Molecular Interaction Research Group

Simon Bergqvist	***Pfizer Inc.***
Michael Doyle	***Bristol-Myers Squibb***
T. Neubert	**NY University Sch. of Medicine**
M. K. Robinson	**Fox Chase Cancer Center**
Satya P. Yadav	***Cleveland Clinic Foundation***
Aaron P. Yamniuk	**Bristol Myers Squibb**

Survey Result Presented by:

Satya P. Yadav

Lerner Research Institute

Cleveland Clinic Foundation

Objective

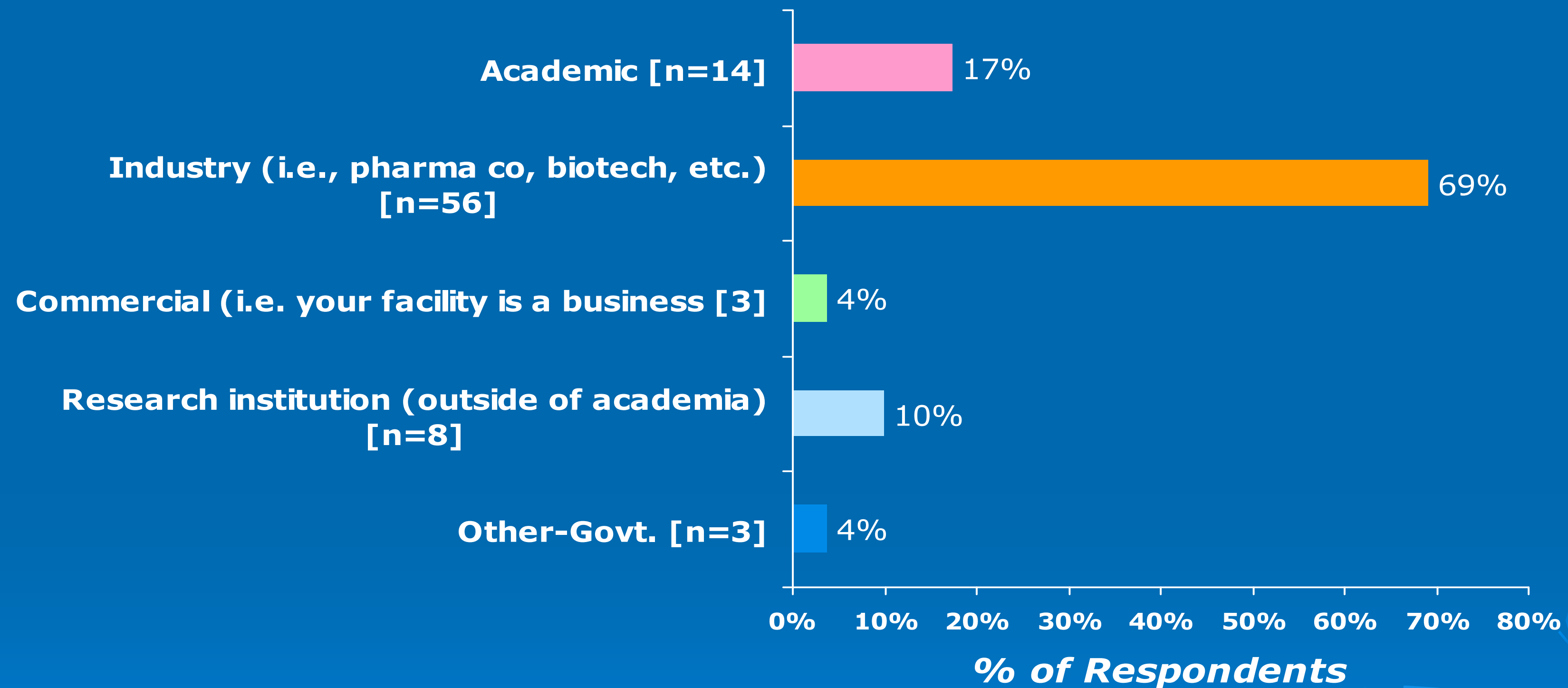
The main goal of the survey was to take a snap shot on the following:

- **Type of laboratories i.e. academic, industry, or commercial etc.**
- **Instrumentation used**
- **What kind of biophysical parameters are measured**
- **Confidence of data interpretation**
- **Data validation and acceptability**
- **Limitations of using ITC, SPR or AUC**

Methodology

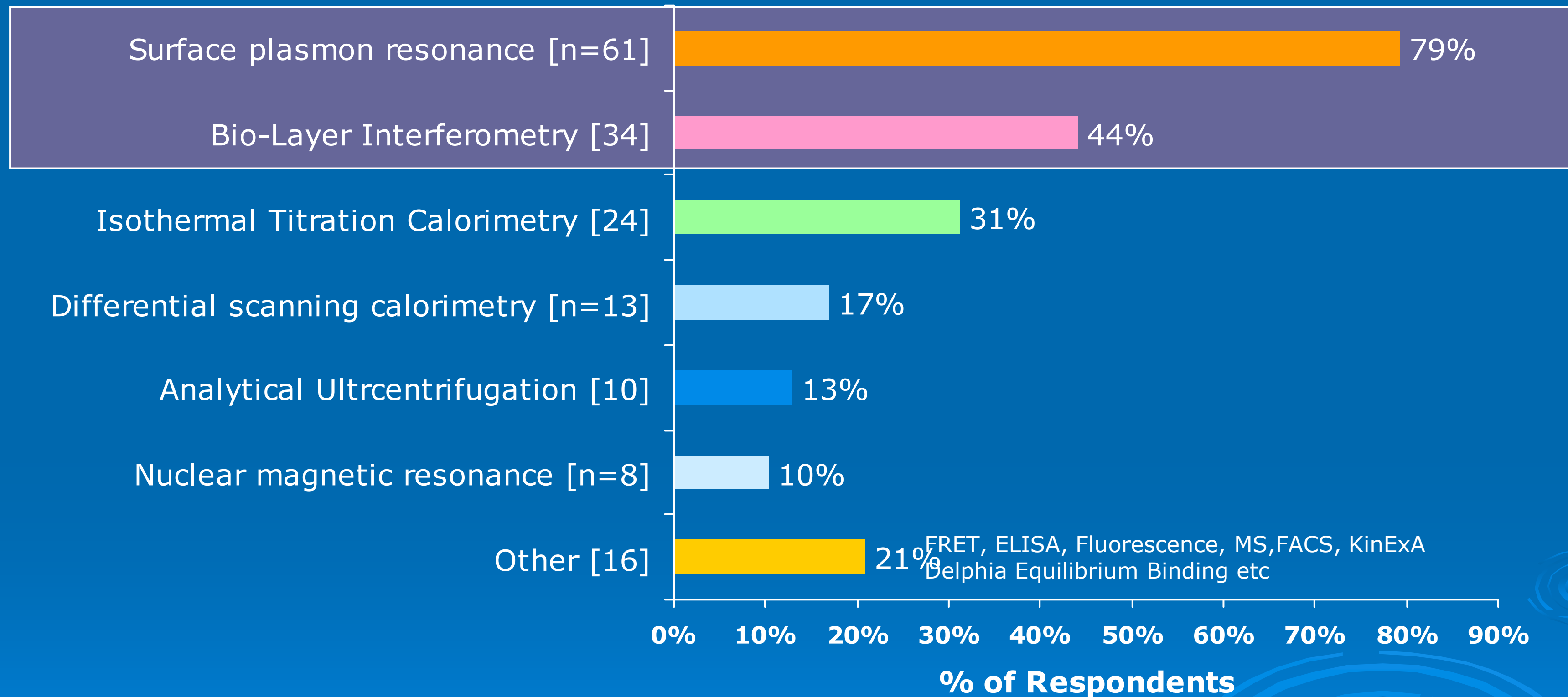
- Online survey completed between January 14 –February 11, 2011
- Number of respondents:
  82 laboratories who use various label free technologies

Q1. What type of Biomolecular Interaction Analysis laboratory do you have (check one)?



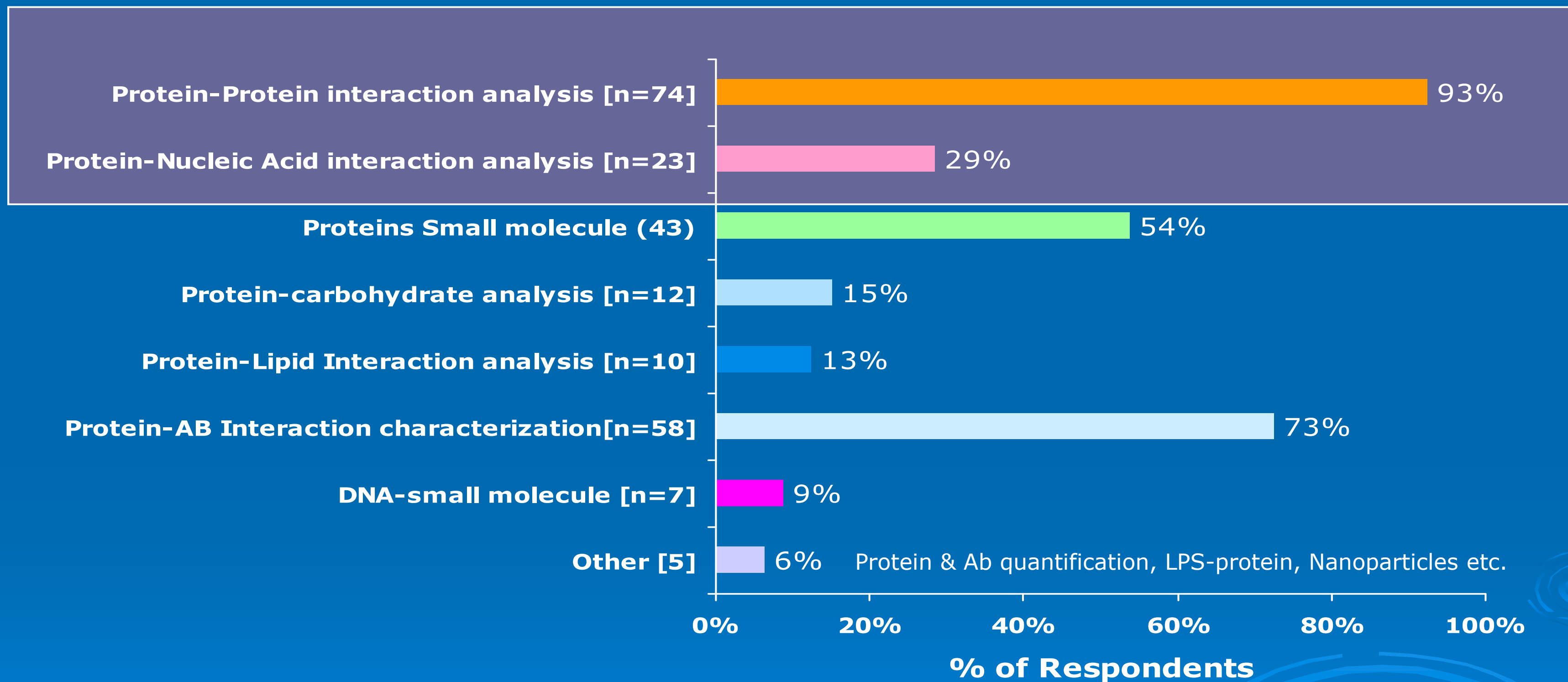
No. of Respondents = 81

Q2: What technologies do you use for quantitative analysis of biomolecular interactions (check all that apply)?



