STANDARD HIGH SCHOOL ZZANA

A. STANDARDISATION

1. In this experiment you are required to determine the concentration of sodium carbonate in moles per liter (molarity).

You are provided with the following;
BA1 is a solution of sodium carbonate
BA2 is 0.2M hydrochloric acid solution.

Procedure:
Pipette 20 or 25$cm^3$of sodium carbonate solution into a conical flask. Add 2drops of Methyl orange indicator, then titrate the mixture with BA2 from the Burette until the end point is reached.

Record your results in the table below and repeat titration until you obtain consist results. **Results:**

Volume of pipette used = …25.0……. cm^3

Titration number	**1**	**2**	**3**
Final burette reading (cm^3)	20.00	40.20	20.00
Initial burette reading ($cm^{3)}$	0.00	20.00	0.00
Volume of BA2 used (cm^3)			

Titre values used to calculate volume of BA2 ……,……

AveragevolumeofBA2
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a) Find the number of moles of hydrochloric acid in BA2 that reacted.
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b) Write the equation for the reaction
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c) Find the concentration of sodium carbonate in moles per liter (molarity)
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2. In this experiment you are required to determine the concentration of oxalic acid in g/ liter

You are provided with the following;
BA1 which is a solution containing 2g of Sodium hydroxide in 250 cm^3 solution.
BA2 is oxalic acid solution.
Procedure;
Pipette 20 or 25$cm^3$of BA1 into a conical flask add 2drops of phenolphthalein indicator
Titrate the mixture with BA2 from the burette until the end point is reached.
Record your results in the table below and repeat titration until you obtain consistent results. **Results:**

Volume of pipette used = ……20.0……. cm^3

Titration number	**1**	**2**	**3**
Final burette reading (cm^3)	11.10	21.10	31.10
Initial burette reading ($cm^{3)}$	00.00	11.10	00.00
Volume of BA2 used (cm^3)			

Titre values used to calculate volume of BA2 …….....

Average volumes of BA2
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a).Determine the number of moles of sodium hydroxide in BA1 that reacted
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b).Write the equation for the reaction between BA1 and BA2
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c).Determine the concentration of oxalic acid in g per liter (H=1,C=12,O=16)
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B. PERCENTAGE PURITY AND IMPURITY

1. In this experiment, you are required to determine the percentage purity and impurity in sodium carbonate.

1. You are provided with the following
BA1 is made by dissolving 12.7g of the impure Sodium carbonate in one litre of solution.
BA2 is 0.2M Hydrochloric acid solution.
Procedure:
Pipette 20 or 25cm^3 of BA1 into a conical flask; add 2 drops of methyl orange indicator then titrate the mixture with BA2 from the burette until the end point is reached. Record your results in the table below and repeat titration until you obtain consistent results.

Volume of pipette used = ……25.0……. cm^3

Titration number	**1**	**2**	**3**
Final burette reading (cm^3)	25.10	25.00	35.00
Initial burette reading ($cm^{3)}$	00.00	00.00	10.00
Volume of BA2 used (cm^3)			

Titre values used to calculate volume of BA2 …….....

AveragevolumeofBA2.....
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a) Find the number of moles of Hydrochloric acid in BA2 that reacted
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b)Write the equation for the reaction between BA1and BA2
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c) Determine the concentration of sodium carbonate in moles per litre (molarity)
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d) Determine the percentage purity and impurity of sodium carbonate (Na=23, C=12, O=16)
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2. In this experiment, you are required to determine the percentage purity and impurity in sodium carbonate.

You are provided with the following;
BA1 is made by dissolving 6.4g of the impure sodium carbonate in 500cm^3 of water to make a solution.
BA2 is 0.2M Hydrochloric acid solution.
Procedure:
Pipette 20 or 25$cm^3$of BA1 into a conical flask; add 2drops of methyl orange indicator then
Titrate the mixture with BA2 from the Buirete until the end point is reached. Record your results in the table below and repeat titration until you obtain consistent results.

Volume of pipette used = ……20.0……. cm^3

Titration number	**1**	**2**	**3**
Final burette reading (cm^3)	20.20	40.20	20.00
Initial burette reading ($cm^{3)}$	00.00	20.20	00.00
Volume of BA2 used (cm^3)			

Titre values used to calculate volume of BA2 …….....

