CHEMISTRY 31
Quiz 2 - SOLUTIONS
Spring, 2017

1. A solution requires 0.200 g of methanol to prepare a standard. A chemist has a stock standard that is 21.6±0.5% methanol.
a) How many grams of the 21.6% methanol solution is needed to deliver 0.200 g of methanol? (3 pts)
m(methanol)/m(sol'n) = 21.6/100 or m(sol'n) = m(methanol)/0.216 = 0.200 g/0.216 = ***0.926 g***

b) If the uncertainty in the mass of solution delivered in a) is ±0.002 g, what is the uncertainty in the mass of methanol delivered? (4 pts)
For $Y = a*b$, $S_Y/Y = [(S_a/a)^2 + (S_b/b)^2]^{0.5}$
*m(methanol) = m(sol'n)*21.6/100*
$S_{m(methanol)}/m(methanol) = [(S_{m(sol'n)}/m(sol'n))^2 + (S_{\%}/\%)^2]^{0.5}$
$S_{m(methanol)}/m(methanol) = [(0.002/0.926)^2 + (0.5/21.6)^2]^{0.5}$
$S_{m(methanol)}/m(methanol) = (0.000541)^{0.5} = 0.0232$
$S_{m(methanol)} = 0.0232(0.200\ g) =$ ***0.005 g***

2. A test sample is analyzed for testosterone using a new method. The measured value is 38.11 ± 0.02 mg/L (second number is standard deviation) while the true value is 27.1 mg/L. It is desired to have % errors under 5% and % relative standard deviations under 2%. We can conclude that the measurement is:
a) precise and accurate
b) precise but not accurate
c) accurate but not precise
d) neither precise nor accurate
(3 pts)
%RSD = 0.05% *% error = 41%*