KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER
MAIN EXAMINATIONS

FOR THE DEGREE OF BSC CHEMISTRY

COURSE CODE: SCH 123

COURSE TITLE: LABORATORY TECHNIQUES II

DATE: 13/07/2021 **TIME:** 9:00-11:00AM

INSTRUCTIONS TO CANDIDATES:

- Answer **Question ONE (Compulsory)** and any other **TWO (2)** questions
- Indicate answered questions on the front cover
- Start each question on a new page and make sure the question's number is written on each page

TIME: 2 Hours

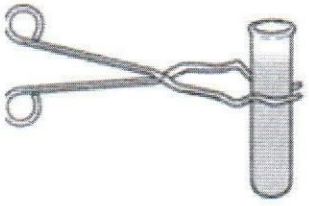
This paper consists of **4** printed pages. Please Turn Over

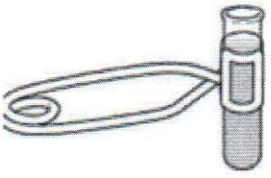
KIBU observes ZERO tolerance to examination cheating

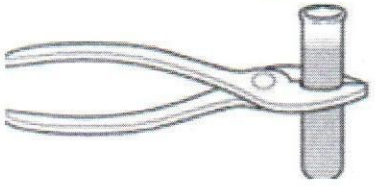
Question 1 [30 Marks]

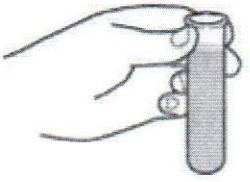
Section I

i. Which of the following illustrate the correct way to pick up a heated test tube [1 Mark]

a) 

c) 

b) 

d) 

ii. Approved eye protection devices, such as goggles, are worn in the laboratory [1 Mark]

A. to avoid eye strain

B. any time chemicals, heat, or glassware are used

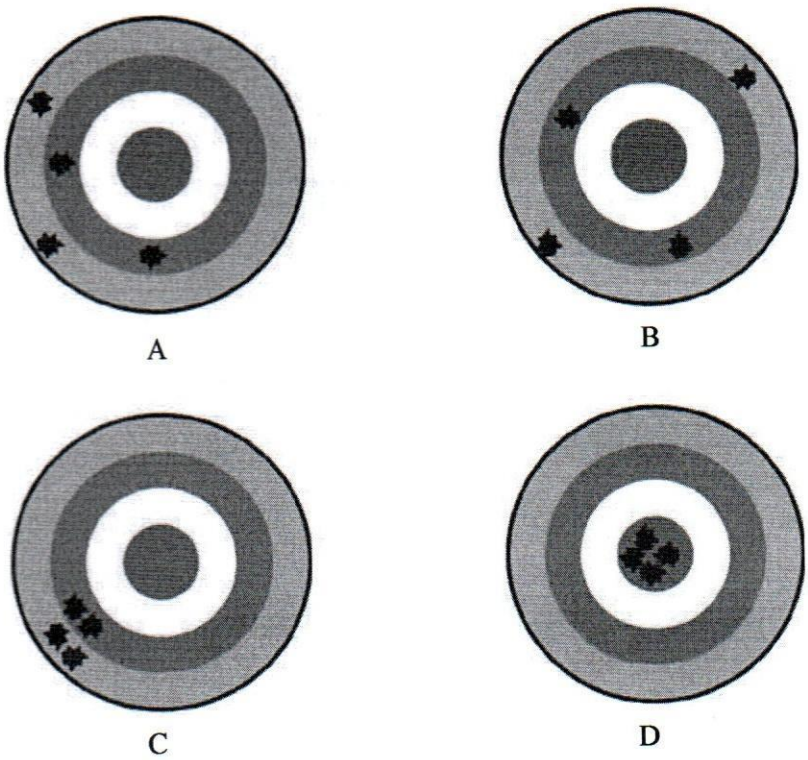
C. to improve your vision

D. only if you do not have glasses

iii. Which of the following experiments is

a) precise but not accurate? [1 Mark]

b) neither accurate nor precise? [1 Mark]



iv. A student is carrying out an experiment and needs to incubate a bacterial culture at 45 °C. Estimate the difference in temperature between the current reading and the desired temperature. [1 Mark]

