[SANS typical operating settings]
(Chapter 5.4.1 in *Elements*)

Typical Operating Procedures

Experimenters must vary instrument operating conditions to span different Q ranges to complete the SANS picture or to provide appropriate resolution for different types of measurements. They follow optimization principles, but only as general guidelines because of practical considerations. In Table 5-STO1 we tabulate the settings for isotropic-sample (i.e., axially symmetric scattering) measurements on the General Purpose SANS instrument at the High Flux Isotope Reactor (HFIR) at ORNL (Littrell et al. 2008; Wignall *et al*. 2012). These are everyday, "workhorse" settings. The detector of this instrument is square, 1 m^2, and the pixels are square, 5.1 mm^2. In the terminology of the table, $2R_3$ is the diameter of the beam stop, covering up the beam penumbra and obscuring Q_{min}, sometimes to excess because an error can cause serious damage to the detector.

Table 5-STO1. Typical operating settings for a steady-source SANS instrument

Parameter	Low Q-Range	Mid Q-Range	High Q_{max}
Q_{min}	0.00125 $Å^{-1}$	0.009 $Å^{-1}$	0.06 $Å^{-1}$
Q_{max}	0.025 $Å^{-1}$	0.19 $Å^{-1}$	0.9 $Å^{-1}$
Wavelength	12 Å	4.75 Å	4.75 Å
L_c	19 m	9 m	9 m (ideally, 2 m)
L_D	19.3 m	5 m	1.1 m
Detector offset	40 cm (horizontal)	40 cm (horizontal)	40 cm (horizontal)
Nominal geometry R_1:R_2:R_3	2:1:3	3:1:3	2:1:2
Collimator entrance diameter $2R_1$	2 cm	4 cm	2 cm
Collimator exit diameter $2R_1$	1.2 cm	1.2 cm	1.2 cm
Beam stop diameter $2R_3$	8 cm	5 cm	5 cm
Beam droop at detector	35. cm	0.37 cm	0.016 cm

The collimator exit is the same diameter as the sample cells used in most SANS measurements, standard ultraviolet (UV) absorption spectroscopy cells, which are 1.2 cm in diameter with a filling stem and called *banjo* or *lollypop* cells because of their shape. The material is *suprasil*, high-purity quartz. Sometimes special-purpose cells are of single-crystal sapphire or aluminum metal. Measurements can be so quick that setup time substantially exceeds measuring time, so

that experimenters often mount 10 or 15 samples at once on a sample changer, to be examined sequentially.

Measurements typically consist of several runs, usually three when the smallest possible values of Q are required, at different collimator and sample-detector distances, as in Table 5-STO1. Empty-sample data provide for background determination, frequent measurements on standard calibration samples provide detector efficiency and pixel-size calibration, and measurements of the unscattered (transmitted) beam intensity provide for sample attenuation corrections. These corrections are practically independent of the scattering angle and equal to the transmitted beam attenuation when the scattering angles are small. Some experiments require corrections for resolution broadening to bring measurements into coincidence in overlapping Q-ranges.