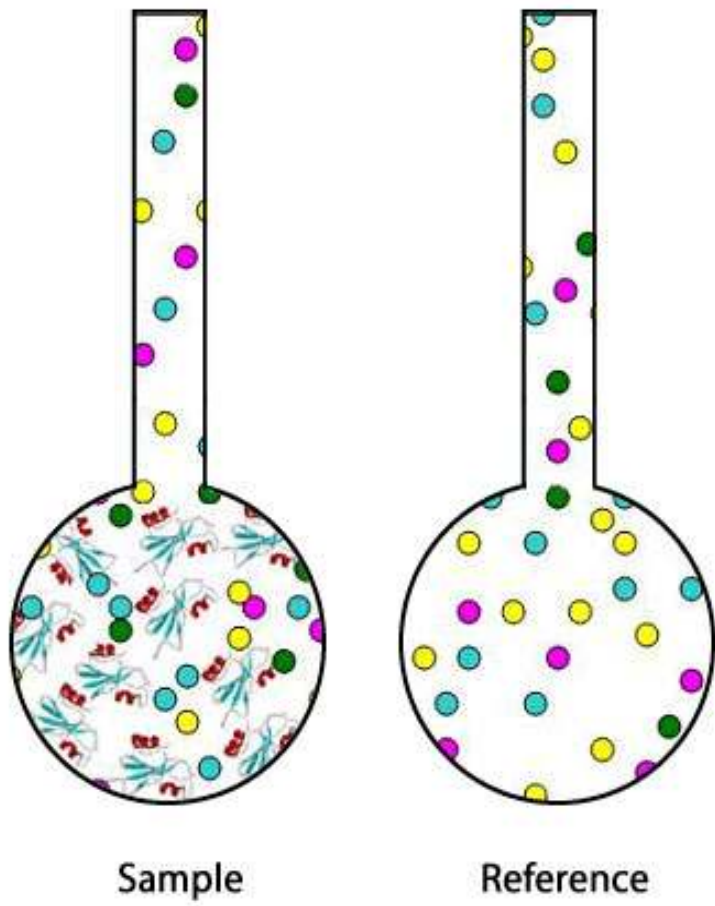
Unfolding of Protein

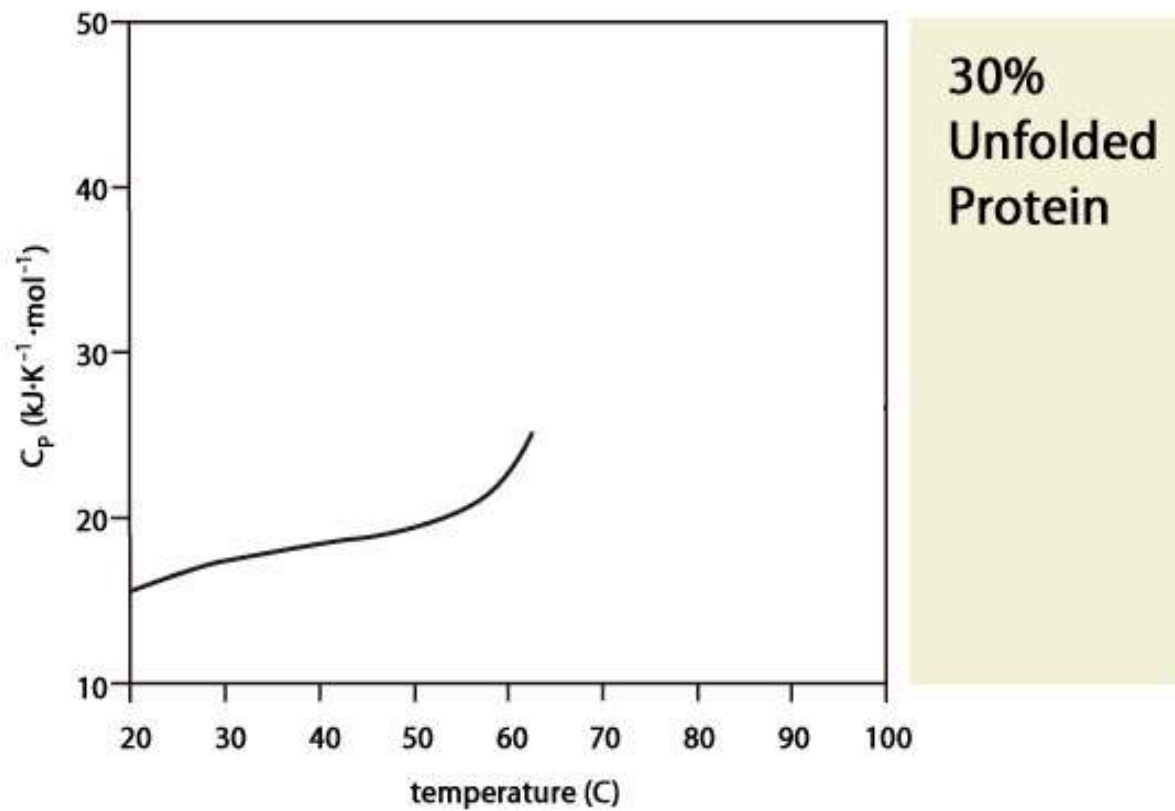
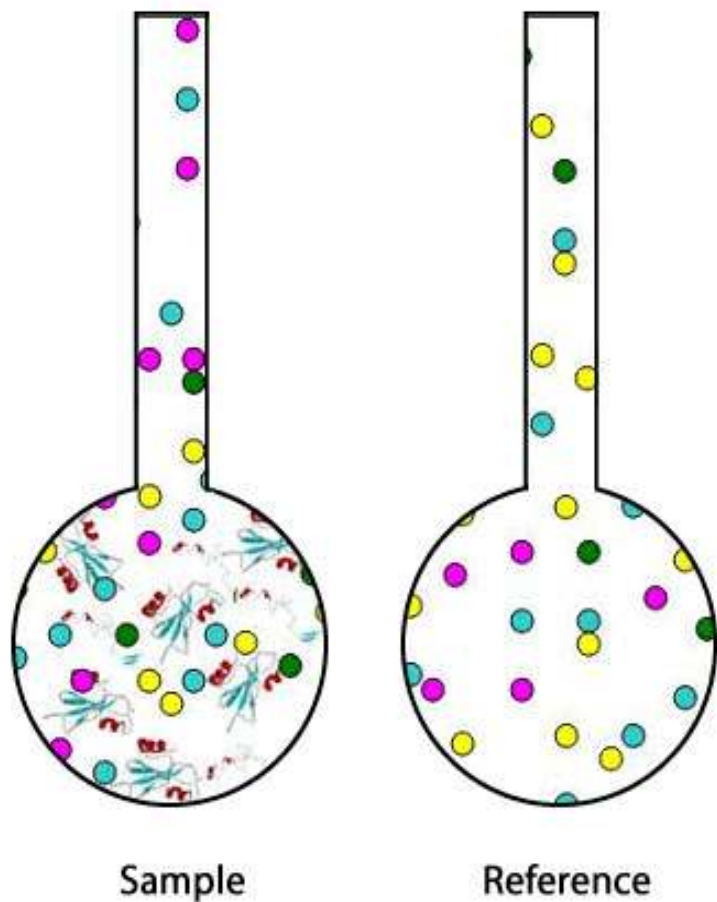