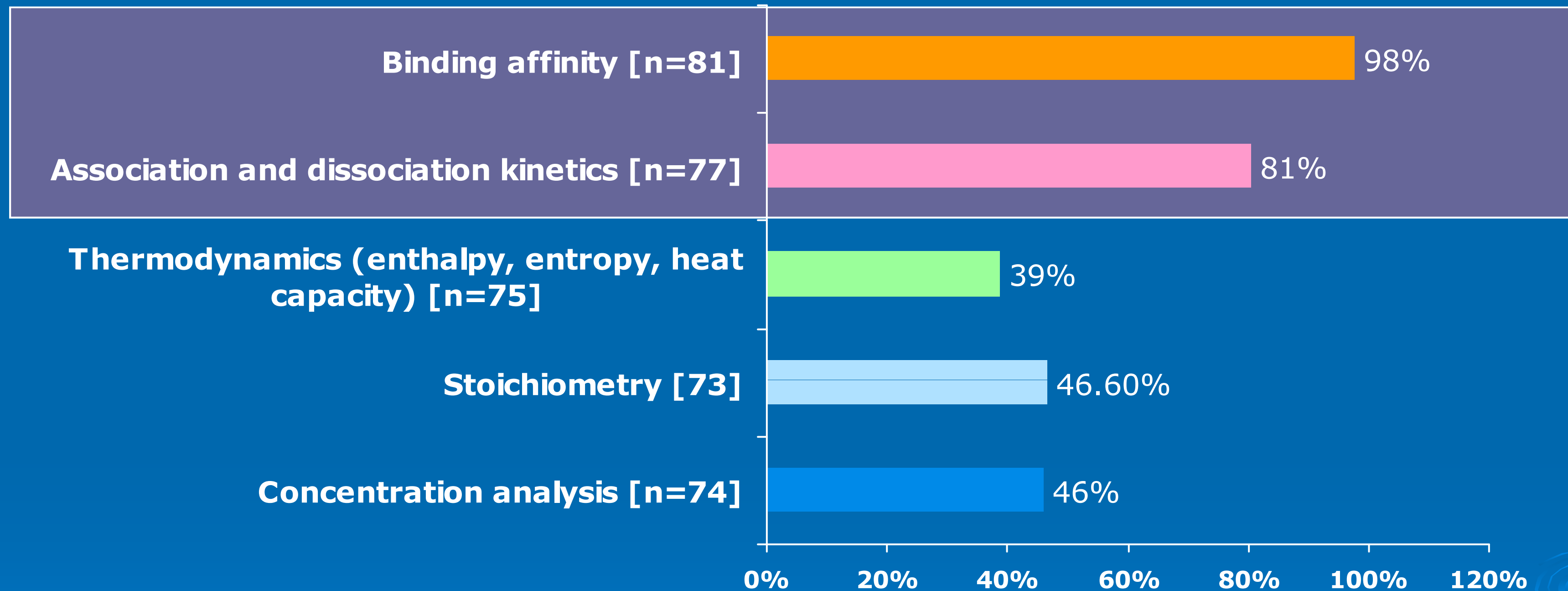
No. of Respondents: 77

Q3: For what applications do you use the instruments in your lab (check all that apply)?



No. of Respondents: 80

Q4: What type of molecular parameters do you find most valuable to know from the above technologies?

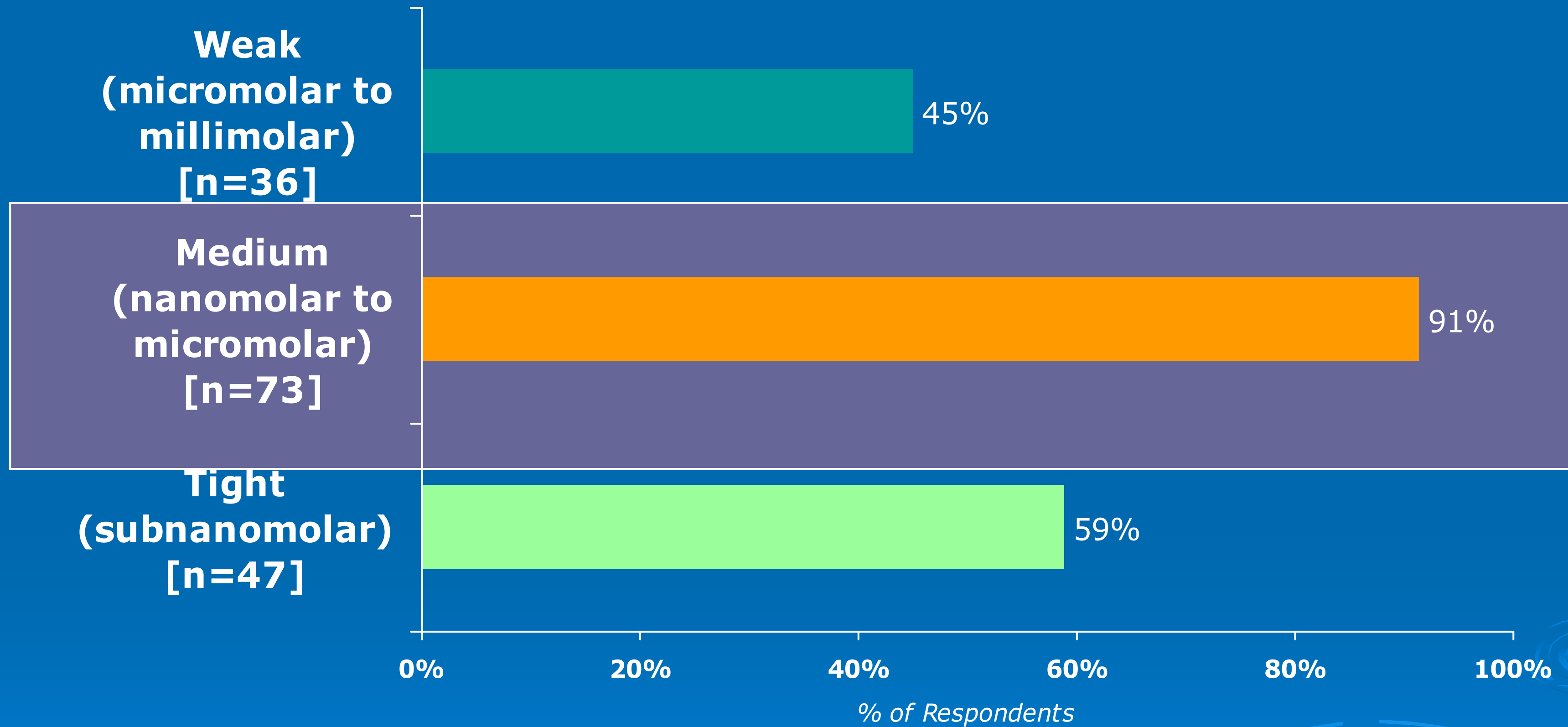


% of Respondents Rating 1 & 2 for Each Parameter (on a scale of 1-5)

