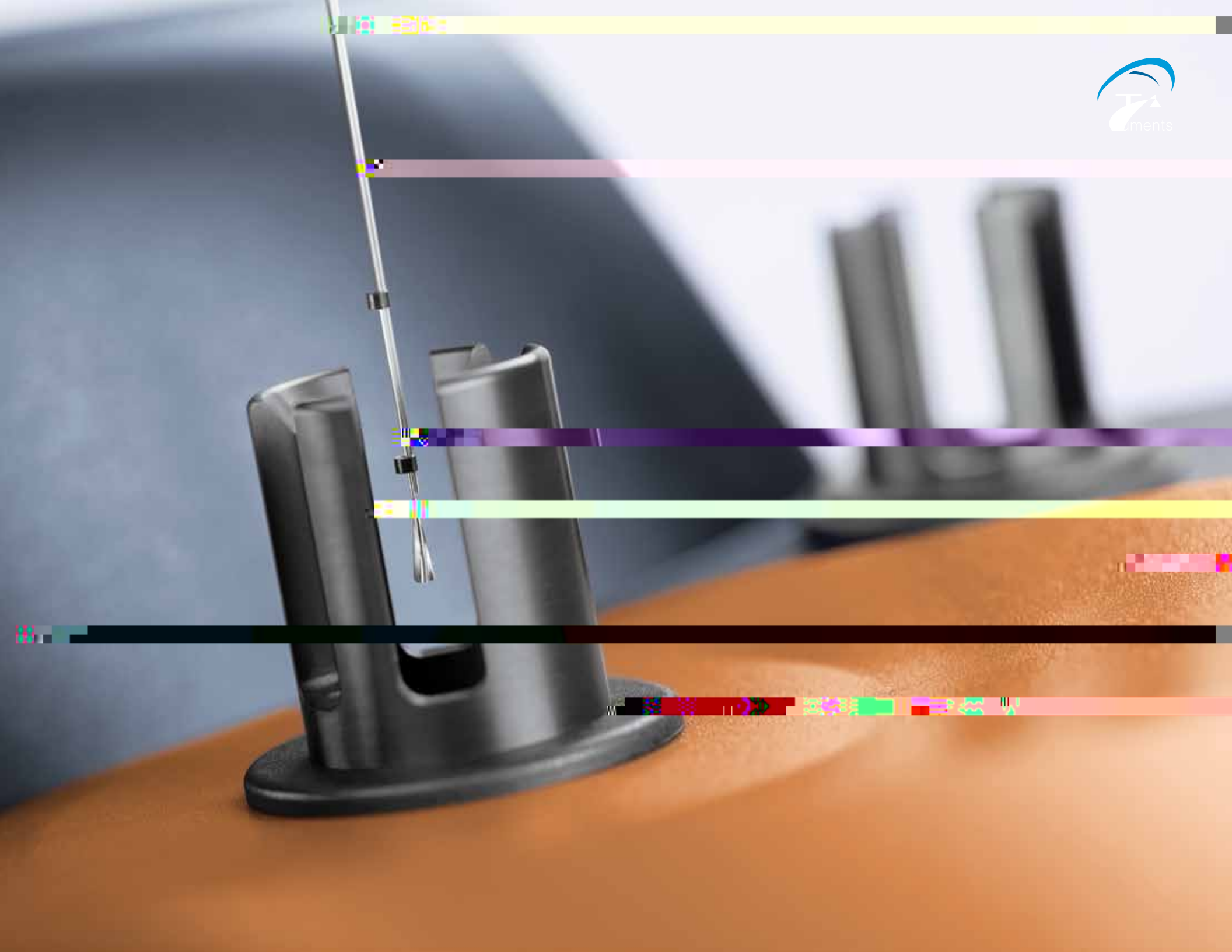


Microcalorimetry

The Affinity ITC and ITC Auto are designed for the most challenging life science laboratory environments that require high sensitivity, high productivity and the most advanced ITC technologies. The Affinity ITC brings advanced engineering to all critical aspects of the measurement ensuring the highest quality ITC data.