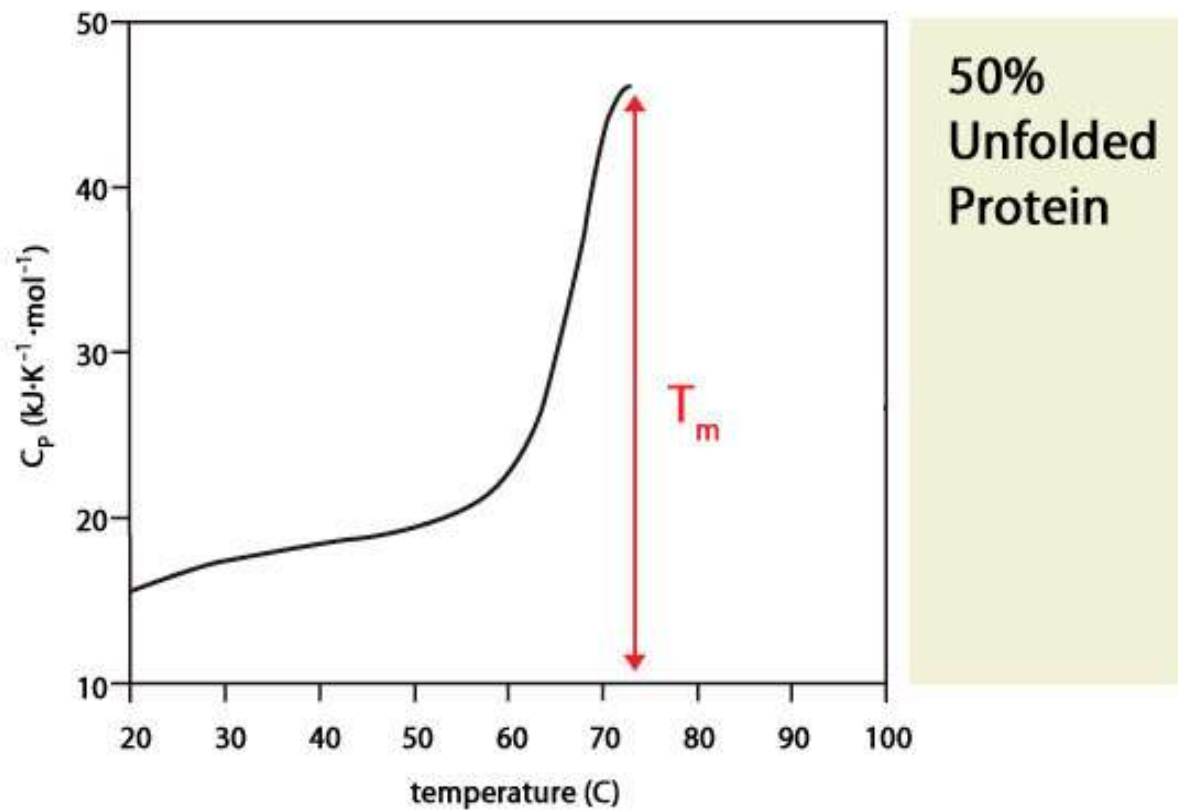
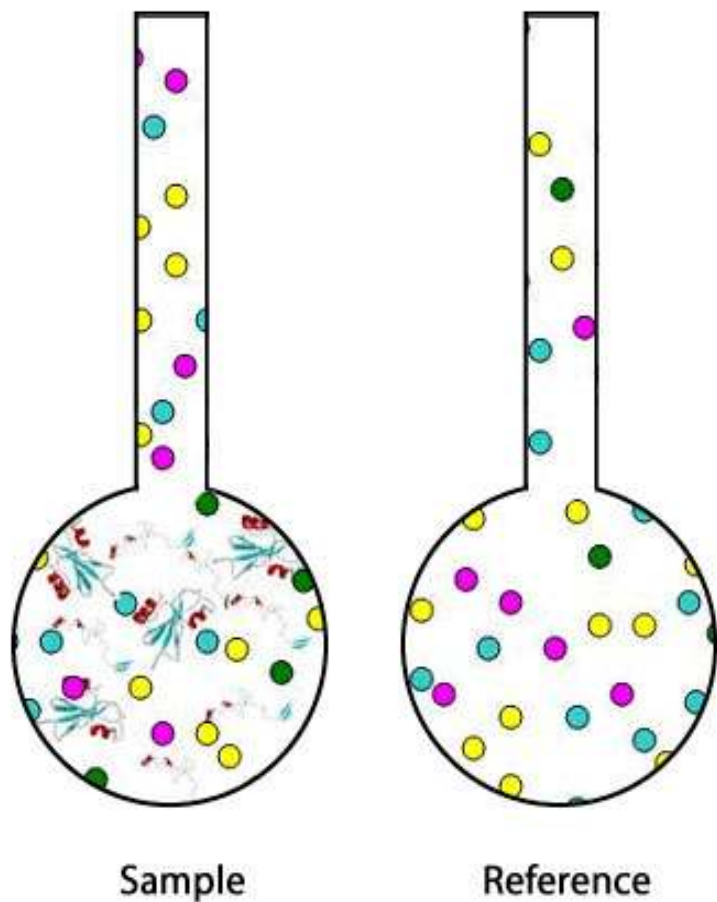
Native