Rating of importance on a scale of 1 to 5, with 1 being of Highest Importance

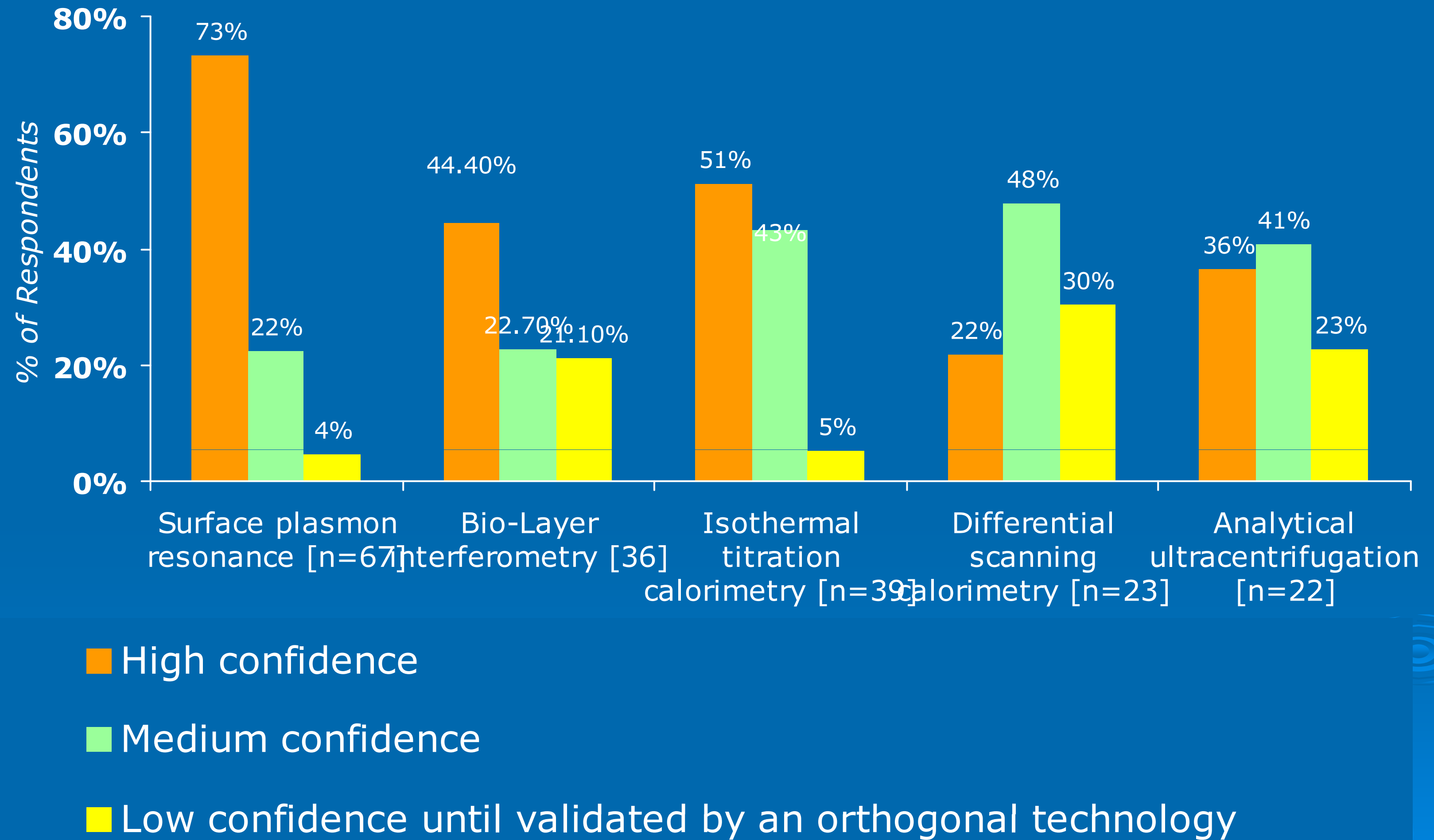
No. of Respondents: 81

Q5: What range of KD values are normally measured in your laboratory (Check all that apply)?



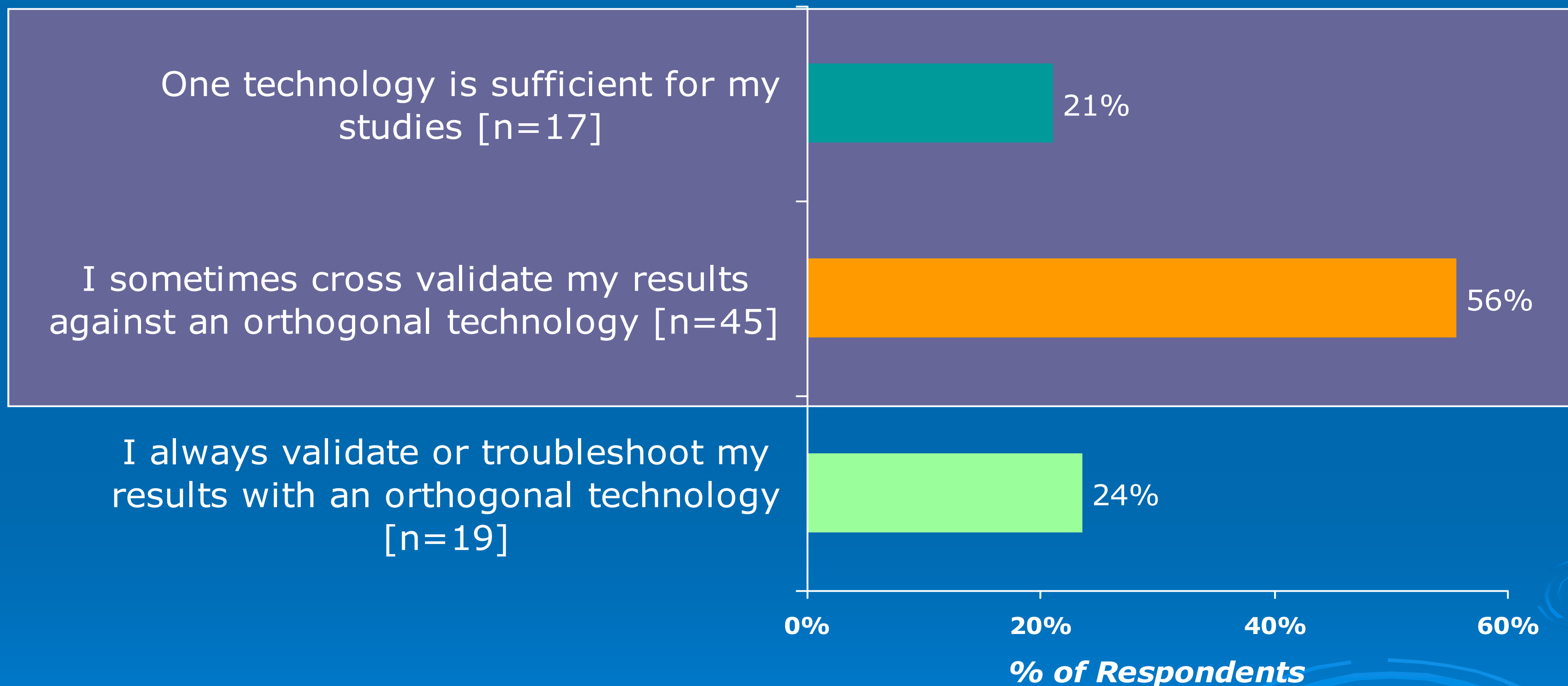
No. of Respondents: 80

Q6: How confident are you that affinity values determined by the following methods are accurate?



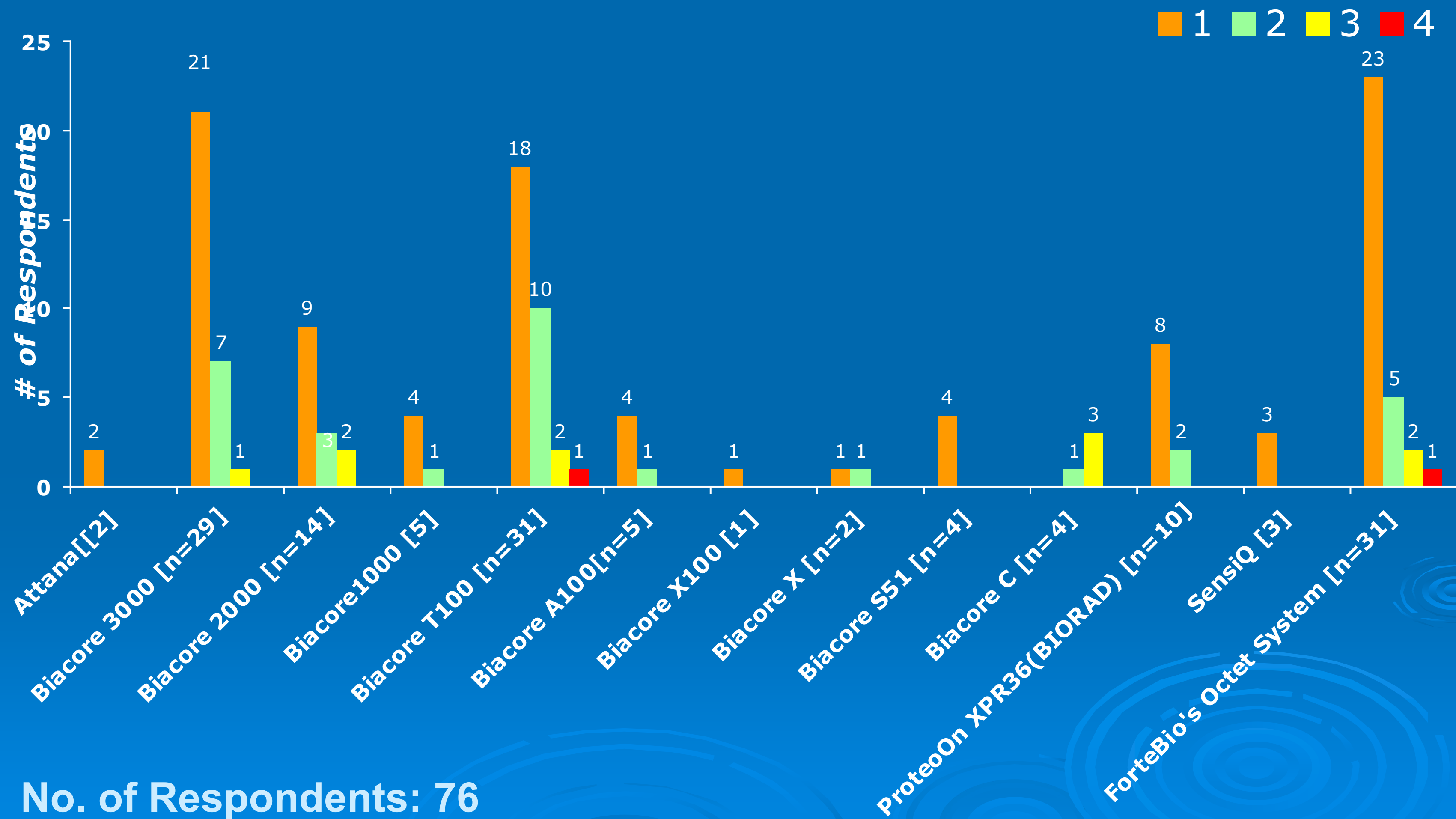
No. of respondents: 79

Q7: How important is it for your work to use more than one technology for determining quantitative biomolecular interaction parameters?