A. 8
B. 7
C. 9
D. 12

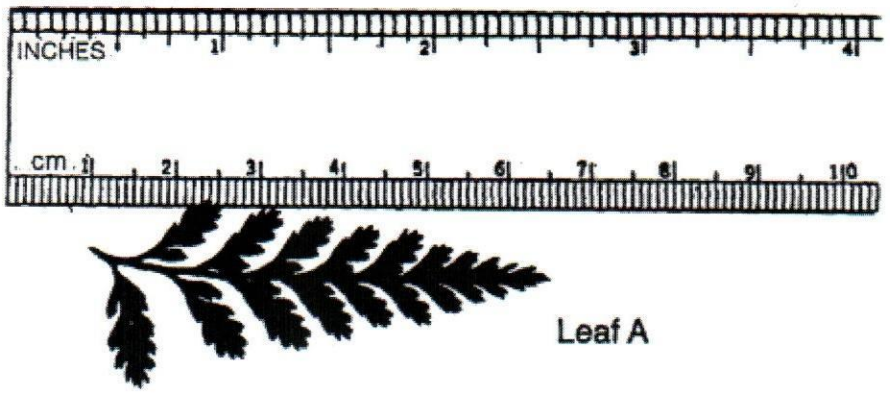
v. Which of the following represents the products for the reaction below? [2 Marks]

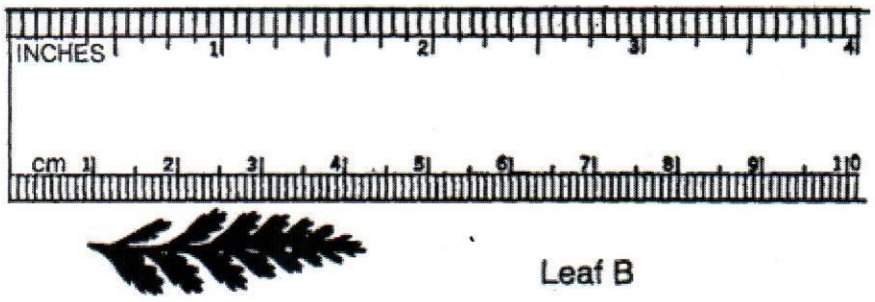
$Na_2SO_4 + 2AgNO_3 \longrightarrow$ '

A. $Ag_2SO_4 + Na_2NO_3$
B. $AgSO_4 + NaNO_3$
C. $Ag_2SO_4 + 2NaNO_3$
D. $Ag_2SO_4 + NaNO_3$

vi. In a gravimetric analysis, the barium sulfate precipitate was weighed before it completely dried, indicate the likely impact of this on the experimental result. [2 Marks]

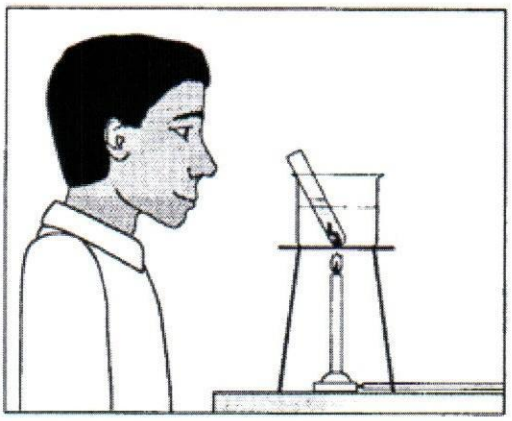
vii. Estimate the difference in length in mm between leaves A and B [2 Marks]





viii. The diagram below illustrates a student carrying out an experiment in the laboratory. Highlight two unsafe laboratory practises and the correct practise the student should have adhered to