AveragevolumeofBA2.....
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a) Find the number of moles of Hydrochloric acid inBA2 that reacted
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b) Write the equation for the reaction between BA1 and BA2
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c) Determine the concentration of sodium carbonate in moles per litre (molarity)
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d) Determine the percentage purity and impurity of sodium carbonate(Na=23,C=12,O=16)
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C. WATER OF CRYSTALLISATION

1. In this experiment, you are required to determine the value of n (molecules water of crystallization) in hydrated sodium carbonate.

You are provided with the following;

BA1 is made by dissolving 28.6g of hydrated sodium carbonate $Na_2CO_3.nH_2O$ in one litre.

BA2 is 0.2M Hydrochloric acid.

Procedure:

Pipette 20 or 25 $cm^3$of BA1 into a conical flask; add 2drops of methyl orange indicator then Titrate the mixture with BA2 from the burette until the end point is reached. Record your results in the table below and repeat titration until you obtain consistent results.

Volume of pipette used = ……25,0……. cm^3

Titration number	**1**	**2**	**3**
Final burette reading (cm^3)	25.50	25.00	25.00
Initial burette reading ($cm^{3)}$	00.00	00.00	00.00
Volume of BA2 used (cm^3)			

Titre values used to calculate volume of BA2 …….....

Average volume ofBA2

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a) Find the number of moles of BA2 that reacted

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b) Write the equation for the reaction between BA1 and BA2

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c) Determine the concentration of sodium carbonate in moles per litre

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d) Deduce the relative formula mass of Hydrated sodium carbonate $Na_2CO_3.nH_2O$ and Hence find the value of n in the salt (Na=23,C=12,O=16,H=1)

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2. **In this experiment you are required to determine the value of X (molecules water of crystallization) in the acid**

You are provided with the following

BA1 is 0.2M sodium hydroxide solution.

BA2 is made by dissolving 12.6g of hydrated acid $H_2C2O_4.XH_2O$in one litre.

Procedure:

Pipette 20 or 25$cm^3$of BA1 into a conical flask, add 2drops of phenolphthalein indicator

Then titrate the mixture with BA2 from the burette until the end point is reached .Record your results in the table below and repeat titration until you obtain consistent results.

Volume of pipette used = ……20.0……. cm^3

Titration number	**1**	**2**	**3**
Final burette reading (cm^3)	21.00	41.00	20.00
Initial burette reading ($cm^{3)}$	00.00	21.00	00.00
Volume of BA2 used (cm^3)			

Titre values used to calculate volume of BA2 …….....

AveragevolumeofBA2.....

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a) Determine the number of moles of sodium hydroxide is BA1 used

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b) Write the equation for the reaction between BA1 and BA2

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c) Determine the concentration of the acid in moles per dm^3 (molarity)

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d) Find the mass of one mole of the hydrated acid (molecular weight) and hence deduce the value of X in the acid.(H=1C=12,O=16)

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C. MOLE RATIO (stochiometry).

In this experiment you are required to determine the mole ratio between Q and P.

1. You are provided with the following;

BA1 is 0.1M solution of base Q

BA2 is 0.05M solution of an acid P

Procedure:

Pipette 20 or 25 $cm^3$of BA1 into a conical flask and add 2 drops of phenolphthalein indicator

Then titrate the mixture with BA2 from the burette until the end point is reached. Record your results in the table below and repeat titration until you obtain consistent results.

Volume of pipette used = ……25.0……. cm^3

Titration number	**1**	**2**	**3**
Final burette reading (cm^3)	25.50	25.00	35.00
Initial burette reading ($cm^{3)}$	00.00	00.00	10.00
Volume of BA2 used (cm^3)			

Titre values used to calculate volume of BA2 …….....

Average volume of BA2

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a) Find the number of moles of Q inBA1 that reacted

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b) Find the number of moles of P in BA2

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c) determine the mole ratio between Q and P

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2. In this experiment you are required to determine the mole ratio between Q and P.
You are provided with the following;
BA1 is 0.2M solution of base R
BA2 is made by dissolving 9.8g of an acid K in one litre.

Procedure:
Pipette 20 or 25$cm^3$of BA1 into a conical flask and add 2drops of phenolphthalein indicator
Then titrate the mixture with BA2 from the burette until the end point is reached. .Record your results in the table below and repeat titration until you obtain consistent results.

Volume of pipette used = ……20.0……. cm^3

Titration number	**1**	**2**	**3**
Final burette reading (cm^3)	20.00	40.50	20.00
Initial burette reading ($cm^{3)}$	00.00	20.00	00.00
Volume of BA2 used (cm^3)			

Titer values used to calculate volume of BA2 …….....
Average volume of BA2
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a) Find the number of moles of R in BA1 that reacted
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b) Find the number of moles of K in BA2 (RFM of K = 98)
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c) Determine the mole ratio between R and K
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D. BASICITY OF AN ACID

In this experiment you are required to determine the Basicity of an acid (value of n) in H_nX.