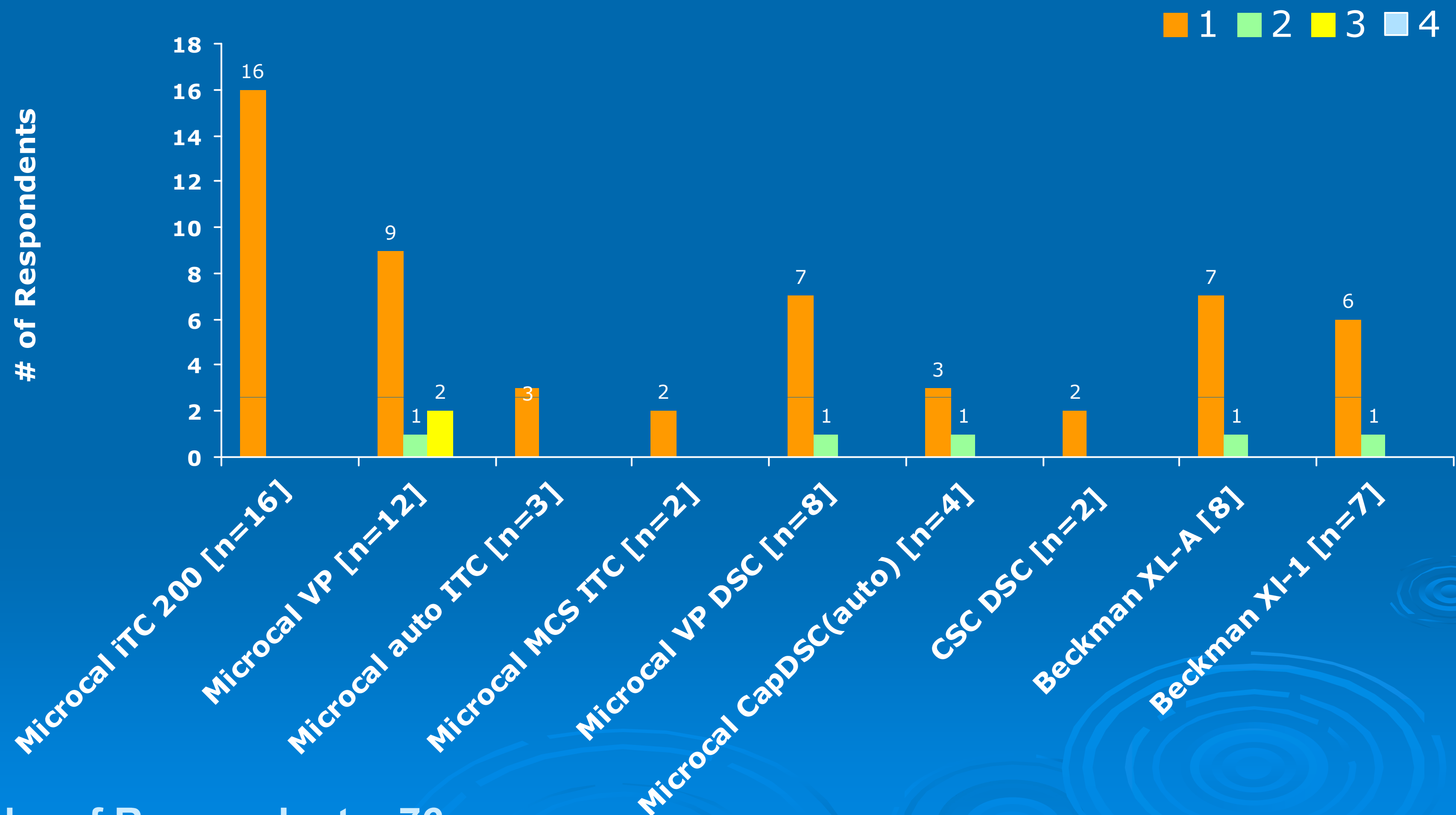
No. of Respondents: 81

Q8: What type of instruments do you have in your laboratory (Please indicate the number of instruments available)? - SPR Instruments



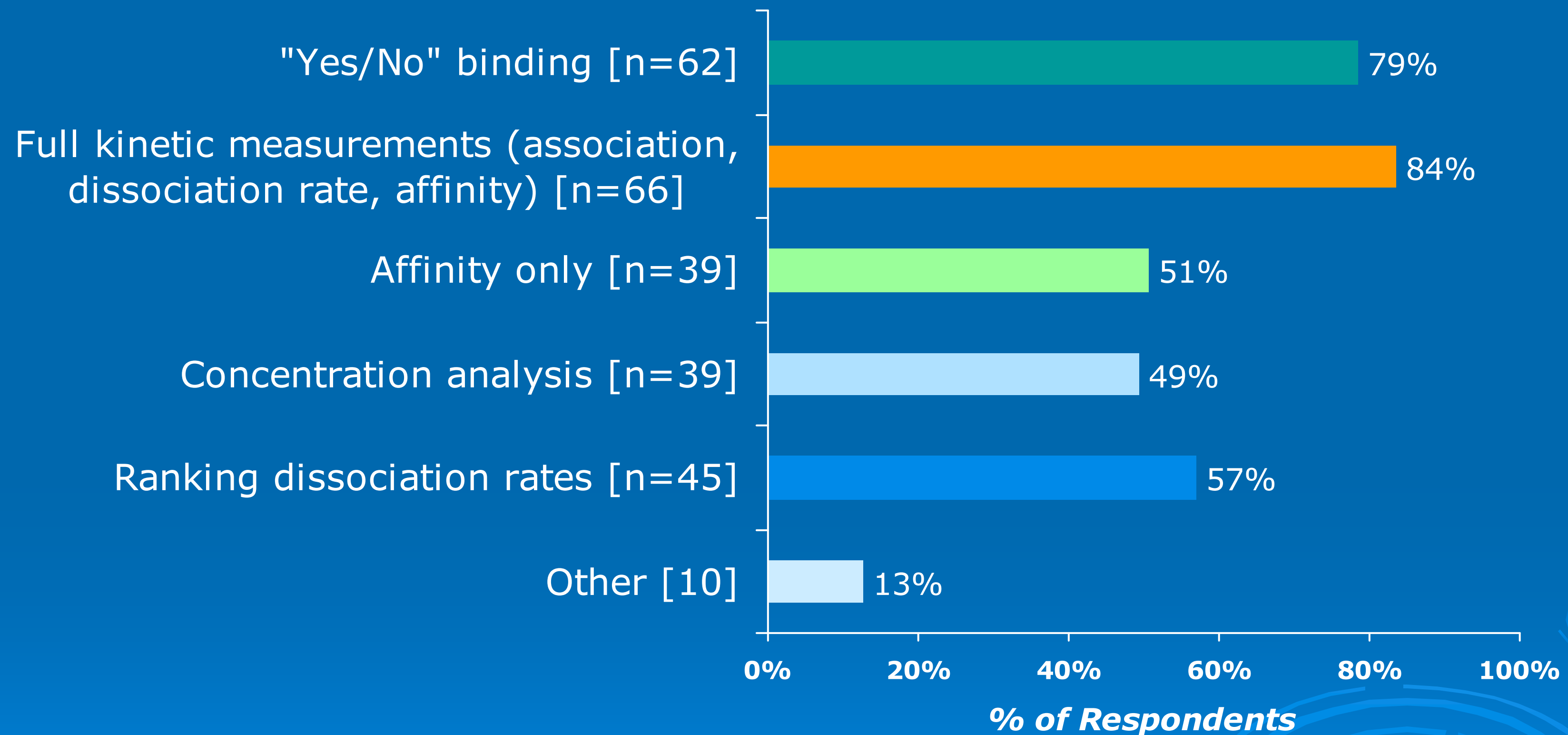
No. of Respondents: 76

Q8: What type of instruments do you have in your laboratory (Please indicate the number of instruments available)? - ITC



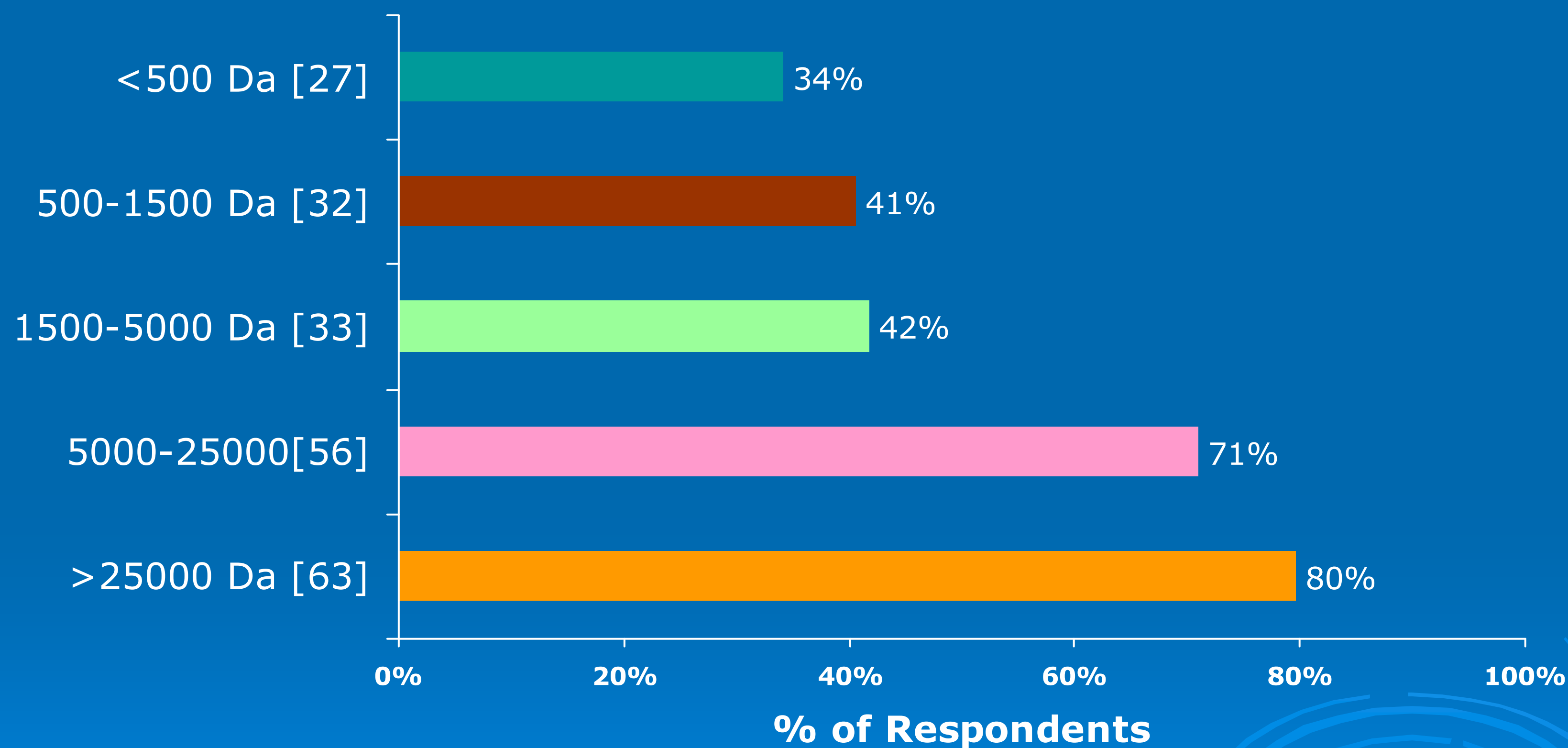
No. of Respondents: 76

Q9: What type of measurements do you routinely carry out using biosensor technologies (Please check all that applies)?