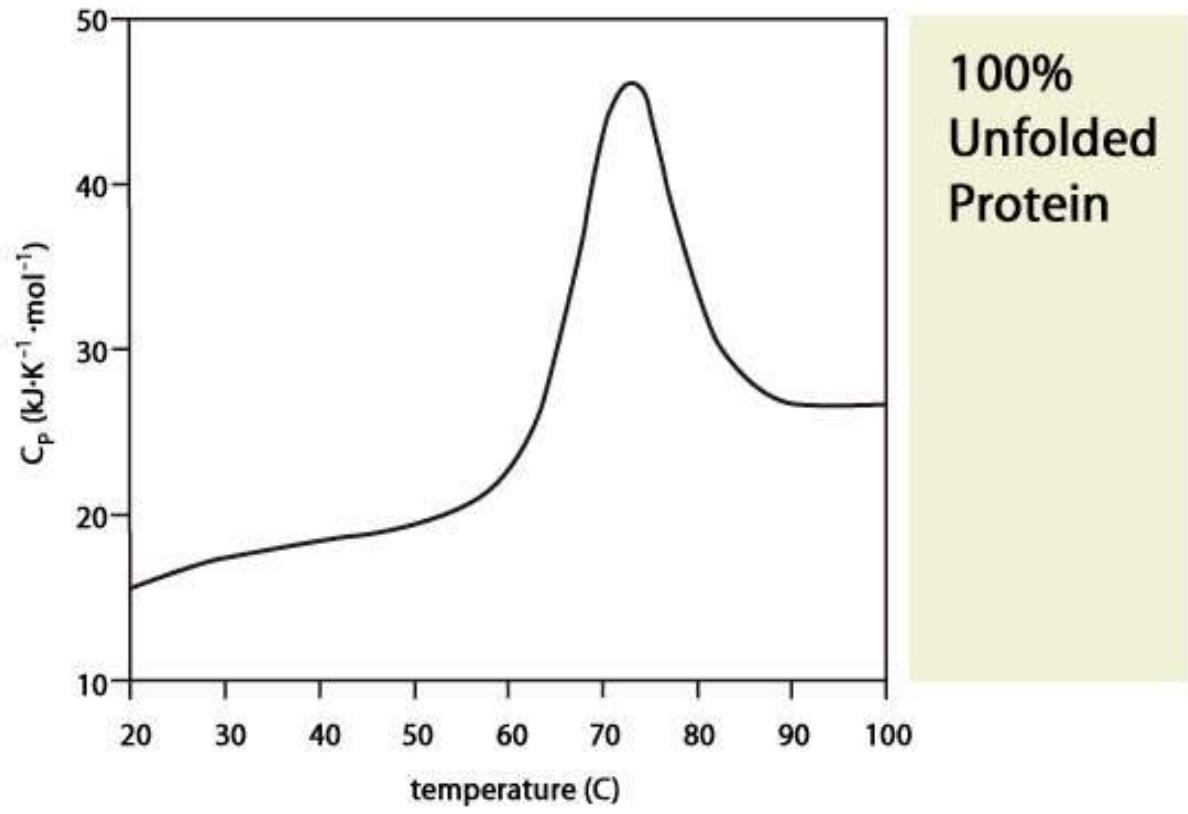
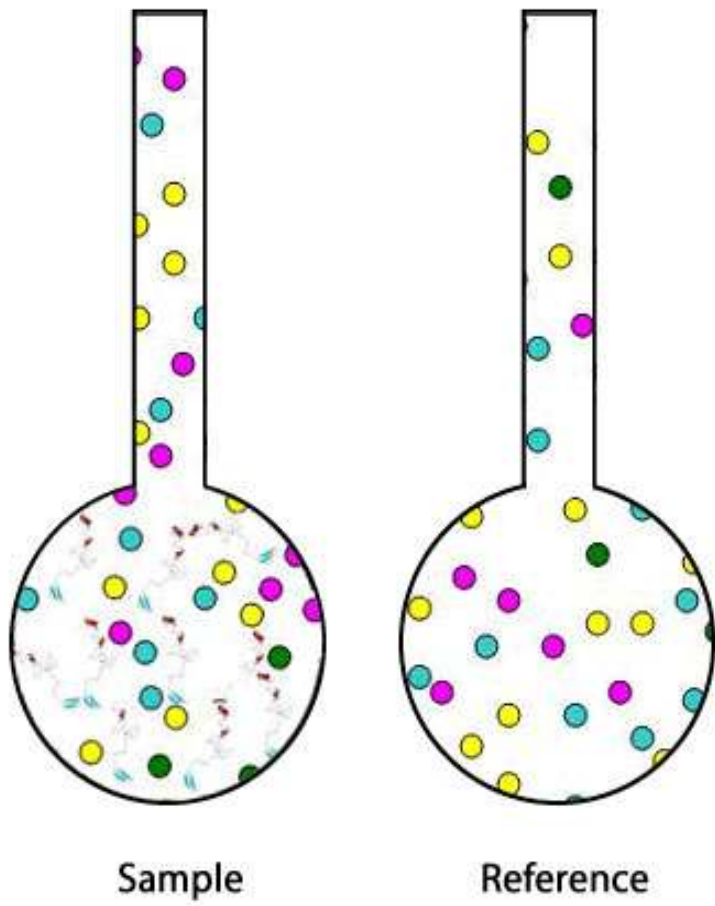


