233/3

CHEMISTRY

PRACTICAL

JULY/AUG 2019

TIME: 2 ¼ HOUR

NAME \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ADM NO. \_\_\_\_\_\_\_\_\_

CLASS\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE\_\_\_\_\_\_\_\_\_\_\_\_

SCHOOL\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ SIGN\_\_\_\_\_\_\_\_\_\_\_\_\_\_

NYANDARUA WEST CLUSTER EXAMINATION

KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)

INSTRUCTION TO CANDIDATES

1. Write your name and admission number in the space provided above.

2. Sign and write the date of examination in the spaces provided above.

3. Answer all questions in the spaces provided.

4. You are required to spend the first 15 minutes of the 21/4 hours allowed for this paper reading the whole paper carefully and make sure you have all the chemicals and apparatus that you may need.

5. This paper consist of\_\_\_\_\_\_\_\_\_ printed pages.

6. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

For Examiner’s use only.

|  |  |  |
| --- | --- | --- |
| Question | Maximum score | Candidates Score |
| Q1 | 23 |  |
| Q2 | 11 |  |
| Q 3 | 06 |  |
| TOTAL | 40 |  |

1A. **You are provided with:-**

 0.1M Sodium thiosulphate labeled solution P

 2M hydrochloride acid labeled solution Q

You are required to determine how the rate of reaction of hydrochloric acid and sodium thiosulphate varies with the concentration of sodium thiosulphate.

* Label a 250ml conical flask as conical flask A.
* Using a 50ml measuring cylinder, place 50cm3 of 1M sodium thiosulphate into the conical flask
* Mark a cross X on a white piece of paper. Place the conical flask containing sodium thiosulphate solution on the paper with a cross. Add 5cm3 of 2M hydrochloric acid and at the same time start the stop watch. Swirl the mixture. Record the time taken for the cross to be invisible. When viewed directly from above in table B. label another 250ml conical flask as conical flask B. place 40cm3 of 1M sodium thiosulphate into flask B and add 10cm3 of distilled water to make up to 50cm3 place the flask B on the paper with across. Add 5cm3 of 2M HCL and at the same time start the stop watch. Record the same taken for the cross to be invisible. Repeat the experiment with conical flasks C, D and E. using the volume shown in the table A, each time add 5cm3 of 2M HCL and record the time taken for the cross to be invisible in table B.

**Table A**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Conical flask | A | B | C | D | E |
| Volume of sodium thiosulphate (cm3) | 50 | 40 | 30 | 20 | 10 |
| Volume of water (cm3) | 0 | 10 | 20 | 30 | 40 |
| Total volume of solution (cm3) | 50 | 50 | 50 | 50 | 50 |

**Table B**

|  |  |  |  |
| --- | --- | --- | --- |
| Conical flask | Concentration of sodium thiosulphate (Mol/dm3) | Time taken for the cross to be invisible | 1/time Sec -1 |
| A |  |  |  |
| B |  |  |  |
| C |  |  |  |
| D |  |  |  |
| E |  |  |  |

1. Fill the **table B** by calculating concentration of sodium thiosulphate in mol/dm3 and 1/time (8mks)
2. Plot a graph of 1/time against concentration in the grid provided below. (3 mks)
3. How does the rate of reaction of hydrochloric acid vary with the concentration of sodium thiosulphate. (1mk)

1B. **You are provided with:-**

Solution T: 0.2M hydrochloric acid

Solution W: containing 2.65g of M2CO3 in 250cm3 of solution.

You are required to determine the relative atomic mass of M

**Procedure**

Fill the burette with solution T. Pipette 25cm3 of solution W in a 250ml conical flask. Add 3 drops of methyl orange indicator and titrate with solution T.

Record the results in the table below. Repeat the procedure two more times to complete the table.

|  |  |  |  |
| --- | --- | --- | --- |
| **Titration** | **I** | **II** | **III** |
| Final burette reading (cm3) |  |  |  |
| Initial burette reading (cm3) |  |  |  |
| Volume of solution T used (cm3) |  |  |  |

 (4 mks)

1. Calculate the average of solution T used. (1mk)
2. Write the equation for the reaction that takes place between T and W. (1mk)
3. Calculate the
	1. Number of moles of solution T in the average titre. (1mk)
	2. Number of moles of M2CO3 in 25cm3 of solution W. (1mk)
	3. Concentration of W in moles per litre (molarity). (1mk)
	4. Concentration of W in grams per litre. (1mk)
	5. The relative formula mass (RFM) of the M2CO3. (1mk)
	6. Relative atomic mass at metal M C=12.0, O=16.0. (1mk)

2. You are provided with solid X. carry out the test below.

Write your observations and inferences in the spaces provided.

1. Place one half of solid X in a clean dry test tube. Heat it gently then strongly. Test any gas produced with blue and red litmus papers.

**Observation inferences**

 1 ½ 1mk

1. Place the other half of solid X in a boiling tube. Add about 10cm3 of distilled water and shake until all the solid dissolves (use the solution for test (i), (ii), (iii) and (iv)
	1. Place about 2cm3 of solution in a test tube. Add sodium hydroxide until in excess

**Observation inferences**

 1 ½ 1mk

* 1. To about 2cm3 of solution X add 3 drops of acidified hydrogen peroxide solution

**Observation inferences**

 1 mk 1mk

* 1. To about 2cm3 of solution X add Barium chloride solution

**Observation inferences**

 1 mk 1mk

* 1. To the resulting mixture in (iii) above add dilute hydrochloric acid

**Observation inferences**

 1 mk 1mk

3. You are provided with liquid Z. carry out the following tests and record your observations and inference in the spaces provided.

1. Place about 4 drops of liquid Z on a clean watch glass and ignite it.

**Observation inferences**

 1mk 1mk

1. Place about 2cm3 of liquid Z in clean dry test tube, and add all the sodium hydrogen carbonate provided.

**Observation inferences**

 1mk 1mk

1. Place about 2cm3 of liquid Z in a test tube, add about 1cm3 of acidified potassium chromate vi and warm the mixture.

**Observation inferences**

 1mk 1mk

**CONFIDENTIAL**

**Requirements**

1. 160 cm3 of solution P
2. 30cm3 of solution Q
3. Stop watch
4. 3 250ml conical flask
5. White plain paper
6. 50ml measuring cylinder
7. 10ml measuring cylinder
8. 100cm3 of solution T
9. 80cm3 of solution W
10. A burette
11. A pipette and pipette filler
12. Solid X about 1g (FeSO4.7H2O)
13. 1 boiling tube
14. 4 cleaning test tubes
15. Red and blue litmus papers
16. Distilled water
17. Liquid Z (about 5cm3 in a test tube covered with a foil paper)
18. About 0.5g of NaHCO3

Access to

1. Methyl orange indicator
2. Source of heat
3. 2M sodium hydroxide
4. Acidified hydrogen peroxide
5. 2M barium chloride solution
6. 2m hydrochloric acid
7. Watch glass
8. Acidified potassium chromate (vi)

**Note**

* Solution P is 0.1M Na2S2O3

Q is 2M HCl

T is 0.2M HCl

* Solution W is prepared by dissolving exactly 10.6g of sodium carbonate in about 400cm3 of distilled water and top up to 1 litre
* Solid X is FeSO4.7H2O
* Liquid Z is ethanol