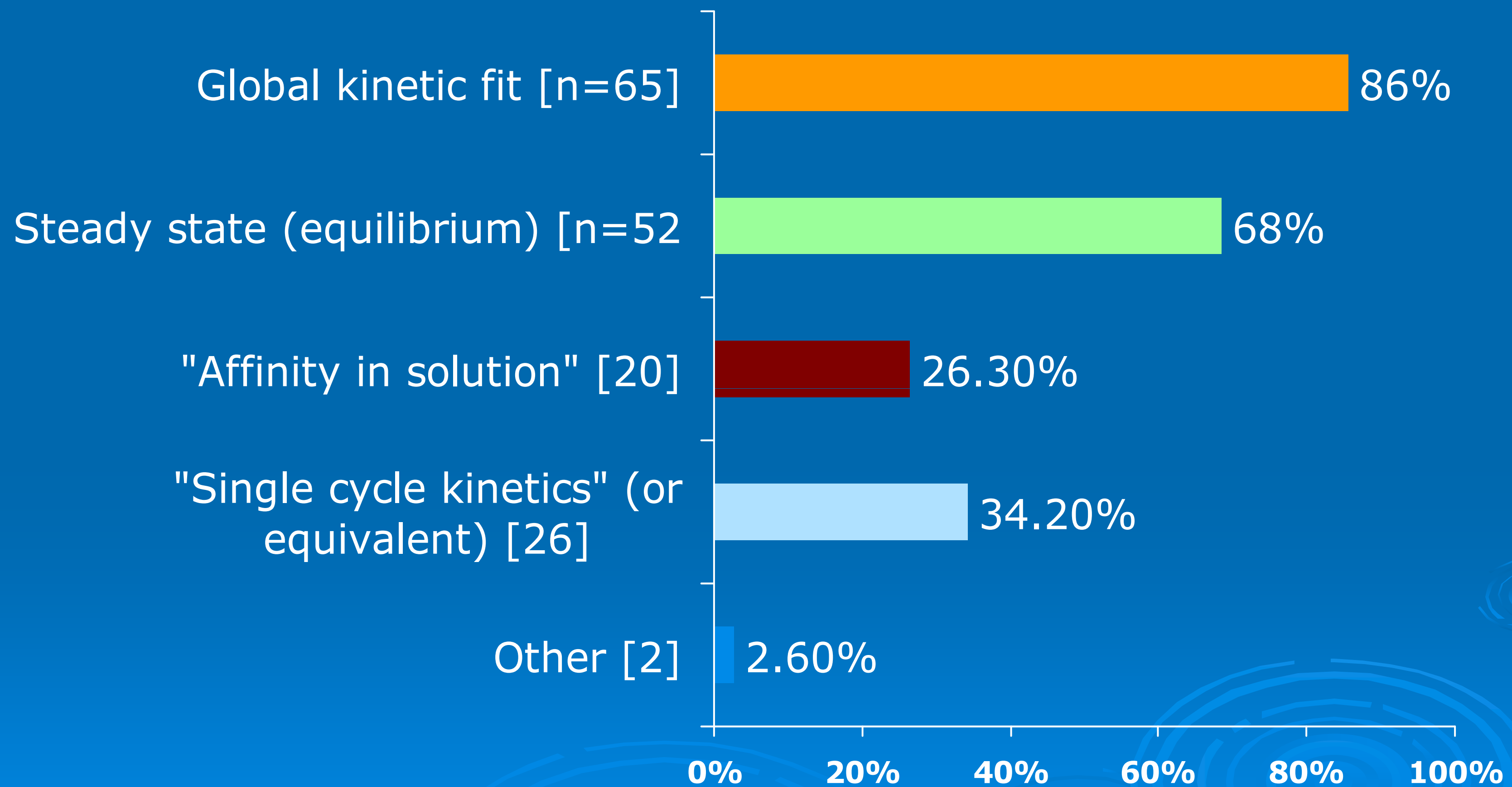
No. of Respondents: 79

Q10: What analyte size range (s) do you study using biosensor technologies (please check all that apply)?



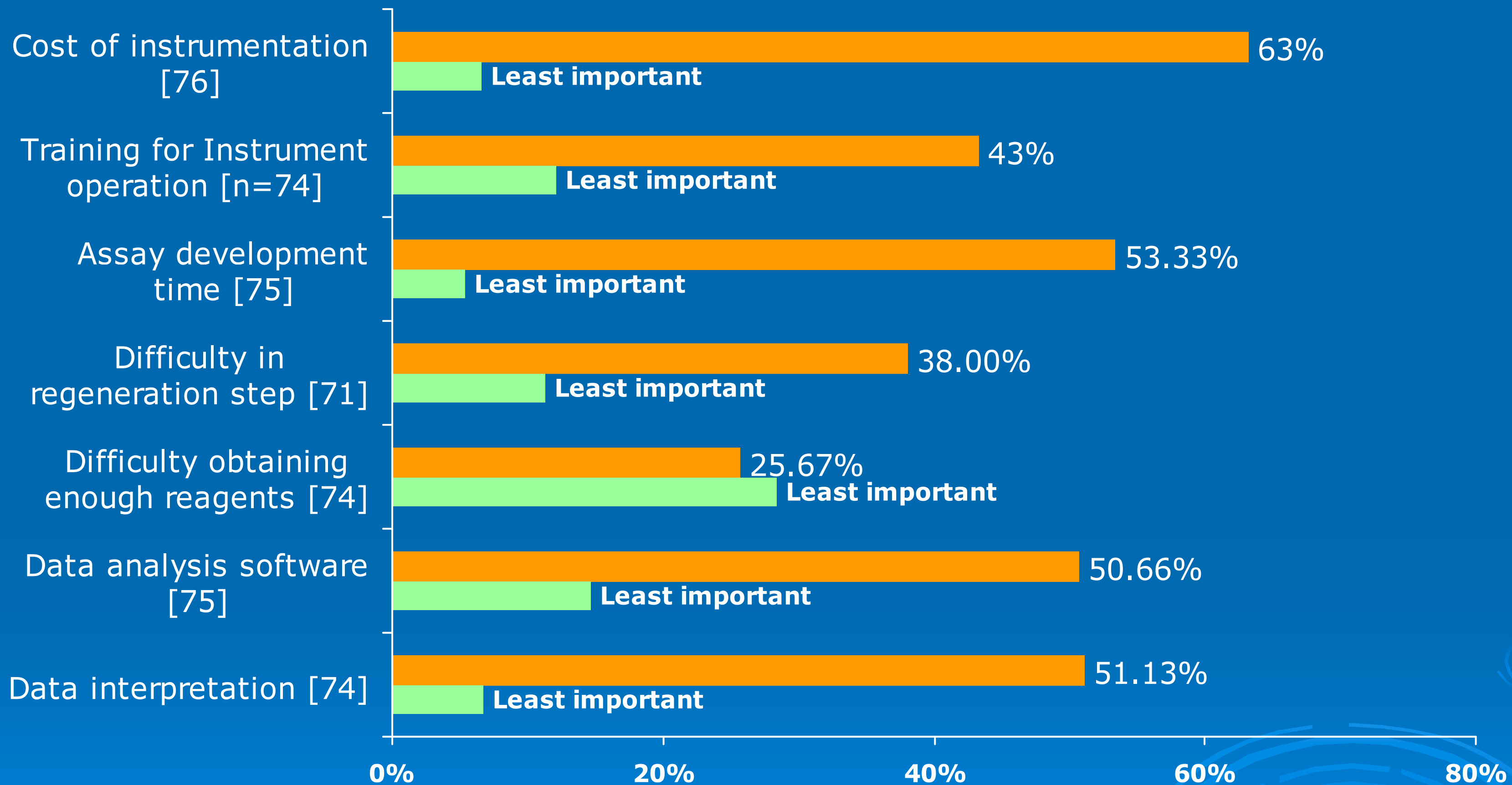
No. of Respondents: 79

Q11: What method do you use to determine binding affinity using biosensor technologies? (please check all that applies)



No. of Respondents: 76

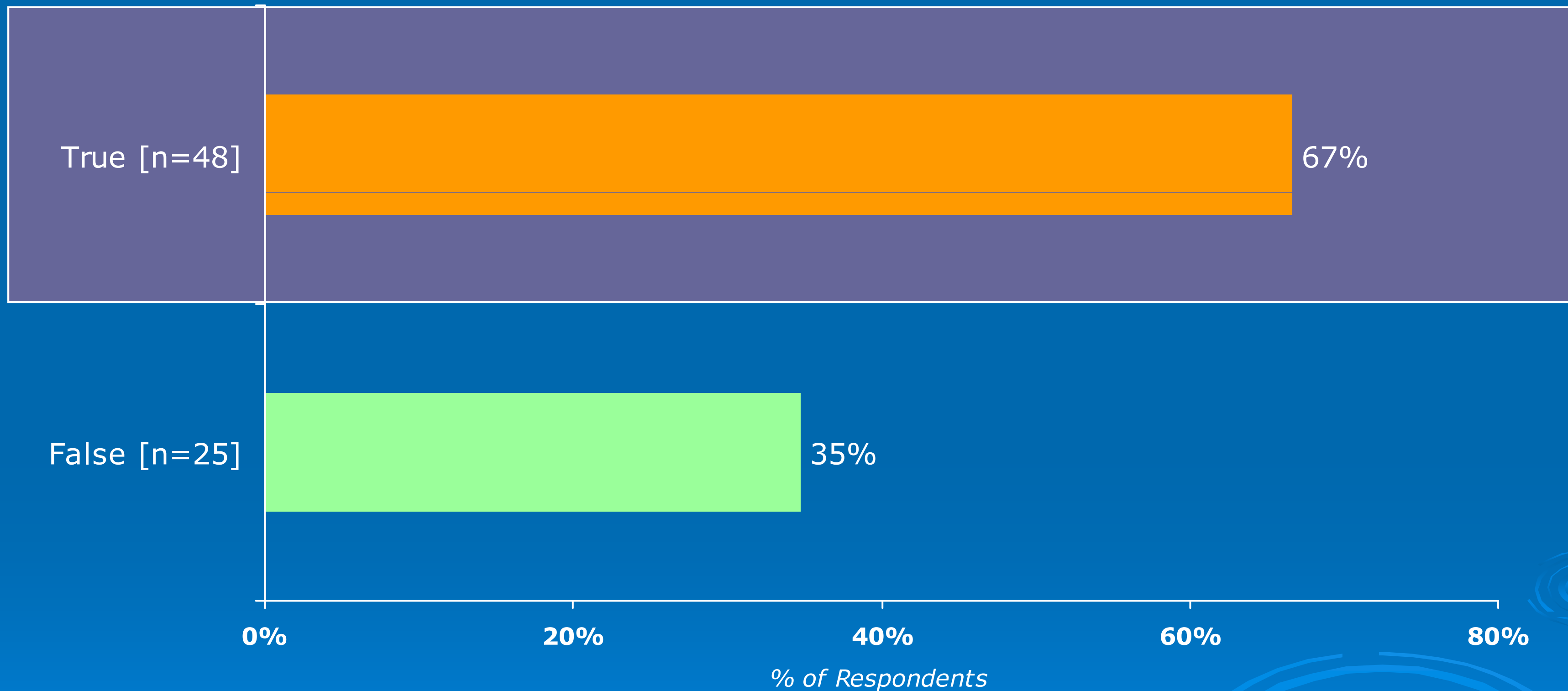
Q12: What are the main limitations in using Biosensor interaction technologies?