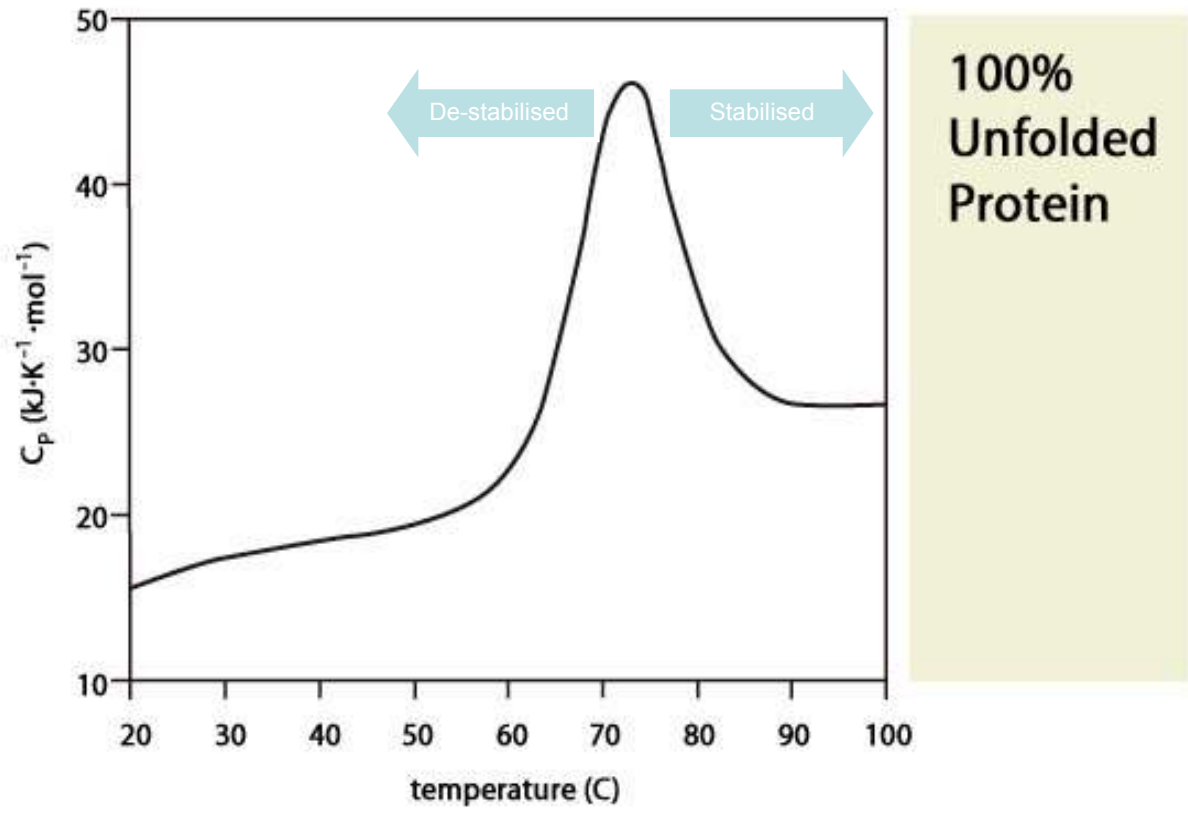
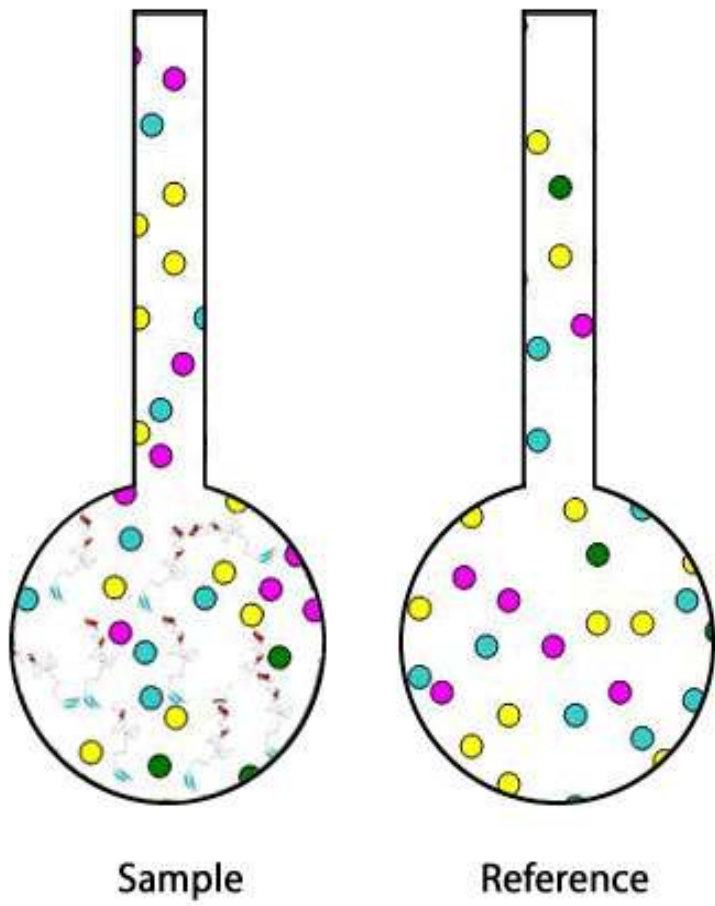
Unfolded











Real World Examples Formulations

- Stability screening under various pH conditions
- Stability screening under different excipient conditions
- Stability screening under different preservative conditions

Real World Examples

Process Development

- Making downstream purification processes more economically viable
- Stability screening to guide chromatographic method selection during antibody purification
- pH/ionic strength stability screening to guide IgE purification

Real World Examples

Manufacturing

- Biocomparability of biopharmaceuticals produced at different manufacturing sites
- Optimisation of manufacturing process
- Improvement of biopharmaceutical quality

