Answer on Question # 72761 - Chemistry - General Chemistry

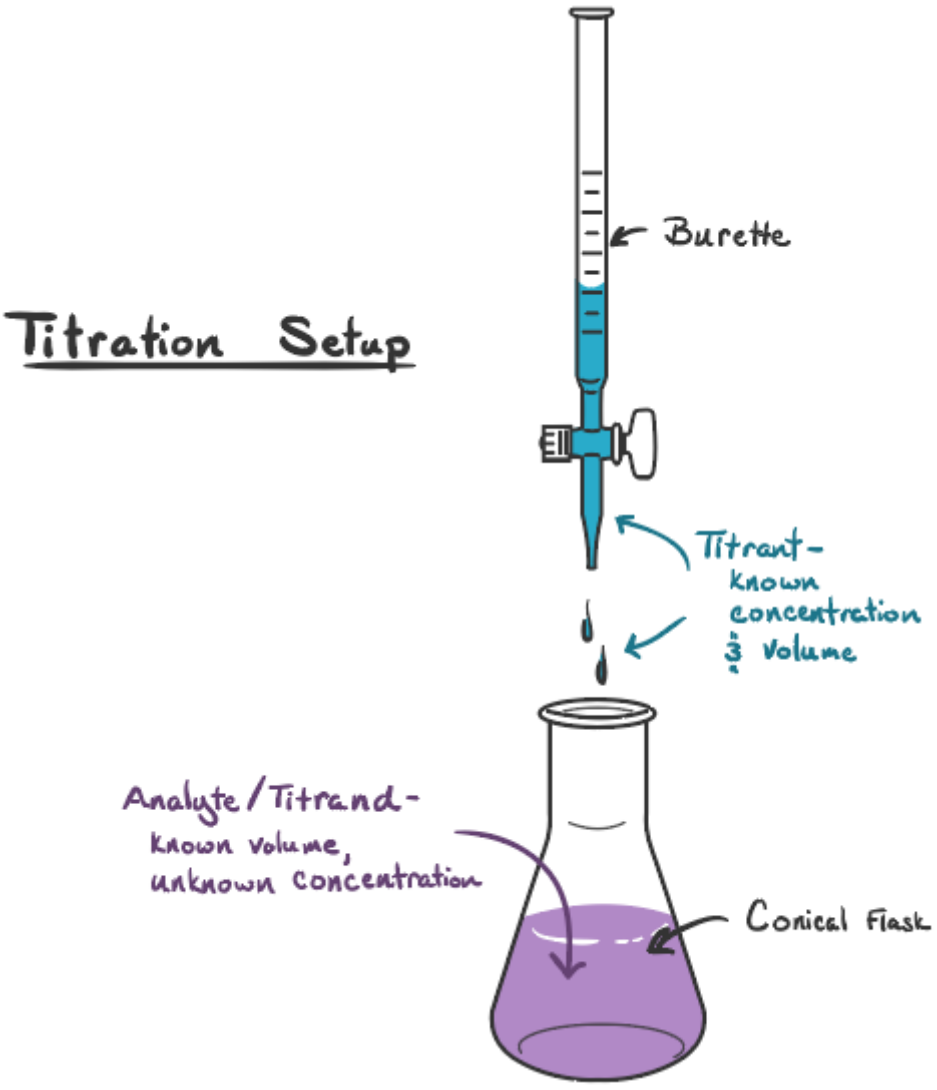
5. The Ministry of the Environment is assessing a closed metal processing factory. Several large barrels of labelled sulphuric acid are awaiting disposal. However, before they can be transported, they must be neutralized. As the lab technician, you have been charged with determining the concentration of this acid.

a. Draw a labelled diagram of the equipment and setup you will be using.

b. You use 2.00 mol/L sodium hydroxide and carry out the titration on a 15.0 mL sample of the acid. You record the following information. Determine the concentration of the acid.

Solution

a) Titration is a method by which an unknown concentration of a solution can be determined by comparing it with a solution having a predetermined or standard concentration. To titrate an acid versus a base, one can add a basic solution of unknown concentration to an acid until neutralization occurs, or when the number of moles of hydronium (H_3O^+) ions equals the number of moles of hydroxide (OH^-) ions. A flask is used to hold a known, measured volume of the unknown concentration of the other solution. Burettes are used to dispense the acid and base (see picture below).



b) By knowing the volume of both the acid and base used in the titration as well as the molarity of the acid, one can find the unknown concentration of the base through stoichiometry of the acid-base neutralization reaction. In this part of question the volume of the acid is given (V_{acid}=15.0 mL), and the volume of the base is to be determined as a result of titration. After this step, the concentration of the acid can be calculated by the following formula:

$c_{acid}V_{acid} = c_{base}V_{base}$.

Sources:

https://www.lahc.edu/classes/chemistry/arias/Exp%209%20-%20AcidBaseSp14.pdf (Acid-base titrations)