Rating of importance on a scale of 1 to 5, with 1 being of Highest Importance
Most important % is rating 1+2; Least important % is 5 rating

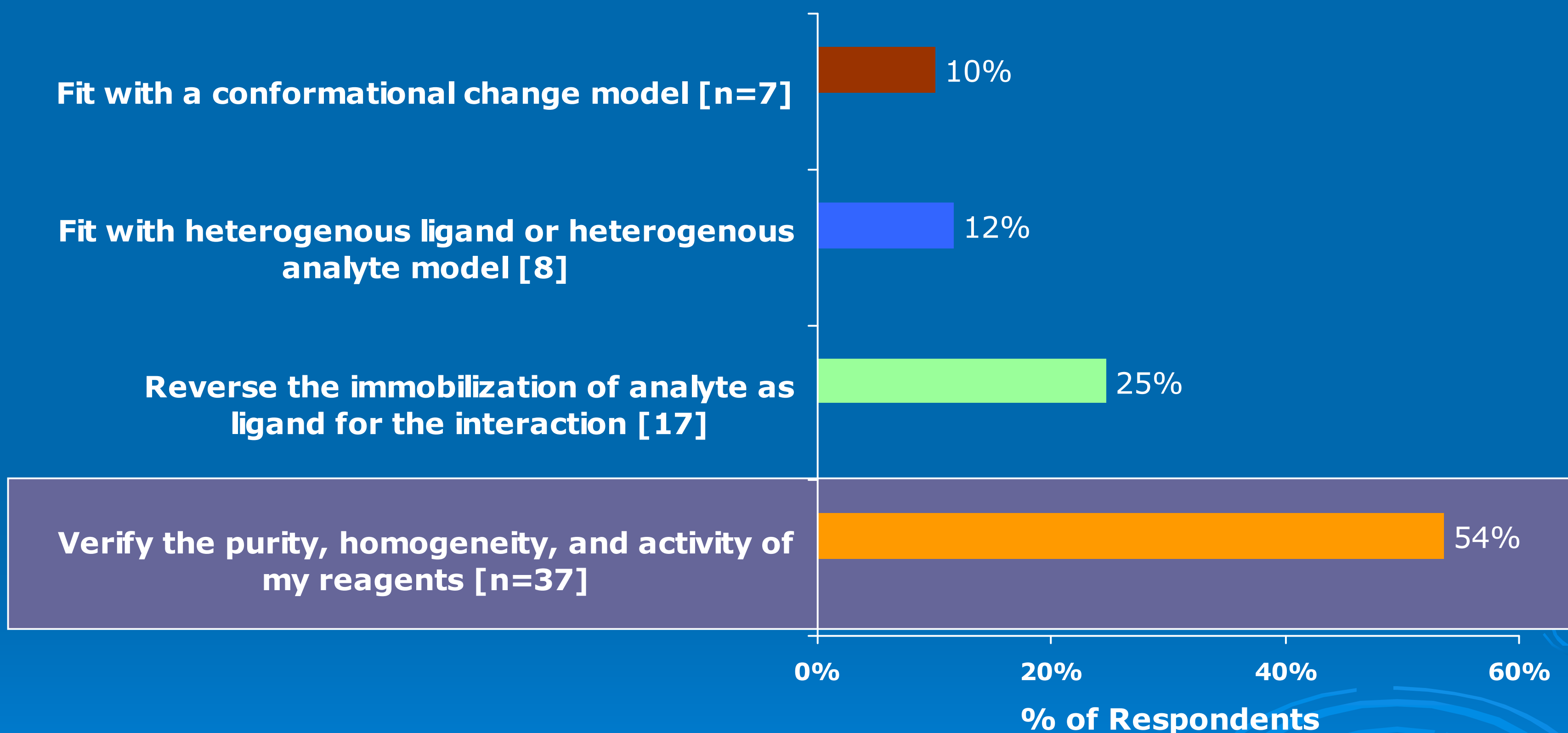
No. of Respondents: 78

Q13: If setup properly, most biosensor instruments can detect small molecule/protein interactions down to, and even below, 150 Da to targets larger than 50 KDa?



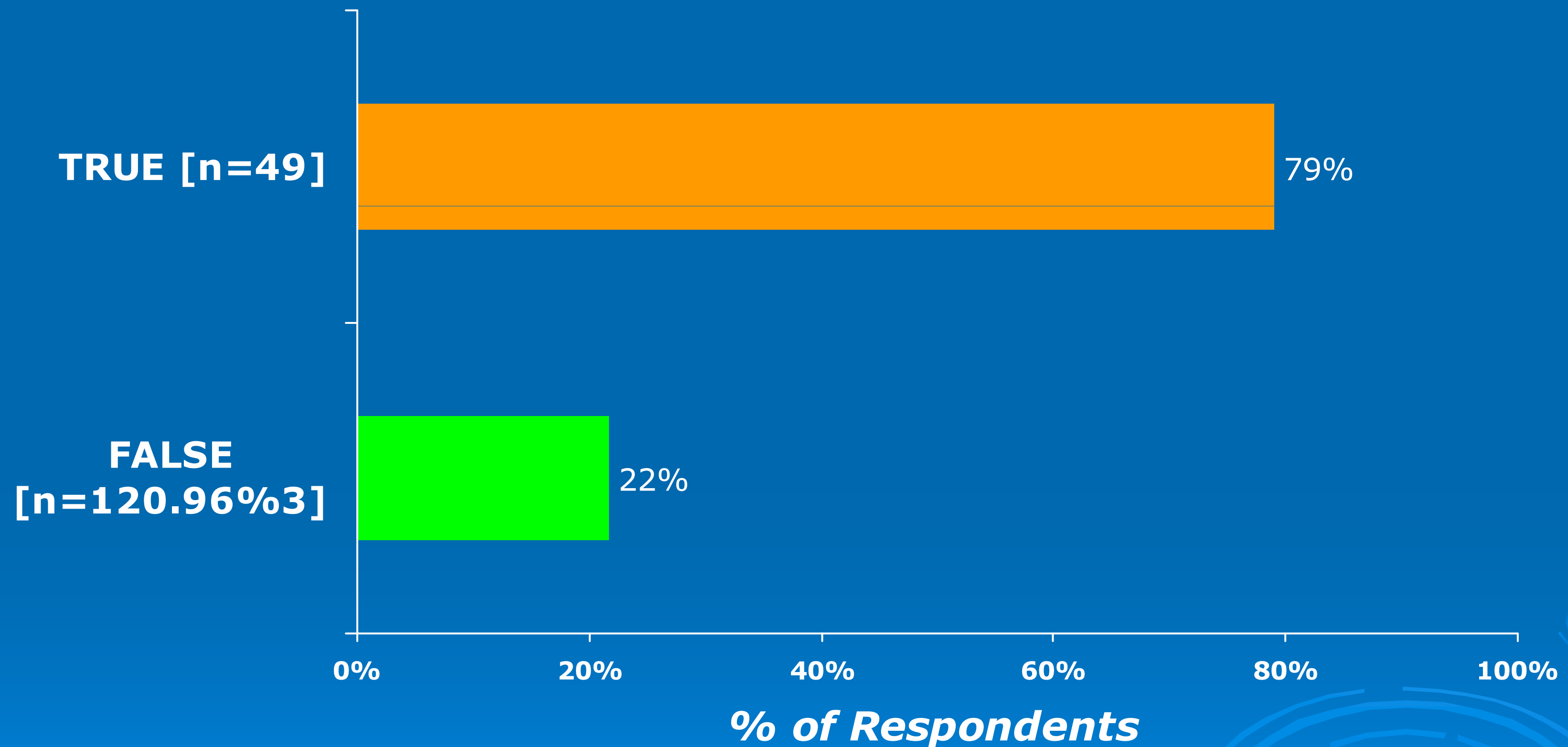
No. of respondents: 72

Q14: If the biosensor data do not fit a simple 1:1 binding model, what is the most important thing to do next?