VP-DSC System

Single sample

Manual sample
loading

Up to 5 Samples per
day



Capillary DSC System

Automated system
for high throughput
screening

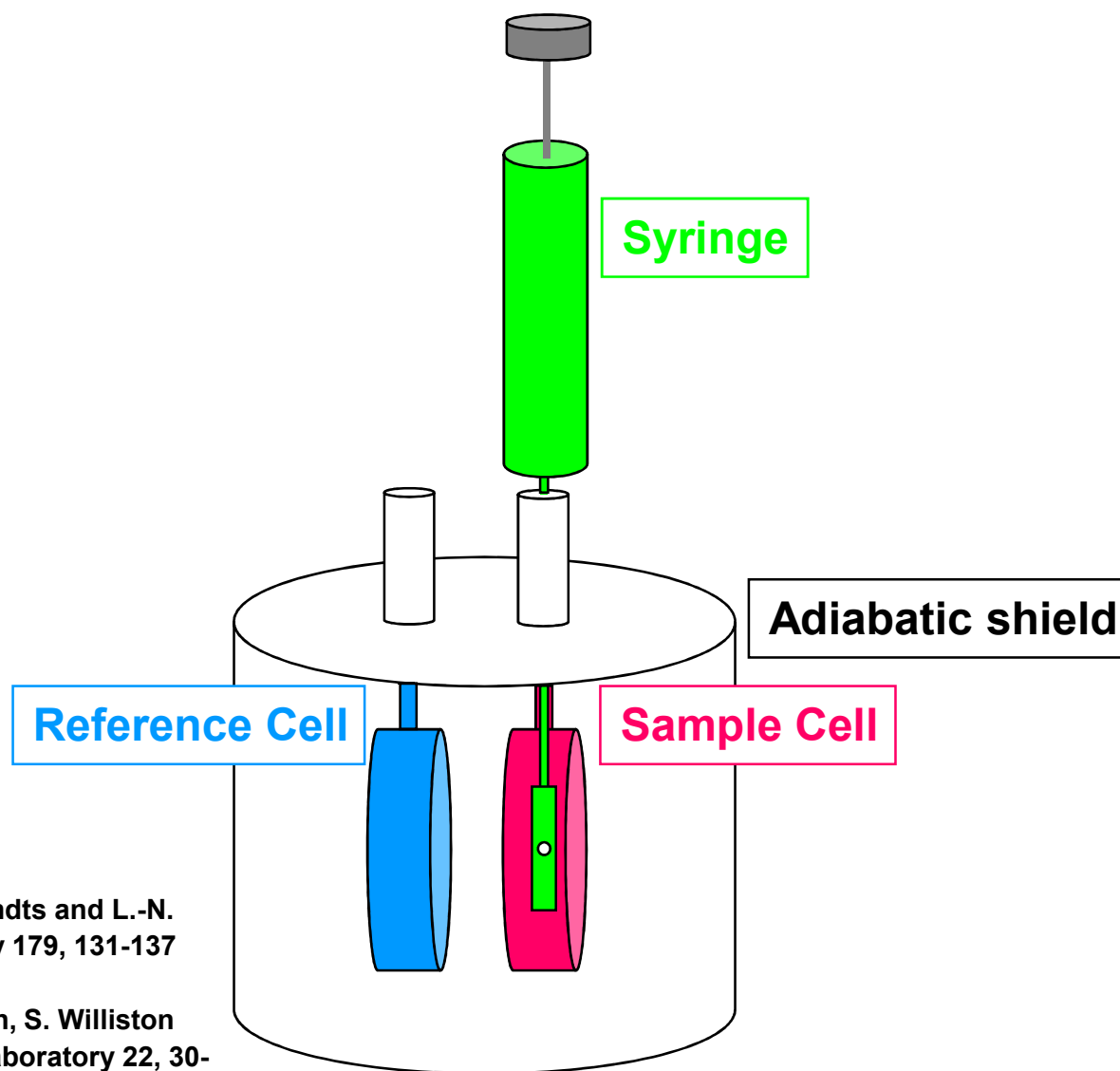
Up to 50
samples/day

96-well plate format



Isothermal Titration Calorimetry

Schematic Representation of ITC



