TEVETA

Technical Education, Vocational and Entrepreneurship Training Authority

DIPLOMA IN SCIENCE LABORATORY

LEVEL 6 YEAR I EXAMINATIONS

FINAL INTEGRATED SUMMATIVE EXAMINATIONS

SITTING: JULY/AUGUST 2025

SUBJECT: CHEMISTRY TECHNIQUES I

TIME: ONE (1) HOUR THIRTY (30) MINUTES **TOTAL MARKS: 100**

PASS MARK: 50

INSTRUCTIONS TO CANDIDATE

1. Write your Examination Number and National Registration Card (NRC) number on the Marking Guide provided.
2. This paper has One (1) task. Perform the task according to the procedure given.
3. Cellphones and programmable calculators are not allowed in the examination room.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

DETERMINATION OF THE UNKNOWN CONCENTRATION OF SUBSTANCE Q

In this experiment you are required to determine the concentration of the solution Q (dilute hydrochloric acid) by titrating with a standard solution P (sodium hydroxide) of molarity 0.1M.

PROCEDURE

- Fill the burette with solution Q.
- Using the measuring cylinder, measure 25 ml of solution P and transfer into a clean conical flask.
- Add 2-3 drops of phenolphthalein indicator provided.
- Slowly titrate solution Q with P until you obtain the titration end point.
- Repeat the procedure two times until you obtain accurate value of volume. Record your volume in the table.

TASK

i. Determine the average volume used.

ii. Construct a balanced chemical equation to represent the reaction that took place between solution Q and P, include state symbols

iii. Construct the net ionic equation for the reaction experiment equation in **(ii)** above.

iv. Using the concentration of P and the volumes of P and Q, calculate the concentration of solution Q (dilute hydrochloric acid)

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MARKING GUIDE

Centre Name	
Centre Number	

Candidate Examination Number	
Candidate NRC Number	

Examiner Name	
Examiner NRC No	

SCORE (Percentage)

DETERMINATION OF THE UNKNOWN CONCENTRATION OF SUBSTANCE Q- MARKING GUIDE

Criteria	Criteria Assessment	Allocated Marks	Actual Marks
Fill burette with 50 cm^3 of solution Q	Burette correctly filled, no air bubbles, solution Q used	1	
2. Measure 25 ml of solution P into conical flask	Correct volume measured using clean measuring cylinder	1	
3. Add indicator	2–3 drops of correct indicator added	1	
4. Perform titration	Careful titration, swirling flask, slow near end point	2	
5.End point determination	Correct colour change observed and noted	1	
6.Record volume readings	Proper recording of initial, final and titre values in a table	1	
7.Calculate concentration of solution	Uses appropriate formula and substitution, units included	3	
Total marks		10	

Criteria	Criteria Assessment	Marks	Score
1. Correct calculation of average	Accurately calculates the average titre values	2	
2. Correct average titre used	Uses accurate average titre values in calculations	2	
3. Correct formula used for calculation	States or applies the titration formula: $C_1V_1 = C_2V_2$ or moles method	2	
4.Correct calculation of concentration	Accurate final concentration of solution P with correct units g/dm^3	3	
5.Correct calculation of concentration	Accurate final concentration of solution P with correct units mol/dm^3	2	
6. Correct balanced equation	Accurately balanced chemical equation	2	
7. Correct net equation	Accurately balanced net ionic chemical equation	2	
Total marks		15	