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HINTS & TIPS

Guidance for users

How to Enhance Ion Transmission for Low Mass or Labile Compounds

This guidance document is directed at analysts who are planning to analyse low mass (<200Da) or labile ions with the SYNAPT G2-Si HDMS mass spectrometer.

1. Why Re-tune the Source Region of the SYNAPT G2-Si

The default tuning of the SYNAPT G2-Si is optimised to transmit maximum ion intensity for a wide range of molecular species, however, the transmission of low mass ions (<200Da) can be compromised by this default tuning. In addition, the default tuning could result in increased fragmentation of labile compounds.

2. The Basics Steps of Optimising Transmission / Minimising Fragmentation

The analyte(s) of interest is infused using the fluidics and the intensity of the molecular ion is monitored on the tune page whilst the parameters in Tables 1, Table 2 and Table 3 are optimised.

As a general guide the parameters should be optimised in the following order:

- 1. StepWave and Ion Guide RF
- 2. Differential Aperture 1
- 3. StepWave 1 wave height
- 4. StepWave 2 wave height
- 5. StepWave 2 Offset

3. Optimise Transmission / Minimise Fragmentation

Adjusting the StepWave and TriWave parameters shown in Table 1 can significantly improve low mass transmission or reduce fragmentation. In addition, the parameters shown in Table 2 can also be used to optimise transmission / reduce fragmentation whilst in Tof mode only and Table 3 for mobility mode.

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Table 1 – Tune page parameters

Parameter	Default tuning	Adjust between	Note
Sample cone	35	Full slider range	
Source offset	80	Full slider range	
Trap collision energy	4.0	1.5 to 4.0	Adjust in conjunction with Trap entrance
Transfer collision energy	2.0	0.0 to 2.0	Crosstalk maybe observed if set to 0.0
Trap/transfer collision gas flow	2.0	1.5 to 2.0	Tof resolution maybe compromised if set <1.5
StepWave 1 reverse direction	Off	On/Off	
StepWave 1 wave height	15.0	5.0 to 15.0	
StepWave 2 wave height	15.0	1.0 to 15.0	
StepWave 2 offset	25.0	0.0 to 25.0	
Diff. aperture 1	3.0	0.0 to 3.0	
Diff. aperture 2	0.0	0.0 to 1.0	If >0.0, can indicate StepWave is contaminated
Source ion guide wave height	1.0	0.0 to 1.0	Crosstalk maybe observed if set to <0.5
StepWave RF	300	100 to 300	
Ion guide RF	350	150 to 350	

Table 2 – Additional parameters to tune in Tof mode only

Parameter	Default tuning	Adjust between	Note
Trap entrance	2.0	1.0 to 2.0	Must reduce if trap collision energy is set <3.0
Trap bias	2.0	1.0 to 2.0	
Trap DC	-2.0	-2.0 to 0.0	Crosstalk maybe observed if set to 0.0
Helium cell DC	1.0	0.0 to 1.0	
Trap bias	2.0	1.0 to 2.0	
Transfer entrance	5.0	3.0 to 5.0	
Trap RF	300	150 to 300	
IMS RF	300	150 to 300	
Transfer RF	350	150 to 350	

Table 3 – Additional parameters to tune in mobility mode only

Parameter	Default tuning	Adjust between	Note
Trap entrance	3.0	1.0 to 2.0	Must reduce if trap collision energy is set <3.0
Trap bias	45.0	30.0 to 45.0	
Helium cell DC	50.0	30.0 to 50.0	Charge capacity may decrease if set <50V
IMS bias	3.0	1.0 to 2.0	
Transfer entrance	5.0	3.0 to 5.0	
Trap RF	300	150 to 300	
IMS RF	250	150 to 250	
Transfer RF	350	150 to 350	

Note: StepWave and TriWave parameters not listed above should be left at their default tuning.

Warning: Do not adjust System 1 & System 2 parameters. Adjusting these values will have significant detrimental effects on instrument resolution and sensitivity.