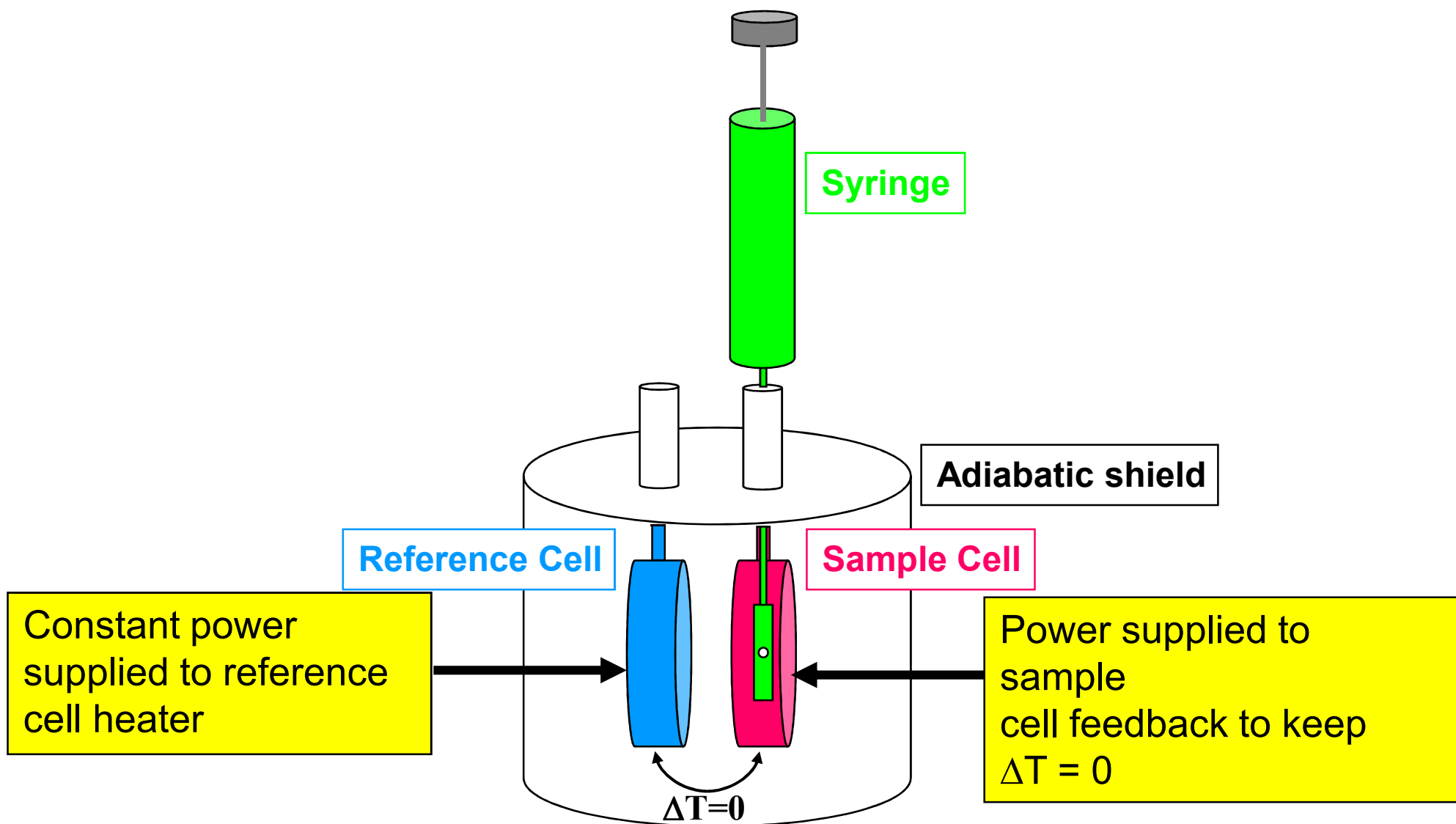
For more details see

T. Wiseman, S. Williston, J.F. Brandts and L.-N. Lin (1989) *Analytical Biochemistry* 179, 131-137

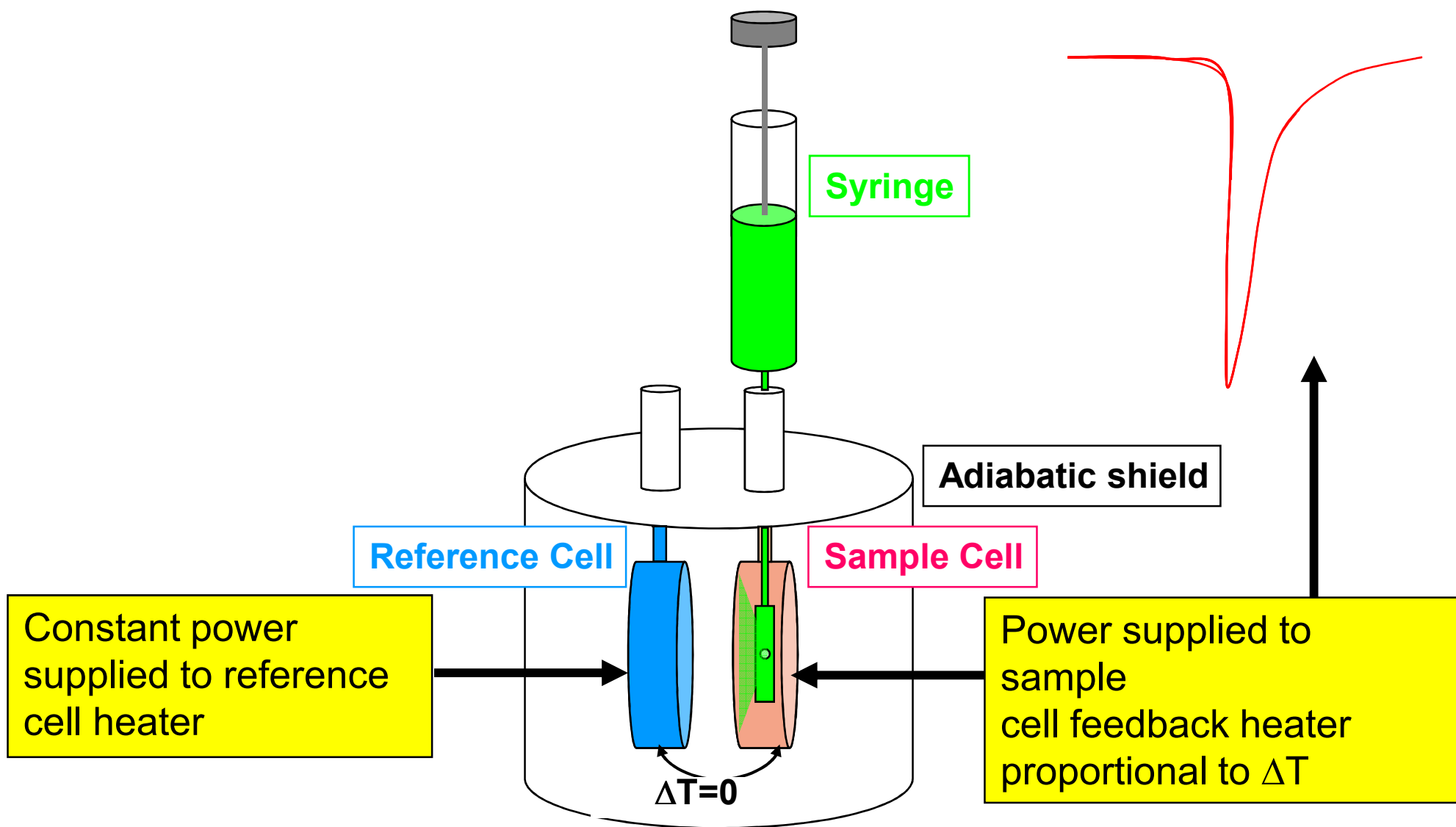
or

J.F. Brandts, L.-N. Lin, T. Wiseman, S. Williston and C.P. Yang (1990) *American Laboratory* 22, 30-41