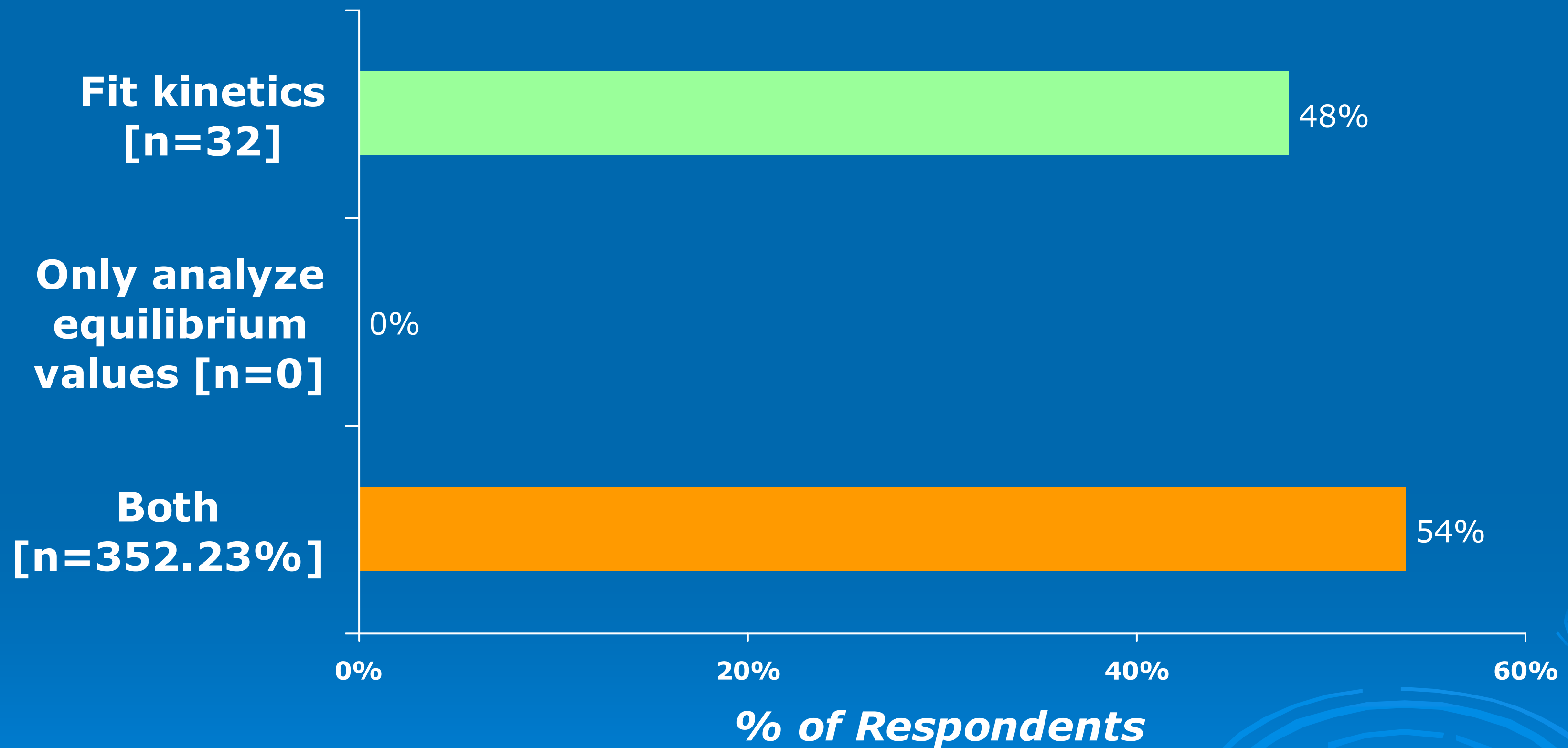
No. of respondent = 69

Q15: When fitting equilibrium biosensor data, I always take my data points from the flat part of the association phase (dR/dt=0). If my sensorgrams aren't flat I rerun with longer association phases.



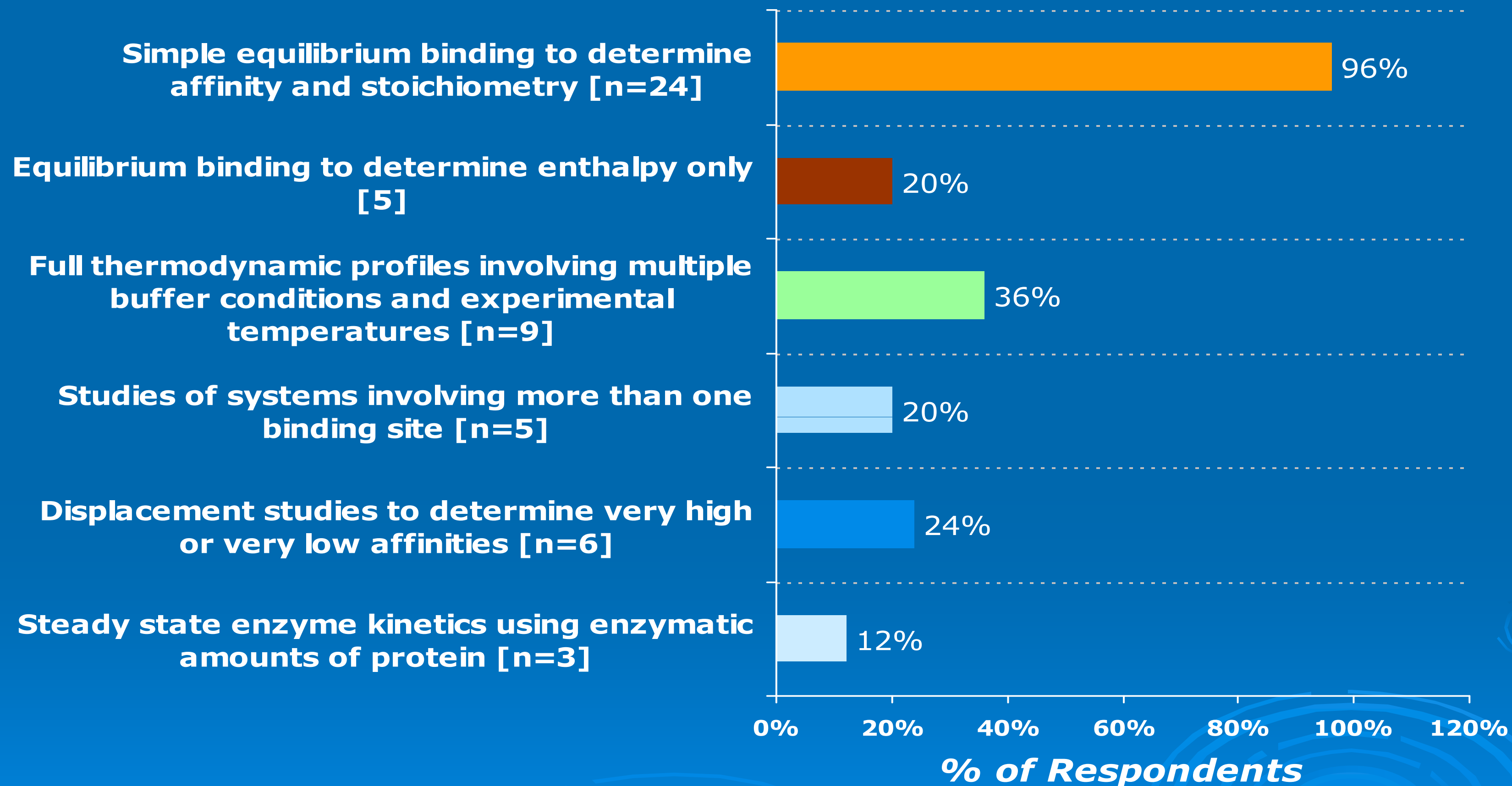
No. of respondents = 62

Q16: When your Biosensor data has observable kinetics do you fit for kinetics or only do equilibrium fitting?



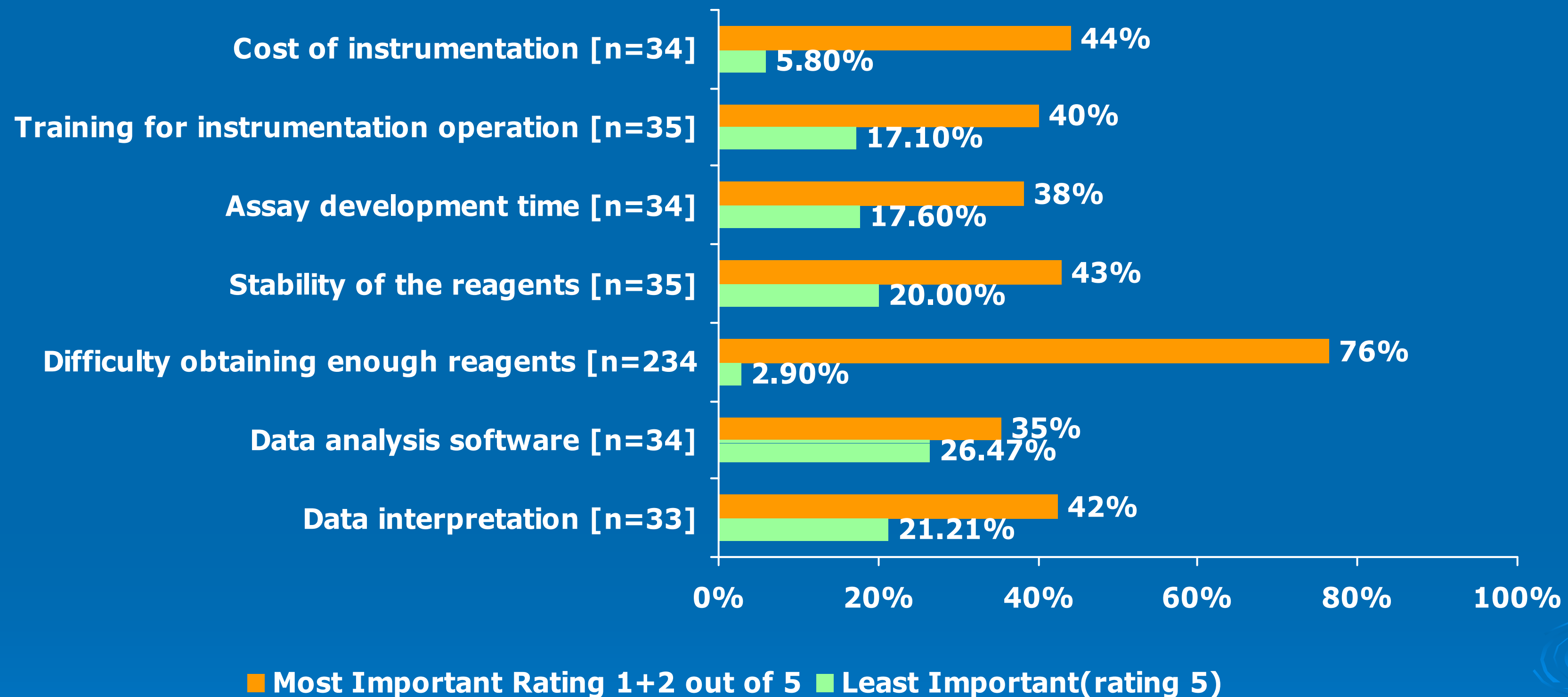
No. of respondents = 67

Q17: What type of measurements do you routinely carry out by ITC? (Please Check all that apply)