1. You are provided with the following
BA1 is 0.1M sodium hydroxide solution
BA2 is 0.05M solution of an acid H_nX.

Procedure;

Pipette 20 or 25cm^3 of BA1 into a conical flask add 2drops of phenolphthalein Indicator then titrate it with BA2 from the Burette until the end point is reached, Record your Results in the table below and repeat titration until you obtain consistent results.
Volume of pipette used = ……25.0……. cm^3

Titration number	**1**	**2**	**3**
Final burette reading (cm^3)	25.70	25.00	25.00
Initial burette reading ($cm^{3)}$	00.00	00.00	00.00
Volume of BA2 used (cm^3)			

Titre values used to calculate volume of BA2 …….....
Average volume of BA2
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a) Find the number of moles of Sodium hydroxide in BA1 that reacted
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b) Find the number of moles of the acid that reacted.
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c) Find the value of **n** in the acid.
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2. In this experiment you are required to determine the Basicity of an acid (value of n) in H_nX.

You are provided with the following
BA1 is 0.2M sodium hydroxide solution
BA2 is 0.1M solution of an acid H_nX.
Procedure;
Pipette 20 or 25$cm^3$of BA1 into a conical flask add 2 drops of phenolphthalein
Indicator then titrate it with BA2 from the Burrete until the end point is reached, Record your
Results in the table below and repeat titration until you obtain consistent results.

Volume of pipette used = ……20.0……. cm^3

Titration number	**1**	**2**	**3**
Final burette reading (cm^3)	42.00	40.00	40.00
Initial burette reading ($cm^{3)}$	00.00	00.00	00.00
Volume of BA2 used (cm^3)			

Titre values used to calculate volume of BA2 …….....
Average volume of BA2
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a) Find the number of moles of Sodium hydroxide in BA1 that reacted
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b) Find the number of moles of the acid that reacted.
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c) Find the value of n in the acid.
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E. DETERMINATION OF RELATIVE ATOMIC MASS

1. In this experiment you are required to determine the relative atomic mass of X in one mole of K_2X

You are provided with the following:

BA1 which is a solution containing 1.725g of K_2X in 250cm^3 of solution.

BA2 which is 0.1M sulphuric acid.

Sulphuric acid reacts with K_2X in the ratio 1:1

Procedure:

Pipette 25 cm^3 or 20 cm^3 of BA1 into a conical flask, add 2 or 3 drops of methyl orange indicator and titrate with BA2 from the burette. Repeat the titration until you obtain consistent results. Record you obtain consistent results. Record your results in the table below.

Volume of pipette used is .....20.0.....cm^3

Final burette reading/cm^3	10.00	21.00	31.00
Initial burette reading/cm^3	0.00	10.00	21.00
Volume of BA2 used/cm^3			

Volumes of BA2 used in the calculating the average volume.....

Average volume of BA2.....

a)Calculate number of moles of BA2 that reacted.

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b) Determine the;

i) molarity of BA1

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ii) the relative formula mass of K_2X and hence the mass of X in one mole of K_2X (K=39)

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2. **You are required to determine the relative mass of M in the metal carbonate $MHCO_3$**

You are provided with the following:

BA1; which is 0.2M hydrochloric acid solution.

BA2; which is a solution containing 8.4 g/500cm^3 of a metal hydrogen carbonate $MHCO_3$

Procedure:

Pipette 25.0 cm^3 or 20 cm^3 of BA2 into a conical flask, add 3 drops of methyl orange and titrate with BA1 from the burette. Repeat the titration until you obtain consistent results. Record your results in the table below.

Volume of pipette used = ……25.0……. cm^3

Titration number	**1**	**2**	**3**
Final burette reading (cm^3)	25.00	27.00	25.20
Initial burette reading ($cm^{3)}$	0.00	0.00	0.00
Volume of BA2 used (cm^3)			

Titre values used to calculate volume of BA2 …….....

Average volume of BA2

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Write the equation for the reaction between hydrochloric acid and $MHCO_3$

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a) Calculate the number of moles of BA1 that reacted.

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b) Determine the;

i) molarity of BA2

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ii) the relative formula mass of the hydrogen carbonate and hence the atomic mass of M (H=1,C=12,O=16)

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