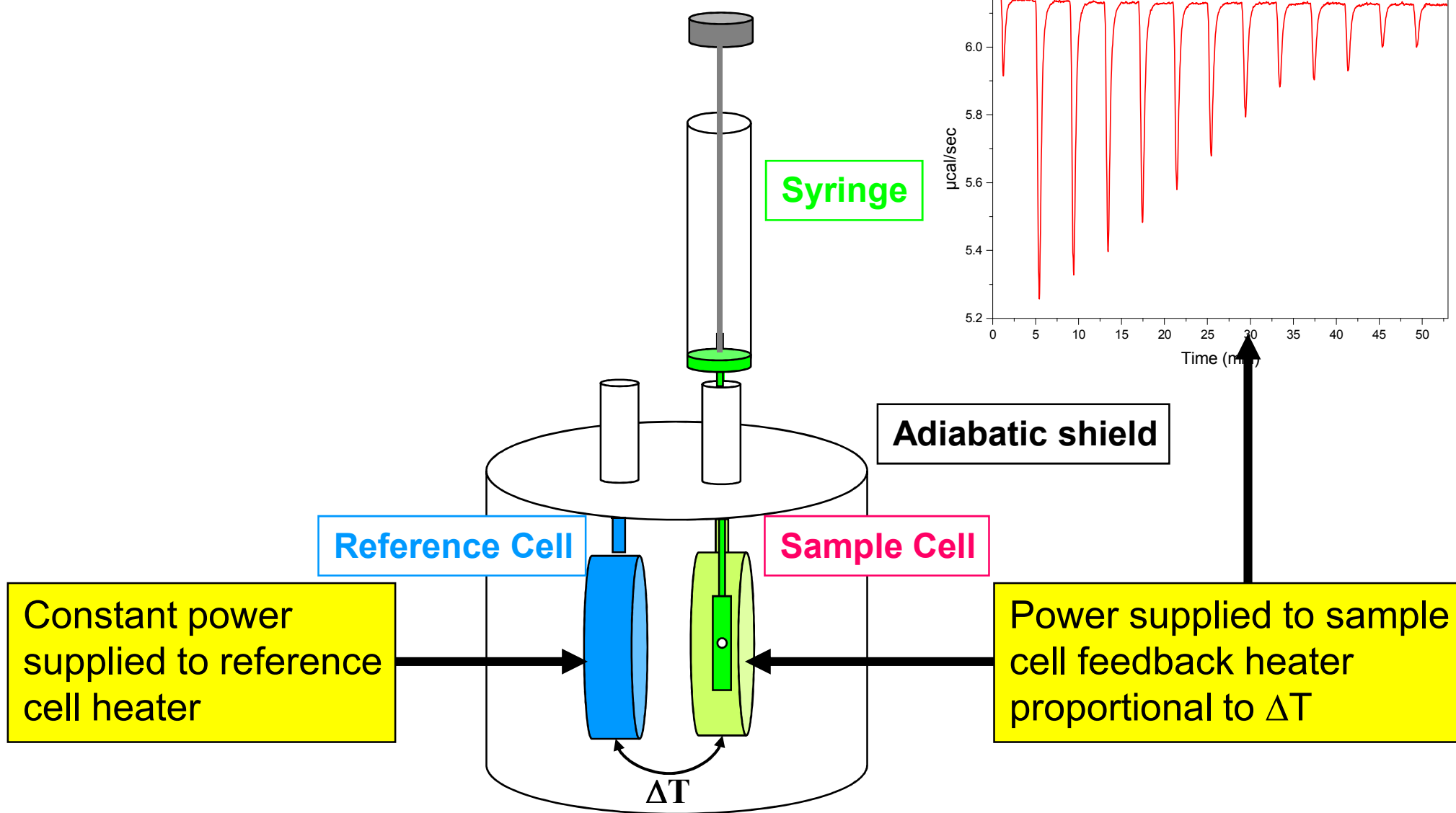
ITC Experiment



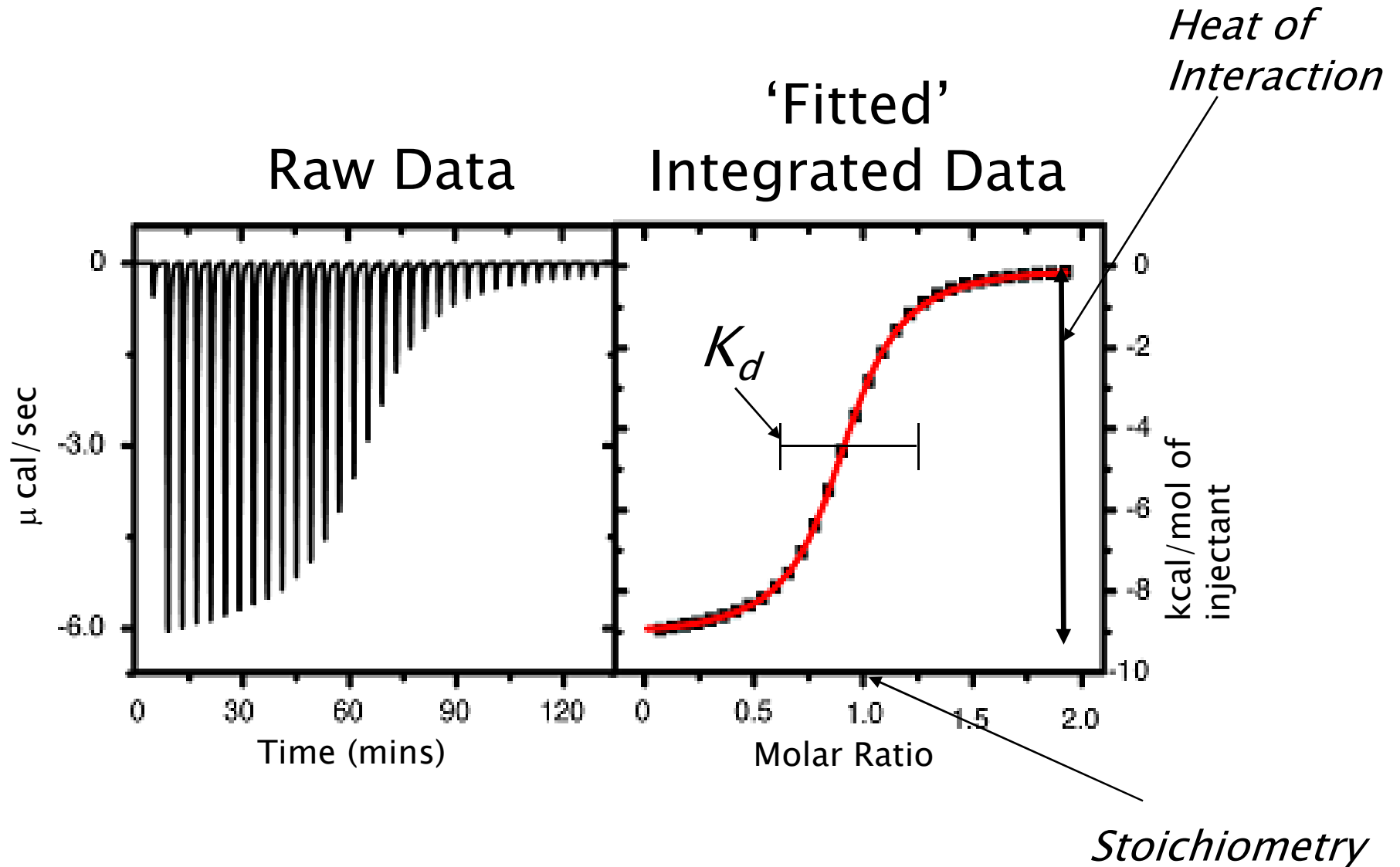
ITC Experiment



ITC Experiment



Typical Binding Data

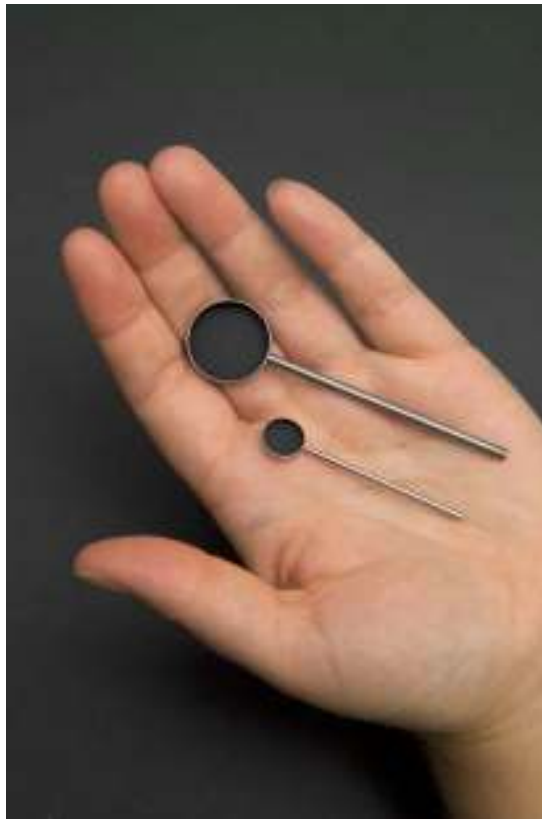


Applications

- Confirm binding / Determine binding affinity
- Energetic profiling of binding
- Determine stoichiometry
- Determine active concentration
- Determine if binding is specific
- Characterise mechanism of binding
- Determine K_m , k_{cat}

Isothermal Titration Calorimetry

Manual loading systems

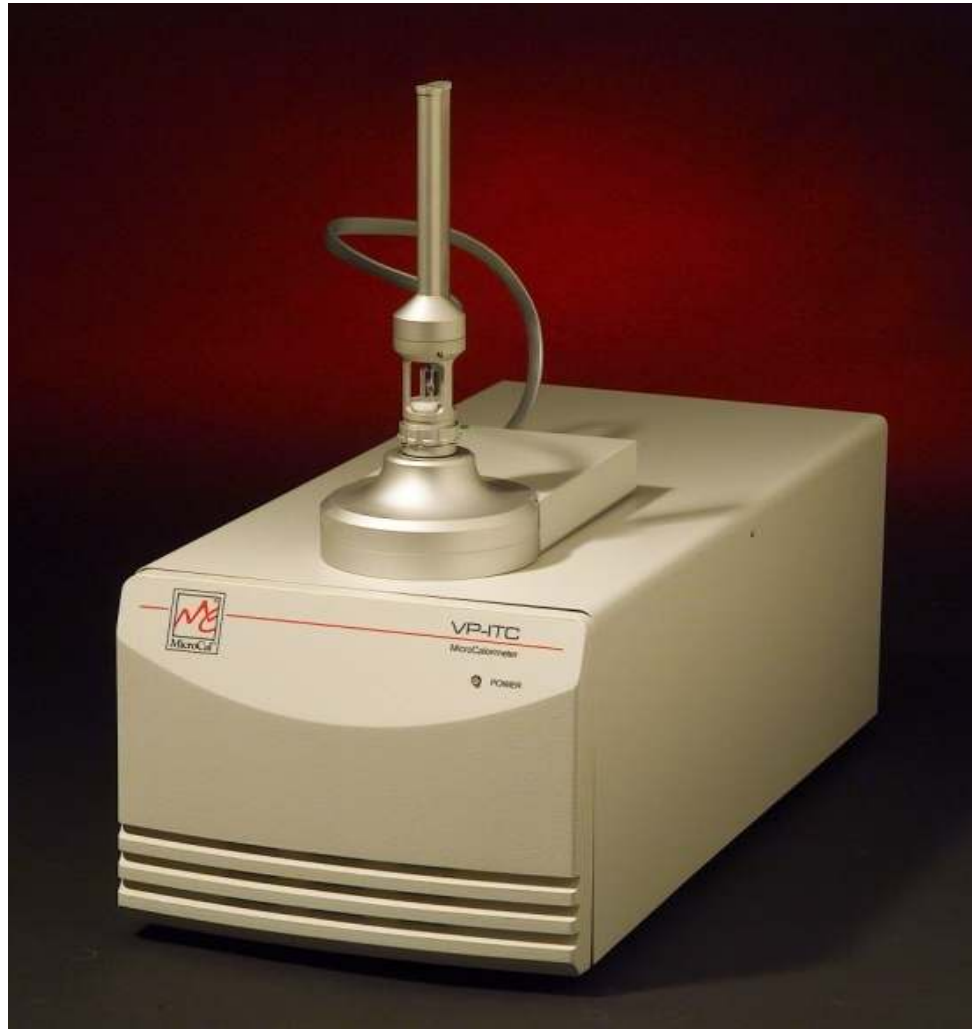


VP-ITC System

Single sample

Manual sample
loading

Up to 4 Samples per
day



iTC₂₀₀ System

Single sample

Manual sample
loading

Up to 15 Samples
per day



Automated iTC₂₀₀ System

Automated system
for high throughput
screening

Up to 50
samples/day

96-well plate format



The MicroCal Advantage™

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- Reliable, responsive customer service
- Consistently high customer satisfaction ratings
- An on-going commitment to advance calorimetry education through symposia, conferences, webinars and support materials