Features:

- t"DDV4IPU™ EFMJWFST UIF UJUSBOU UP UIF SJHIU MPDBUJPO GPS UIF CFTU NJYJOH
- t 'MFY4QJO™ QSPWJEFT JOOPWBUJWF
sensitivity
- t 'VMMZ BVUPNBUFE
contamination
- t *OUFMMJHFOU)BSEXBSF 1PTJUJPOJOH GPS QSFDJTF SFMJBCMF JOKFDUJPOT
- t 4PMJE TUBUF BDUJWF IFBUJOH BOE DPPMJOH GPS USVF JTPUIFSNBM UFNQFSBUVSF DPOUSPM
- t $IPJDF PG TUBOEBSE WPMVNF N- PS MPX WPMVNF DFMMT µL)
- t *OEVTUSZ QSPWFO
Autosampler can be included with initial purchase or added at a later date
- t 1PXFSGVM *5$3VO BOE /BOP"OBMZ[F GPS UIF NPTU DPNQSFIFOTJWF TVJUF PG UPPMT GPS
NFUIPE PQUJNJ[BUJPO BOE EBUB FYQPSU

TA Instruments has perfected what others have attempted. The Affinity ITC is a powerful
UPPMCPY
and advanced ITC users the highest confidence in generating superior ITC data.

The Affinity ITC cell is optimized in shape, material, and volume to provide the greatest measurement accuracy over the widest range of sample chemistries.

Choice of Cell Volumes:

5 I F " G G J ⊙ 5 ⅁ $ J Z

Solid-State Temperature Control & Power Compensation Operation. The Af nity ITC utilizes multiple solid-state thermo-electric elements for active heating and cooling of the sample and reference cells.

Advantages of active heating and cooling:

- t 'BTUFS IFBUJOH BOE DPPMJOH CFUXFFO UFNQFSBUVSF TFU
- t 3BQJE FRVJMJCSBUJPO BU UFNQFSBUVSF TFU QPJOU
- t"DUJWF UFNQFSBUVSF DPOUSPM IFBUJOH

New FlexSpin technology dramatically improves one of the

AccuShot™

The precision and the location of the titrant delivery are critical to obtaining the highest quality ITC data. The AccuShot injection system has been completely redesigned to optimize these factors. AccuShot delivers the right amount of titrant in the right location, every time.

Features:

- *OKFDUJPO TZTUFN TFQBSBUF GSPN TUJSSJOH NFDIBOJTN
- 4ZSJOHF OFFEMF QPTJUJPOFE UP EFMJWFS UJUSBOU BU UII NJYJOH BOE TIBSQFS QFBLT
-)JHI QSFDJTJPO TUFQQFS NPUPS GPS UIF NPTU BDDVSBUF E JOKFDUJPO
- *NQSPWFE TBNQMF EFMJWFSZ TZTUFN EFDSFBTFT FRVJMJCS
- 4NBMM EJBNFUFS DBOOVMB NJOJNJ[FT TU JOKFDUJPO EJGG
- 4JOHMF TZSJOHF GPS BMM JOKFDUJPO WPMVNFT BOE FYQFS
- 2VJDLBTZ TZSJOHF SFQMBDFNFOU
- &BTZ UJUSBOU MPBEJOH XJUIPVU JOKFDUJPO TZSJOHF SFN
- 'VMMZ BVUPNBUFE JOUFSOBM BOE FYUFSOBM DMFBOJOH PG

Af nity ITC Auto Cleaning Ef ciency

The NANO ITC features many of the high performance technologies found in the Af nity ITC. It is a versatile, high-sensitivity, cost-effective isothermal titration calorimeter that can easily outperform competitive systems in a wide range of applications.