[4 Marks]



ix. List any 4 pieces of safety equipment located in the chemistry laboratory [4 Marks]

x. A student determines measures the mass of one mole of carbon and finds it to be 12.22 grams. If the accepted value is 12.11 grams, what is the students % of error. [3 Marks]

xi. Differentiate between direct and indirect titration methods [4 Marks]

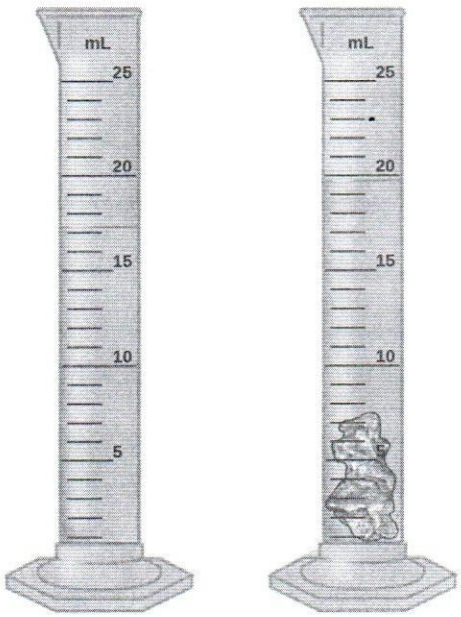
Question 2 [20 Marks]

i. While driving from Lokichogio to Mombasa (approx. 808 miles), a 2012 Toyota Prado uses 52.8 gallons of Diesel. Calculate

a. the average fuel economy in km per Litre for the Prado [10 Marks]

b. the fuel costs for the trip if Diesel costs 107.66 per Litre [4 Marks]

ii. An irregular shaped material weighing 51.84 g is submerged in graduated cylinder containing water as shown below



a. Determine the density of the material [3 Marks]

b. Determine the identity of the material. Explain your answer [3 Marks]

Question 3 [20 Marks]

i. List and explain the different categories of titration reactions [8 Marks]

ii. Sketch the titration curves of each of the following and give examples [12 Marks]

