Worksheet 5: Sample Preparation

1. If a mixture contains 1% KCl particles and 99% KNO_3 particles and 10^4 particles are taken, what is the expected number of KCl particles obtained, and what will be the standard deviation if the experiment is repeated many times?

2. In the analysis of a barrel of powder, the standard deviation of the sampling operation is $\pm$ 4% and the standard deviation of the analytical procedure is $\pm$ 3%. What is the overall standard deviation?

3. For the question above, what value must the sampling standard deviation be reduced to so that the overall standard deviation is $\pm$ 4%?

4. Consider a random mixture containing 4.00 g of Na2CO3 (density 2.532 g/mL) and 96.00 g of K2CO3 (density 2.428 g/mL) with a uniform spherical particle radius of 0.075 mm.

   (a) Calculate the mass of a single particle of Na_2CO_3 and the number of particles of Na_2CO_3 in the mixture. Do the same for K_2CO_3.

   (b) What is the expected number of particles in 0.100 g of the mixture?

   (c) Calculate the relative sampling standard deviation in the number of particles of each type in a 0.100 g sample of the mixture.

5. What does QuEChERS stand for and what are its two major steps?