Features:

- $IPJDF PG 4UBOEBSE N- µL) cells
- 4PMJE TUBUF BDUJWF IFBUJOH BOE DPPMJOH GPS USVF JTPUIFSNBM UFNQFSBUVSF DPOUSPM
-)JHI QSFDJTJPO JOKFDUJPO CVSFU GPS BDDVSBUF UJUSBOU EFMJWFSZ
- 6OJRVF SFNPWBCMF JOKFDUJPO TZSJOHF GPS GBTU SFMJBCMF MPBEJOH BOE DMFBOJOH
- 1PXFSGVM *5$3VO BOE /BOP"OBMZ[F GPS UIF NPTU DPNQSFIFOTJWF TVJUF PG UPPMT GPS NFUIPE DPNQS NFUEd DPN¬ U4 ^ÄðPVO `@ @ ð

Nano ITC

5&$)/0-0(:

The Nano ITC cell is optimized in shape, material, and volume to provide the greatest measurement accuracy over the widest range of sample chemistries.

Choice of Cell Volumes:

5 I F/ B O P* 5 $ G F B U V SXRTJ Y F E J O D Q M B D F N D F U M T B N Q D F X M F S J F O K F D U J P O T

U B L Q M B D E B N B U D I J S F G F S F D C D M X P D F M V P M V N B S T B W B J M B C M F

4 U B O E B S E 7P M V N F B O E 7P M V N F

Selection of cell volume depends on the range of binding constants to be measured (K d

N . U P M P X . B O E U P B W B J M B C M F * O T U S V N F Y O Q U T J F Q Q E M J D B U J P O

teams can recommend the best instrument configuration for your specific measurement

reQ[ÿ 8 <DDFF 520 >R BÇ Ê<6001>Tj EMC 1.16 0 Td [<004E004200550044>5<0049004A0043-4BDCi46004400550045Cyl3.1rical Crþÿ ç*ç.À& A `× S B J M B C M F :¬®þÿ

-PX 7PMVNF

(˜-)

4UBOEBSE 7PMVNF

N-

The Nano ITC utilizes multiple solid- state thermoelectric elements for active heating and cooling of the sample and reference cells. A unique removable buret and injection syringe ensures easy sample loading and accurate sample delivery.

Accurate Temperature Control with Active Heating and Cooling :

- t 'BTUFS IFBUJOH BOE DPPMJOH CFUXFFO UFNQFSBUVSF TFU QPJOUT
- t 3BQJE FRVJMJCSBUJPO BU UFNQFSBUVSF TFU QPJOU
- t "DUJWF UFNQFSBUVSF DPOUSPM FMJNJOBUFT ESJGU PO MPOH *5$ FYQFSJNFOUT

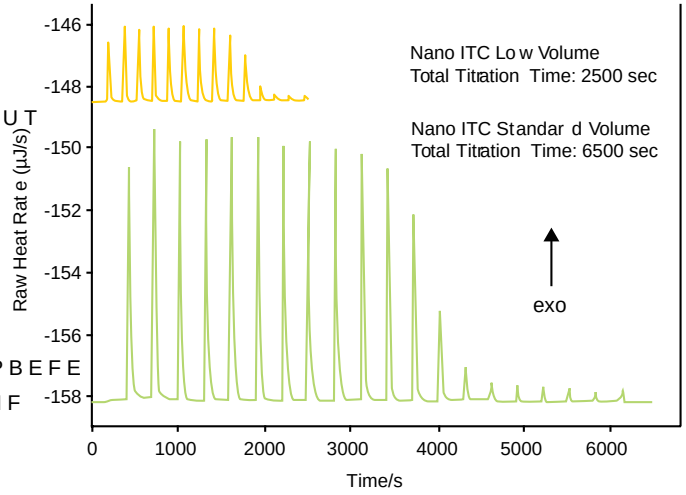
The absorption or evolution of heat as a result of a binding reaction is detected by the UIFSNPFMFDUSJDIBUQSXFSBEKVTUFSBJOUBUPFNQFSBUVSF difference between the sample and reference cell at zero. The combination of power compensation and thermoelectric temperature control ensures the fastest response and higw é þÿ U ð r 'u×ê¾ %þª£Žú½8 %ƒ I½Ê ±• eêì§0î_ð ^à ™6 ê®à ^Žã «î i ^úªs ëÜp Šª‰“aŽ«¨7 ` ‘ D P O B U E S J G U P O Y8ï«Ó•êÍã ì0O U Z¬U P O

