Chem 2222
Self test on chemical calculations

1. What is [Cl\(^-\)] in 100 mL of a solution containing 1.50 g CaCl\(_2\)?
   Ans: 0.273 M

2. How many mmol HCl are in 20 mL of 0.20 M HCl?
   Ans: 4.0 mmol

3. Convert pOH = 12.00 to [H\(^+\)].
   Ans: 0.010 mol/L

4. For the reaction (unbalanced)
   \[ \text{KIO}_3(aq) + \text{La(NO}_3)_3(aq) \rightarrow \text{La(IO}_3)_3(s) + \text{KNO}_3(aq) \]
   what volume of 0.100 M La(NO\(_3\)_3 is required to react exactly with 100 mL of 0.090 M KIO\(_3\)?
   Ans: 30.0 mL

5. What mass of La(IO\(_3\))\(_3\) is produced when 50.0 mL of 0.100 M KIO\(_3\) is added to 20.0 mL of 0.100 M La(NO\(_3\))\(_3\)?
   Ans: 1.11 g

6. What volume of concentrated HCl (37% HCl (w/w), sp. gr. 1.19) is required to prepare 1.00 L of 0.100 M HCl?
   Ans: 8.3 mL

7. A water sample contains 0.5 ppb Pb as Pb\(^{2+}\). Calculate [Pb\(^{2+}\)].
   Ans: \(2 \times 10^{-9}\) mol/L

8. A “class A” 25-mL volumetric transfer pipet is calibrated to deliver 25.00 ± 0.03 mL at 20 °C. Express this information as percent relative error (uncertainty). Repeat the calculation for a 1-mL pipet with an accuracy of ± 0.006 mL.
   Ans: 0.12 % or 0.1 % for the 25-mL pipet, 0.6 % for the 1-mL pipet.