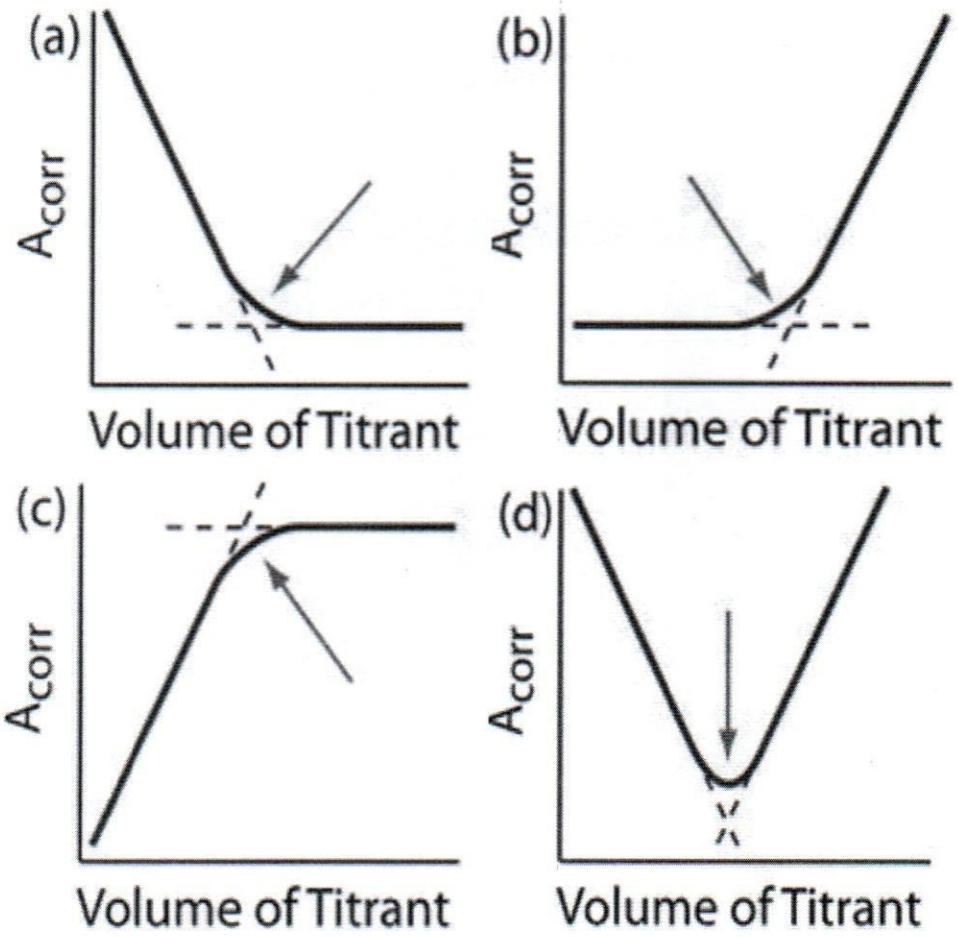
a. A strong acid with a strong base

b. A weak acid with a strong base

c. A polyprotic acid with a strong base

Question 4 [20 Marks]

Describe the absorbance characteristics of the titrant, analyte and product in the titrations represented by the following graphs.



Question 5 [20 Marks]

i. Discuss three factors that may affect accuracy of weighing on an analytical balance [9 Marks]

ii. Describe the proper procedure for operating an analytical balance [11 Marks]

Millimeters	Centimeters	Meters	Kilometers	Inches	Feet	Yards	Miles
mm	cm	m	km	in	ft	yd	mi
1	0.1	0.001	0.000001	0.03937	0.003281	0.001094	6.21e-07
10	1	0.01	0.00001	0.393701	0.032808	0.010936	0.000006
1000	100	1	0.001	39.37008	3.28084	1.093613	0.000621
1000000	100000	1000	1	39370.08	3280.84	1093.613	0.621371
25.4	2.54	0.0254	0.000025	1	0.083333	0.027778	0.000016
304.8	30.48	0.3048	0.000305	12	1	0.333333	0.000189
914.4	91.44	0.9144	0.000914	36	3	1	0.000568
1609344	160934.4	1609.344	1.609344	63360	5280	1760	1

Centimeter cube	Meter cube	Liter	Inch cube	Foot cube	US gallons	Imperial gallons	US barrel (oil)
cm^3	m^3	ltr	in^3	ft^3	US gal	Imp. gal	US brl
1	0.000001	0.001	0.061024	0.000035	0.000264	0.00022	0.000006
1000000	1	1000	61024	35	264	220	6.29
1000	0.001	1	61	0.035	0.264201	0.22	0.00629
16.4	0.000016	0.016387	1	0.000579	0.004329	0.003605	0.000103
28317	0.028317	28.31685	1728	1	7.481333	6.229712	0.178127
3785	0.003785	3.79	231	0.13	1	0.832701	0.02381
4545	0.004545	4.55	277	0.16	1.20	1	0.028593
158970	0.15897	159	9701	6	42	35	1

Densities of common substances

Solids	Liquids	Gases (at 25 °C and 1 atm)
ice (at 0 °C) 0.92 g/cm^3	water 1.0 g/cm^3	dry air 1.20 g/L
oak (wood) 0.60–0.90 g/cm^3	ethanol 0.79 g/cm^3	oxygen 1.31 g/L
iron 7.9 g/cm^3	acetone 0.79 g/cm^3	nitrogen 1.14 g/L
copper 9.0 g/cm^3	glycerin 1.26 g/cm^3	carbon dioxide 1.80 g/L
lead 11.3 g/cm^3	olive oil 0.92 g/cm^3	helium 0.16 g/L
silver 10.5 g/cm^3	gasoline 0.70–0.77 g/cm^3	neon 0.83 g/L
gold 19.3 g/cm^3	mercury 13.6 g/cm^3	radon 9.1 g/L