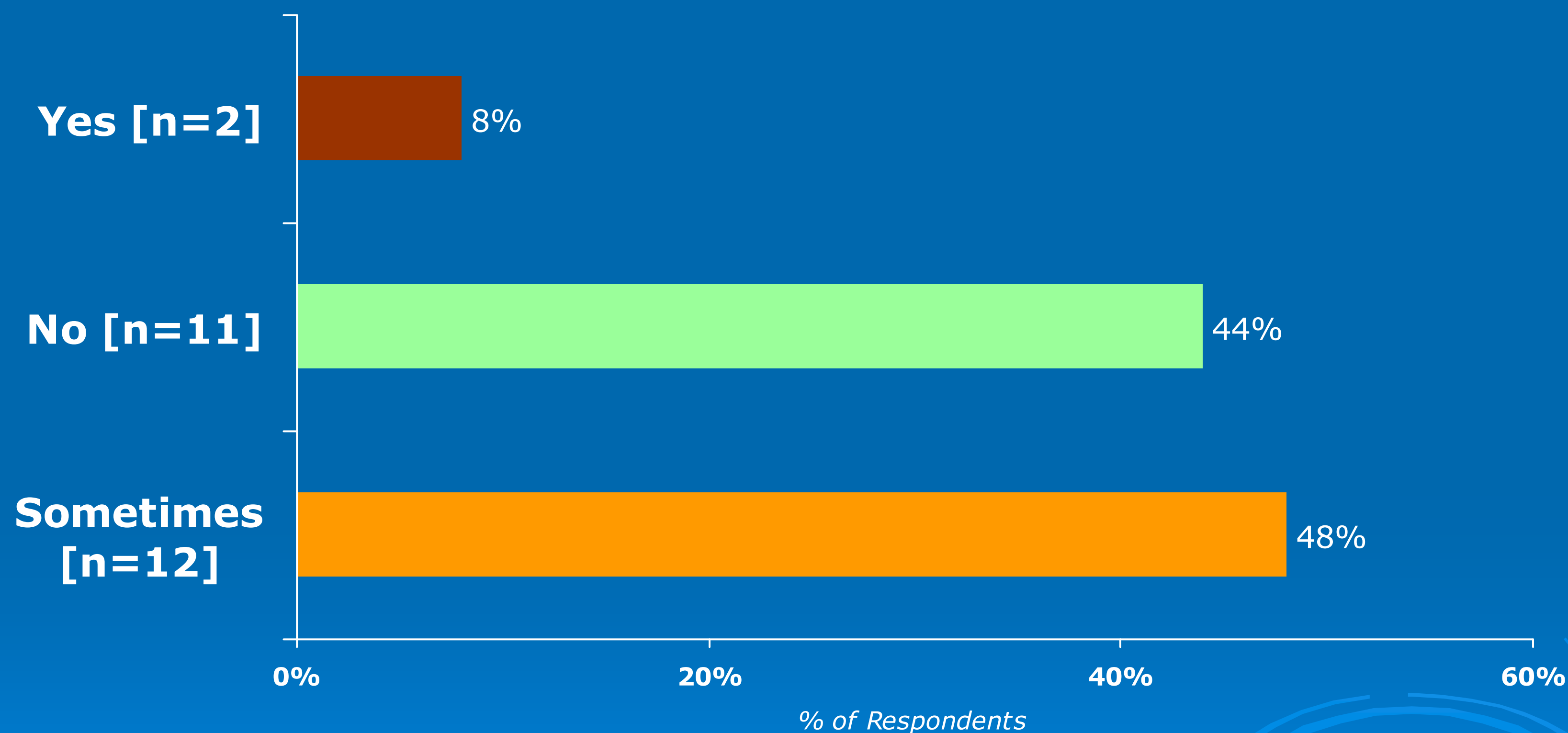
No. of respondents = 25

Q18: What are the main limitations in using calorimetry in your lab?



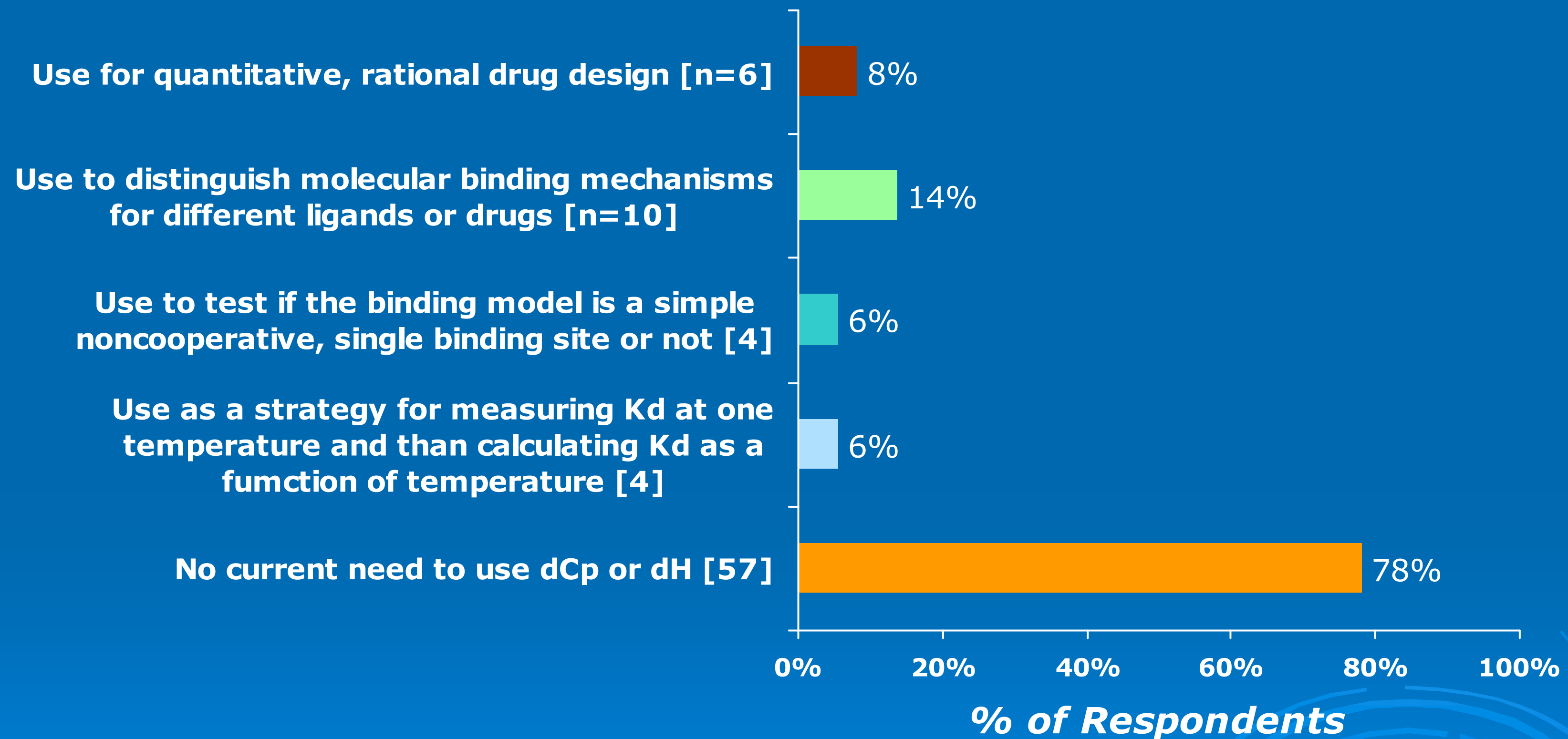
No. of respondents = 35

Q19: Do you account for linkage of coupled equilibria (e.g. proton uptake or release) when interpreting thermodynamic data obtained by ITC?



No. of respondents = 25

Q20:How do you use change in enthalpy (dH) and change in heat capacity (dCp) data?



No. of respondents = 71

Q21:(Optional) What new or improved capability would be most valuable to your laboratory in studying biomolecular interactions? (Answer can be something that currently exists in the marketplace or a technology innovation which does not currently exist in the marketplace).

- True high throughput calorimeter
- Higher throughput for biosensor assays would be the most valuable to our lab
- We get a weak response curve for all protein-protein interactions tested (using BLI). Greater sensitivity would be helpful for quantitation.
- Accurate and verifiable high throughput yes/no binding (for fragment screening) other than BLI. BLI hasn't correlated with SPR in our hands.
- Higher throughput and lower cost in collecting and analyzing screening results for small molecules binding to proteins by SPR
- Dissociation rate measurement in solution phase with v. low target consumption or any combination of two of those parameters
- Throughput matched with easy to use data anlaysis/sensorgram QC software
- Reductions in artifacts associated with label-free detection of small molecules
- Software that better handles large numbers of samples
- Affinity measurements using cells

Q21:(Optional) What new or improved capability would be most valuable to your laboratory in studying biomolecular interactions? (Answer can be something that currently exists in the marketplace or a technology innovation which does not currently exist in the marketplace).

- Conformational changes
- Single molecule techniques
- A good way to determine kinetic parameters for antibodies binding to cell surface receptors.
- ITC with lower reagent requirement
- Quartz crystal microbalance (QCM)
- Parallel injection, software that can easily interface with SoftMax
- Multi wavelength detection (both fluorescence and absorption optical) for analytical ultracentrifugation
- Microscale thermophoresis(currently use another lab instrument)
- MS Identification of the interacting compounds
- Design of iTC200- A lot of room to improve, such as syringe fill connector, cell volume etc. Biacore, iTC and other biosensors cost of service contract is very high.
- The ability to take the ligand-analyte complex from the chip into an Eppendorf tube for further analysis.
- Throughput
- New improved AUC (like open AUC)
- Better analytical software for epitope mapping