**Q1/** A sample of aspirin tablet dissolved and diluted to final volume **500ml** using diluted NaOH then take a **1.5ml** from diluted sample solution in a **25mL** volumetric flask and diluted by diluted NaOH to the final volume. The laboratory results obtained by using spectrophotometer at (λ=297 nm) for a series of standard solution (Salicylic acid) with their absorbance shown in the table below:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Conc. [M]** | 0.2x10-4 | 0.4x10-4 | 0.6x10-4 | 0.8x10-4 | 1.0x10-4 | 1.2x10-4 | **sample** |
| **Abs.** | 0.032 | 0.073 | 0.097 | 0.138 | 0.160 | 0.195 | 0.120 |

* Write the required chemical reaction.
* Name the blank for your experiment and for what it is used?
* Calculate how many mg of acetyl salicylic acid in the tablet.( Drawing a graph is **not allowed**)

**Q2/** Explain why? ( support your answer by using chemical equation):

a- We should add ferric reagent for visible spectrophotometric determination of aspirin?

b- Total iron can be determined by colorimetric method?

d- We use a series of *standard salicylic acid* solution for determination of aspirin in tablets?

e- For the spectrophotometric determination of chromium we should dilute all solutions by using

diluted *H2SO4* instead of D. water?

**Q3/** Take 3ml of industrial wastewater sample **(**contain Cr3+ ) in a beaker then add ------ ,-----, -----, and ------ , to convert chromium to dichromate, then dilute to 50ml volumetric flasks.

**0.40g** of standard K2Cr2O7 was weighed and dissolved then diluted to a **500 mL** volumetric flask. A series of four **25 mL** volumetric flasks prepared, as shown in the table below and each flask was diluted to the mark with 0.05 M H2SO4, and their absorbencies were measured.

|  |  |  |  |
| --- | --- | --- | --- |
| Flask | **Sample sol. Cr2O72- (mL)** | **Standard sol. (mL)** | **Abs. at λ=450 nm** |
| 1 | 5.0 | 0 | 0.192 |
| 2 | 5.0 | 5 | 0.268 |
| 3 | 5.0 | 10 | 0.335 |
| 4 | 5.0 | 15 | 0.412 |
| 5 | 5.0 | 20 | 0.509 |

- Fill the blanks and write the chemical reaction, why you convert chromium to dichromate?

- What was the concentration (ppm)of Cr3+ in the original sample solution using **standard addition technique? Drawing a graph is required**

Atomic weights : Cr = 51.99 , C=12 , O=16 , H=1

**Q1/**  **10g** soil sample dissolved and the filtrate complete to **50mL** using D. water.  **5mL** of the sample solution have been taken into **25mL** volumetric flask and we should add **1mL** of the ---------solution then completed to final volume by D. water. The later solution titrated with **0.25M EDTA** solution using photometric titration. The laboratory results obtained shown in the table below ( at λ=755 nm) **:**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Vol.(mL)**  **EDTA** | **0** | **0.50** | **1.0** | **1.5** | **2.0** | **2.5** | **3.0** | **3.5** | **4.00** | **4.50** | **5.0** |
| **Abs.** | **0.00** | **-0.008** | **-0.015** | **-0.030** | **-0.012** | **-0.003** | **0.020** | **0.067** | **0.087** | **0.100** | **0.109** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **5.5** | **6.0** | **6.5** | **7.0** | **7.5** | **8.0** | **8.5** | **9.0** |
| **0.119** | **0.123** | **0.128** | **0.130** | **0.129** | **0.125** | **0.123** | **0.121** |

**→**

**a-** Fill the blank.

**b-** Draw a graph to find the end-points.

**c-** Calculate the percentage of Ca2+ & Cu2+ in the soil sample.

Atomic weights: Ca=40 , Cu= 63.5

**Q2**/ Answer the following questions briefly:

1. Write the principlesfor the determination of Sodium by Flame photometer instrument.

b) Write the principlesfor spectrophotometric determination of slope ratio.

**Q3**/ For determination of  SO42- in water samemple by the turbidimetric method. Take **5ml sample** with adding **1ml** of -------- reagent then diluted to **25ml** with D.water finally add **0.1g**--------and mixed for fixed time, the transmittance read **80.** The transmittances for a series of sulphate standard solution are shown in the table below. - Calculate the concentration of sulphate in original sample?

**Not: drawing graph not allowed.**

|  |  |
| --- | --- |
| **Conc.** (ppm) | **T%** |
| **5** | **95** |
| **10** | **88** |
| **15** | **83** |
| **20** | **78** |
| **25** | **72** |
| **Sample** | **80** |

***Q1/*** Chromium (III) in an industrial wastewater sample were determined using the spectrophotometric method by ***standard addition technique***.  **10ml** of the sample were taken, with -------- + --------and------- added in a beaker, and then the solution was boiled for 5 minutes. The boiled solution was cooled and then transferred quantitatively to a **100ml** volumetric flask and finally was diluted with 0.05M H2SO4(***Why?***). Table below shown the a series **volumes** of sample and standard **2x10-3 M** K2Cr2O7 solutions were taken to **50 ml** volumetric flasks then diluted with the acid, and their absorbance were measured as below :

|  |  |  |  |
| --- | --- | --- | --- |
| **Flask No.** | **Volume of Sample** | **Volume of Standard** | **Absorbance** |
| **1** | **5 ml** | **0 ml** | **0.152** |
| **2** | **5 ml** | **0.5 ml** | **0.268** |
| **3** | **5 ml** | **1.0 ml** | **0.335** |
| **4** | **5 ml** | **1.5 ml** | **0.412** |

a- Calculate the concentration of Cr3+ in an original wastewater sample? **Draw a graph** for your answer.

b- Write the reaction which occurred during the experiment.

***Q2/***  Sample of Aspirin tablet dissolved in NaOH solution then diluted to final volume **500mL**. For the color formation, a **2mL** from the Aspirin solution and mixed with Fe3+ reagent then diluted to **25mL** volumetric flask. The **Absorption** for the sample and standards solution were shown as a table:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Conc.( ppm**) salicylic acid | 4 | 8 | 12 | 16 | 20 | 24 | **sample** |
| **Absorbance** | 0.047 | 0.110 | 0.154 | 0.215 | 0.271 | 0.320 | **0.160** |

* Calculate how many **mg** of acetyl salicylic acid in the tablet. ***Without drawing a graph***. ***( 5 Marks )***

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***Q3/*** Answer ***only one*** of the following**:  *( 4 Marks )***

1. Write the principlesfor the **indirect** determination of **chloride** by AAS.
2. We should add **CaCO3** to the standard solutions in the determination of **potassium** in cement by AES?
3. The **colorless** solution of **Aspirin** can be determined directly by spectrophotometry?

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***Q4/*** Calculate only the **Total Hardness** in water(**mg/L as CaCO3**), if youknow that the concentrations of  **Ca=45 ppm** and **Mg=23 ppm** in water sample which determined by F-AAS**.**