ITC

"11-*$"5*0/4

Low and Standard Volume Comparison

5 I F T F O T J U P J B M V F B Z O P * 5 $ P X 7 P M V N F O T V S U F B X U J U M F T B N Q M F J O T U S V N F O U
will generate accurate and reproducible results in a shorter overall titration time. The
4 U B O E B S E T V B M V N F O E P X 7 P M V N F O P * 5 $ J O T U S V N F O U T F O T J U J W J U Z G P S Q F S G P S N J O H B X J E F W B S J F U Z P G * 5 $ F Y Q F S J N F O U T

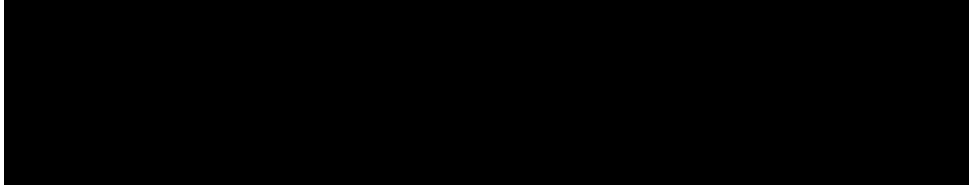


Nano ITC Low Volume:

- Sample Cell = $KHCO_3$ N.
- * O K F D U J P O 4 Z S J O H F .) $ M
- * O K F D U J P O W P M V N F û -
- * O K F D U J P O J O U F S W B M T F D
- provides the highest sensitivity
- D B O Q S P E V D F T I P S U F T U U J U Q B S U J E P V D E T I N F F I R V B M J U Z E B U B X I F O U I F
- J T J E F B M G P S N B Y J N J [J O H Unfortunately, these interactions are high affinity and
  minimum sample consumption

Nano ITC Standard Volume:

- Sample Cell = $KHCO_3$ N.
- * O K F D U J P O 4 Z S J O H F .) $ M
- * O K F D U J P O W P M V N F û -
- * O K F D U J P O J O U F S W B M T F D
- B M M P X T N P S F T B N Q M F N B T T U P C F M P B E F E
- Q B S U J E P V D E T I N F F I R V B M J U Z E B U B X I F O U I F
- unfortunately, these interactions are high affinity and
  yield low heat values

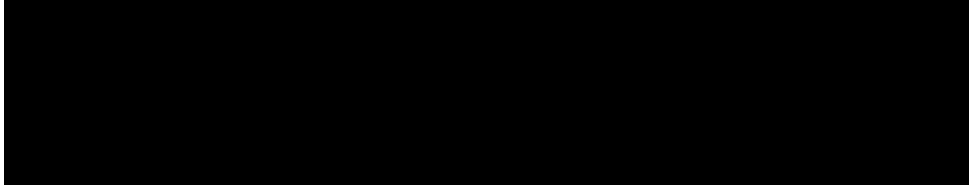


Characterization of Enzyme Kinetics

The Nano DSC has the versatility and precision for characterizing molecular stability, determining high affinity ligand binding and deconvoluting multi-domain structures. There is no other DSC with the proprietary technologies, high performance or the sample throughput of the Nano DSC and Nano DSC Auto.

