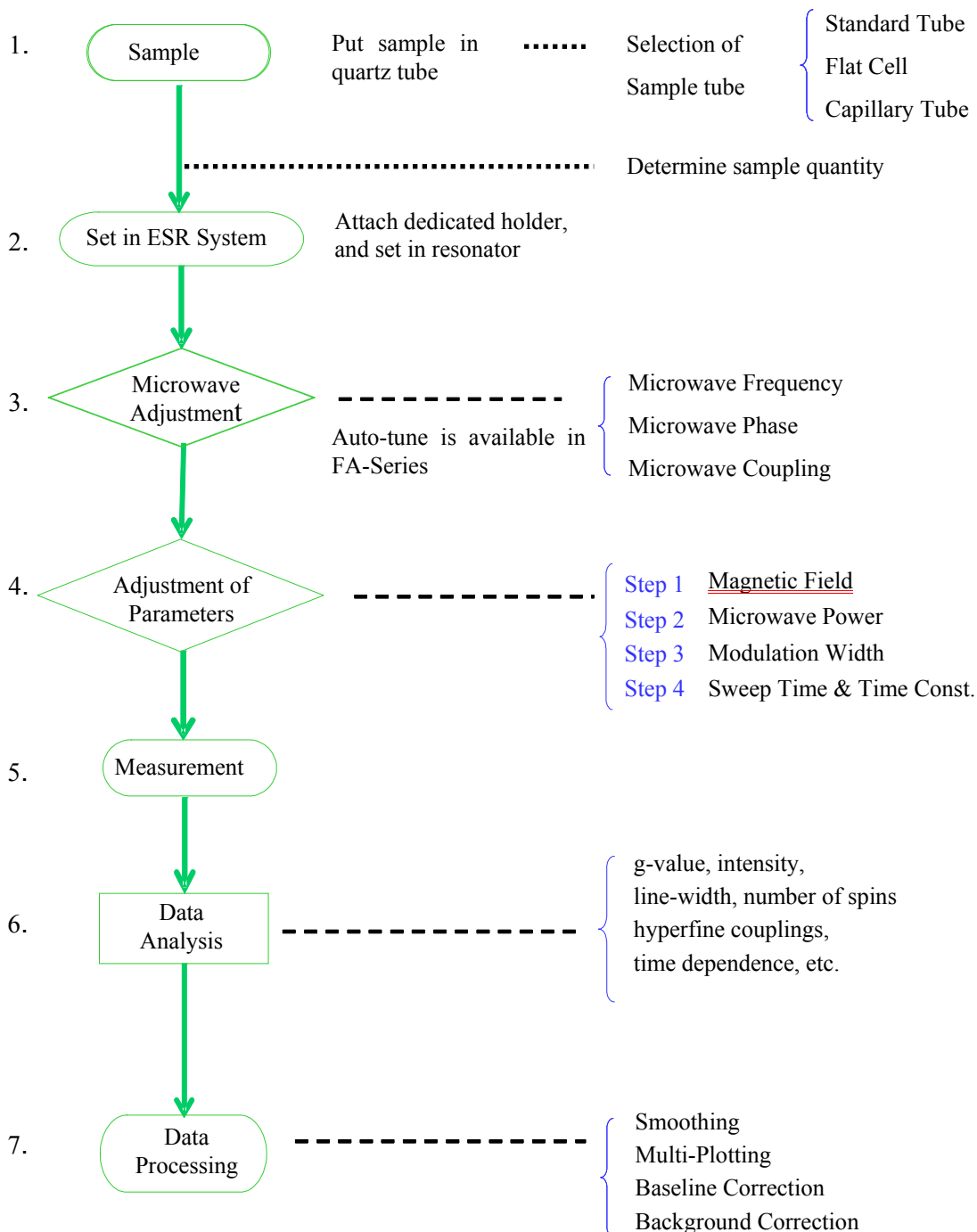


## Let's Use ESR IV – Adjustment of Magnetic Field

ESR may be used to measure a wide range of samples. However, it is necessary to determine the most appropriate conditions for each sample. The following measurement flow chart gives a step-by-step approach. Here, we explain how to determine the magnetic field.

### ESR Measurement Flow



## Adjustment of ESR Measurement Conditions

The basic ESR conditions are set by the following steps.

- Step 1.** Adjustment of Magnetic Field
- Step 2.** Adjustment of Microwave Power
- Step 3.** Adjustment of Modulation Field Width
- Step 4.** Adjustment of Sweep Time and Time Constant

### Step 1. Adjustment of Magnetic Field

Preliminary settings for the magnetic field:

- a. For organic radicals where the g-value is  $\sim 2.00$ .
  - 335 $\pm$ 10 mT (resonance frequency; 9.4GHz)
  - 320 $\pm$ 10 mT (resonance frequency; 9.1GHz when Dewar is set for VT measurements)
  - Microwave Power: 1mW; Sweep Time: 30 sec; Time Constant: 0.03 sec.
  - Modulation Width: 0.05mT; Amplitude: 2000
  
- b. For metal complexes where the g-value is  $\sim 2.003$ 
  - 300 $\pm$ 250 mT
  - Microwave Power: 1mW; Sweep Time: 1min; Time Constant: 0.03 sec.
  - Modulation Width: 0.1mT; Amplitude: 3000

Begin the sweep and confirm the magnetic field where the signal is visible:-

- 1) If signal was observed, change the central magnetic field and sweep width so that all signals can be detected. Change the amplitude to show clearer signal. Sweep again to confirm magnetic field is appropriate. (Application Note ER-06008 [Step 2](#))
- 2) If no signal was observed, conditions should be changed as follows:-
  - Microwave power: 4mW; Modulation Width: 0.2mT; Amplitude: 5000
  - If signal is now observed, the condition should be optimized according to 1).

If signal is still not observed:-

- I. Confirm the instrument is working correctly (magnet power supply, modulation coil, etc.)
  - Check with standard sample if necessary.
- II. Confirm Q-Dip (microwave adjustment), and re-adjust if necessary.
- III. Increase sampling amount.
- IV. Make the measurement at low temperature.
- V. Degas the sample.
- VI. Consider radical generation methods such as photo-irradiation, heating, etc.
- VII. Others, sample-dependent condition where radicals are known to be generated.