Questions

Q// How many milliliters of concentrated HCl (F.wt=36.45g/mol, 37.2% (w/w) and Sp.gr=1.19) are require for the preparation of 2.0L of 5.0 mol/L solution? Then calculate how many milliliters of this solution (5 mol/L) are required to react quantitatively with 10g of Na_2CO_3 (M.wt= 106 g/mol).

(10 Marks)

$$Na_2CO_3 + 2HCl \rightarrow 2NaCl + H_2O + CO_2$$

Q// Calculate H_3PO_4 molarity in the bottle from the information.

(Density of specific gravity = 1.696 g/ml, 85%)

Q// Prepare 250ml of 2M HNO_3 from the traditional solution. The information on the bottle: 69% (w/w) HNO_3, specific gravity 1.42 g/ml, formula weight 63 g/mole.

Q//Describe the preparation of 2.00 L of 0.108 M $BaCl_2$ from $BaCl_2.2H_2O$ (244.3 g/mol).

Q// Describe the preparation of 100 mL of 6.0 M HCl from a concentrated solution that has a specific gravity of 1.18 and is 37% (w/w) HCl (36.5 g/mol).

Q// Describe the preparation of 750 mL of 6.00 M H_3PO_4 from the commercial reagent that is 86% H_3PO_4 (w/w) and has a specific gravity of 1.71.

Q// Describe the preparation of 900 mL of 3.00 M HNO_3 from the commercial reagent that is 70.5% HNO_3 (w/w) and has a specific gravity of 1.42.

Q// Describe the preparation of:

a) 500 mL of 0.0750 M $AgNO_3$ from the solid reagent.

b) 1.00 L of 0.285 M HCl, starting with a 6.00 M solution of the reagent.

c) 400 mL of a solution that is 0.0810 M in KI, starting with solid $K_4Fe(CN)_6$.

d) 2.00 L of 0.120 M $HClO_4$ from the commercial reagent [71.0% HClO4 (w/w), sp gr 1.67].

e) 9.00 L of a solution that is 60.0 ppm in Na1, starting with solid Na_2SO_4.

Q// Describe the preparation of:

a) 5.00 L of 0.0500 M $KMnO_4$ from the solid reagent.

b) 4.00 L of 0.250 M $HClO_4$, starting with an 8.00 M solution of the reagent.

c) 400 mL of a solution that is 0.0250 M in I_2, starting with MgI_2.

Q// Enumerate typical chemical methods used in separation procedures to increase selectivity of the determination process?

Q// Write the balanced net ionic equation for the following redox reaction. Supply H^+ and/or H_2O as needed to obtain balance.

$$SO_3^{2-} + MnO_4^{1-} \rightleftharpoons SO_4^{2-} + Mn^{2+}$$

Q// Drive a titration curve for **only one** of the following:

a) Titration of 25 ml of 0.1 M NaOH with (10, 25, 30) mL of 0.1 M HCl.

b) Titration of 50 mL of 0.01 M Cl^- with (10, 50, 60) mL of 0.01 M Ag^+. ($Ksp=1.8\times10^{-10}$)

Atomic Weight (g/mol):

H=1, C=12, N=14, O=16, F=19, Na=23, P=31, S=32, Cl=35.45, K=39.1, Ag=107.87

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Analytical Chemistry

1st Year Students

Time: 3.0 hours

Date: / 08 / 2019

2018 – 2019 / 2nd Trail

Q1// Fill the following blanks: (20 Marks)

1) Total analysis process consists of five steps: **……..**, **……..**, **……..**, quantitation and evaluation**.**
2) Natural products are made by **…….** which can be much more selective.
3) The metal ion (or cation) in a complex is called the **……..**, while the electron-pair donating species is called the **……..**
4) Molarity is the number of **…….** in **…….** of solution.
5) In Chromophore Theory, the groups which are responsible for the color in the organic compounds are called chromophores like **……..**, and **……..**
6) Separation methods involve removing of the effect of **…….** and increases the **…….** of the method towards the analyte with necessary accuracy and precision.

7) Equivalence point is the theoretical point in a titration when the amount of added standard reagent is **……..** to the amount of analyte.
8) Solutions are homogeneous mixtures, the major component is called **……..**, and the minor components are called **……...**
9) Precipitation titration is a titration in which the reaction between the analyte and titrant involves a **……...**
10) There are three types of indicators in Fajans method: **……..**, **……..**, and **……...**
11) Chemical Indicators are compound often added to the analyte solution to produce an **……..** at or near the equivalence point.

Q2//

a) Explain the properties of ideal standard solution for a titrimetric method? **(3 marks)**

b) Write the balanced net ionic equation for the following redox reaction. Supply H^+ and/or H_2O as needed to obtain balance. **(4 marks)**

$$S_2O_8^{2-} + Mn^{2+} \rightarrow SO_4^{2-} + MnO_4^-$$

c) The maximum allowed concentration of chloride in a municipal drinking water supply is $2.5x10^2$ ppm Cl^-. When the supply of water exceeds this limit, it often has a distinctive salty taste. What is this concentration in moles Cl^- /Liter? **(3 marks)**

Continue…….. →

Q3// What will be the analytical molar Na_2CO_3 concentration in the solution remained when 25 mL of 0.2 mol/L $AgNO_3$ are mixed with 50 mL of 0.08 mol/L Na_2CO_3? **(10 marks)**

$$Na_2CO_{3\,(aq)} + 2AgNO_{3\,(aq)} \rightarrow Ag_2CO_{3\,(S)} + 2NaNO_{3\,(aq)}$$

Q4// Drive a titration curve for **only one** of the following:

(10 Marks)

a) Titration of 50 ml of 0.05 M HCl with (10, 25, 30) mL of 0.1 M NaOH.

b) Titration of 25 mL of 0.1 M Ag^+ with (10, 50, 60) mL of 0.05 M Cl^-. ($Ksp=1.8\times10^{-10}$)

Atomic Weight (g/mol)*:*

H=1, C=12, N=14, O=16, Na=23, P=31, S=32, Cl=35.45, Ag=107.87

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