Features:

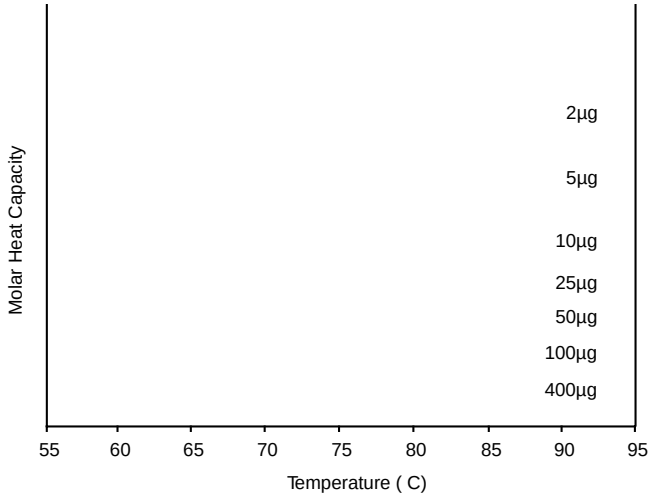
t)JHIFTU TFOTJUJWJUZ BOE MM WPMVNF GPS VONBUDIFE QFSGPSNBODF



The Nano DSC is designed for ultra-sensitive measure of heat absorbed or released by dilute in-solution bio-molecules as they are heated or cooled. The capillary cell design, solid-state thermoelectric temperature control and easy cleaning ensure the highest sensitivity and data reproducibility for a

How much Protein is Required for a DSC Scan?

Determining the thermodynamic parameters of a protein by differential scanning calorimetry (DSC) using the Nano DSC requires about the same amount of protein as T V S G R Q D M F B T N S F F C T P O B K P S G F M V P S F T T D U F V O E D A F F T D B V F T G U I F B O P % 4 $ F T Y U S F N F T F O T J U B J O W E C B Z F M S J F O Q F S P E V D B J O C L M F T U B Z N Q M F M T M N B W F M V N F ˜ - B complete, interpretable, accurate scan can be obtained on essentially any protein of interest. The sensitivity and accuracy of the Nano DSC is demonstrated by this data. Hen F H H X I J U M F Z T P [Z N Q) H M Z D O V G X F S T Q S F Q B B W E B S J D F Y O D F O U S T U J P O T little as 2 µg of lysozyme in the capillary cell is sufficient to provide quality data yielding accurate values of all four thermodynamic parameters!

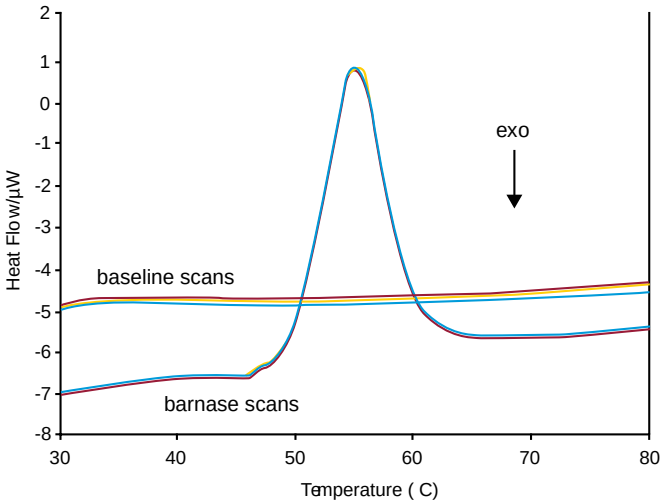


Nano DSC

"11-*$"5*0/4

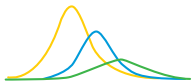
Characterization of Protein Stability

Analyzing the stability of a protein in dilute solution involves determining changes in the Q B S UJFBNMBFSB UD B Q B DFJGUZFQ S P UBFUDP O T UQBSDFUT T V$QF 5 I FD P O U S J GPVGU J P O the protein to the calorimetrically measured heat capacity (its partial Cp) is determined by subtracting a scan of a buffer blank from the sample data prior to analysis. Heating the protein sample initially produces a slightly increasing baseline but as heating progresses, heat is absorbed by the protein and causes it to thermally unfold over a temperature range characteristic for that protein, giving rise to an endothermic peak. Once unfolding is complete, heat absorption decreases and a new baseline is established. After blank subtraction, the data can be analyzed to provide a complete thermodynamic characterization of the unfolding process.



