

NAME _____; Upon placing your signature in this space you are indicating that you have not violated any statute of your respective Honor Codes by completing the following quiz.

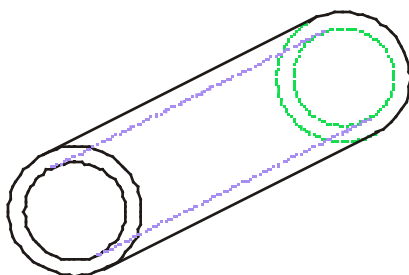
MEASUREMENT STATISTICS

Dominey

Due: Sept. 26, 2000

Problem Set 3

1. The solubility product, K_{sp} , of aluminum hydroxide has been measured at 2.6×10^{-32} with an RSD of 25%. What is the standard deviation (in g/L) of the solubility of aluminum hydroxide that is calculated from this measurement of K_{sp} ? [Note: you have to remind yourself - from General Chem - how to calculate solubility from K_{sp} .]
1. An ion-selective electrode (ISE) is used in a laboratory for the analysis of K^+ in plant food preparations. For this application, the ISE obtains measurements with a random error component of 0.7 mg/g K^+ . Unknown to the analyst, measurements with the ISE are also biased by +1.00 mg/g.
A sample arrives that contains 4.50 mg/g K^+ . Calculate the probability that a relative error of $\pm 20\%$ (relative to the true K^+ concentration, that is) or worse will be observed in a single measurement on the sample.
3. A hollow cylinder is made of an unknown metal alloy:



It is desired to determine the material's density, in order to identify it. The following measurements are made of the hollow cylinder.

	inner diameter	outer diameter	length	mass, g
measurement	2.14 cm	2.89 cm	6.93 cm	160.16 g
std deviation	0.18 cm	0.21 cm	0.27 cm	0.41 g

From these measurements, (i) estimate the density of the material, and (ii) determine the uncertainty in your estimate.