Characterization of Protein Structure

% 4 $D B C FV T F E PD I B S B D U E S PJ U F I FT Q F D JCGJDE JPOBHM J H B C E F SY B N Q M F E S VHB S F D F QCUJPOSE JTCJHF S O P O T Q F D J G E D G F SY B N Q M F U F S H E C OUE J O H to hydrophobic patches on a protein surface). In some instances ligand binding, even if to a specific receptor site, results in long-range protein structural rearrangements that E F T U B C U JMF[DFU JDSPN Q MEFY G J H V T $ F X T % 4 $T D B O PTC$ B2+ saturated bovine B MB D U B MBCUWN$ JCJ Q Y$ P U F2J C$ B, O J JPDTB O OBF E ¡ $ N J G I F N J E Q P P CGU F U I F S NVBOMG P MEGUO Q S P UEF D S F BGT$ P N ¡ $ J OU I FB C T F OPDGC2+ UP ¡ $ B U B Q S P UF2J C$ B, OPJGP 5 I FF O U I B MP QVZO G P MJETBOMEFF D S F B T$ VE C T U B OCUZJ B M M Z I J H I ,2+O concentrations.



Investigation of Protein-Ligand Binding

DSC is a valuable tool for studying binding between a biological macromolecule and a

M J H BTOVEDB TB O P U IOFJSP Q P M P2 SBES V 6HO M J 5 $% 4 $B M M P XFU I F S N P E Z O B N J D T

that drive binding to be correlated with conformational changes in the macromolecule

caused by the binding reaction. DSC is particularly useful for characterizing very tight

or slow binding interactions. DSC also allows characterization of binding reactions that

B S F O D P N Q B X J OUMFP S H B CTJPDM WSFOUV J S F NPFGORUNTF 5 $F Y Q F S J N FJOFU T

X I F S M J H BTOPEM V CGJMSDU $F Y Q F S J NSFOUV JDSFOT D F O U SB OP JSHBTOJPDM W F O U

not tolerated by the protein).The data shows DSC scans of RNase A bound with increasing

D P O D F O U SB G J $.1T I P X J OUHBUIFQ S P UJFTTOB C J M J [F NÄ 0Ð @ ð @ ` ð P 0 þÿ) 0PÐ Ð € ð P D P O D F O U S B U J P O T

Instrument Control & Data Acquisition Software

5 I F " G G J O U E Z B O P J O T U S V N D P O U U B S P M B U B D R V J T J U J P O T P G U Y P D V U F E

X J U I B O J O E P X T D P N Q B U J C M F T F S J F T T P G U X B S F U P D P O U S P M

parameters and sample information are easily entered into an intuitive graphical user

J O U F S G B D F B O E D B O C F T B W F E B T B O F Y Q F S J N F O U B M U F N Q M B U F G P S G V U V S F V T F

3 F B M U N J N F J U P S U P D P O G J H V S F B X E B U B T U I F Y Q F S J N F O U B M F N V M T F S X B T Q J E

B T T F T T N F O U F E B U B V B M J E B U B V O E S W B M J E B U J P O J O E J W J E V B M

icon-controlled functions, such as immediate baseline subtraction, are always available

on the display.

ITCRun & DSCRun features:

- t " V U P N B U J D D P O G J H V S B U J P O P G V T F S J O U F S G B D F G P S B V U P N B U F E P S O P O B V U P N B U F E
  instruments
- t * O E J W J E V B M W J F X J O H U B C T G P S S F B M U J N F N P O J U P S J O H P G J O T U S V N F O U Q F S G P S N B O D F
  characteristics and raw data acquisition
- t & B T Z F Y Q F S J N F O U T F U V Q
- t % J S F D U B V U P T B N Q M F S Q S P H S B N N J O H B O E D P O U S P M G P S B V U P N B U F E J O T U S V N F O U T N P O J U P S J O H G P S þÿ G P S W J F X J O H G P S þÿ G

ITC & DSC

41&$*'*$"5*0/4

Af nity ITC and ITC Auto	Standard Volume	Low Volume
.JOJNVN %FUFDUBCMF)FBU		