Centre Number	Candidate Number	Candidate Name

NAMIBIA SENIOR SECONDARY CERTIFICATE

PHYSICAL SCIENCE HIGHER LEVEL

8322/3

PAPER 3 Practical Test

2 hours

Marks 40

2017

Additional materials: As per instructions to subject teacher
Non-programmable calculator
A pair of scissors

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Candidates answer on the Question Paper in the spaces provided.
- Write your Centre Number, Candidate Number and Name in the spaces at the top of this page.
- Write in dark blue or black pen.
- You may use a soft pencil for any diagrams, graphs or rough working.
- Do not use correction fluid.
- Do not write in the margin *For Examiner's Use*.

- Answer **all** questions.

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The Periodic Table is printed on page 9.
- Chemistry practical notes are printed on page 10.
- The insert for Question 1 is printed on page 11.

For Examiner`s Use	
1	
2	
Total	
Marker	
Checker	

This document consists of **11** printed pages and **1** blank page.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

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1 Read all instructions and questions carefully before you start the experiment.

In this experiment, you are going to investigate the effect of temperature on the speed of reaction between hydrochloric acid and aqueous sodium thiosulfate.

When these chemicals react they form a precipitate, which makes the solution become cloudy. The speed at which the precipitate is formed depends on several factors. Fig. 1.1 shows the setup of apparatus.

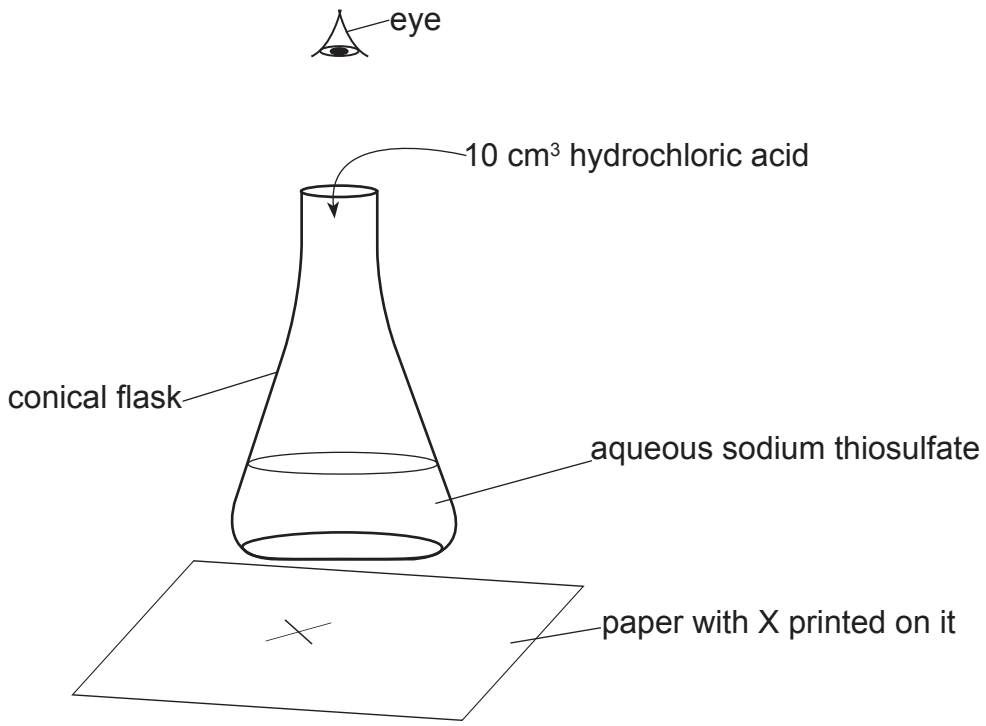

Fig. 1.1

Record your results in the table in Fig. 1.2.

experiment number	initial temperature of solution /°C	final temperature of solution /°C	average temperature of the solution /°C	time for the cross to disappear /s
1				
2				
3				
4				
5				

Fig. 1.2

(a) Cut out the insert provided on page 11.

(b) Using a large measuring cylinder pour 50 cm^3 of aqueous sodium thiosulfate into the conical flask.

Measure the temperature of the solution and record this as the initial temperature in the table in Fig. 1.2. [1]

(c) Place the conical flask on the cross printed on the insert. You need to be able to see the cross from above the flask through the solution.

(d) Using the small measuring cylinder, add 10 cm^3 of the dilute hydrochloric acid provided to the liquid in the flask. Immediately start your timer and shake the flask. Keep the flask above the cross the whole time.

(e) In the table in Fig. 1.2, record the time taken for the cross to disappear from view. [1]

(f) Measure the final temperature of the solution in the flask, record this in the table in Fig. 1.2. [1]

(g) You are going to carry out the experiment at different temperatures to obtain four more sets of reading.

Repeat step **(b)** through **(f)**. Each time;

- measure a fresh 50 cm^3 of aqueous sodium thiosulfate and put it in a clean conical flask
- heat the solution mixture until it is 10°C higher than the previous experiment
- add 10 cm^3 of dilute hydrochloric acid
- take the readings as before and record them in the table in Fig. 1.2

[4]

(h) Calculate the average temperature of the solution for each experiment.

Record your answers in the table in Fig. 1.2.

Space for working

[3]

(i) On Fig. 1.3 draw a graph of the time taken for the cross to disappear against average temperature of the solution.

Draw a smooth line graph.

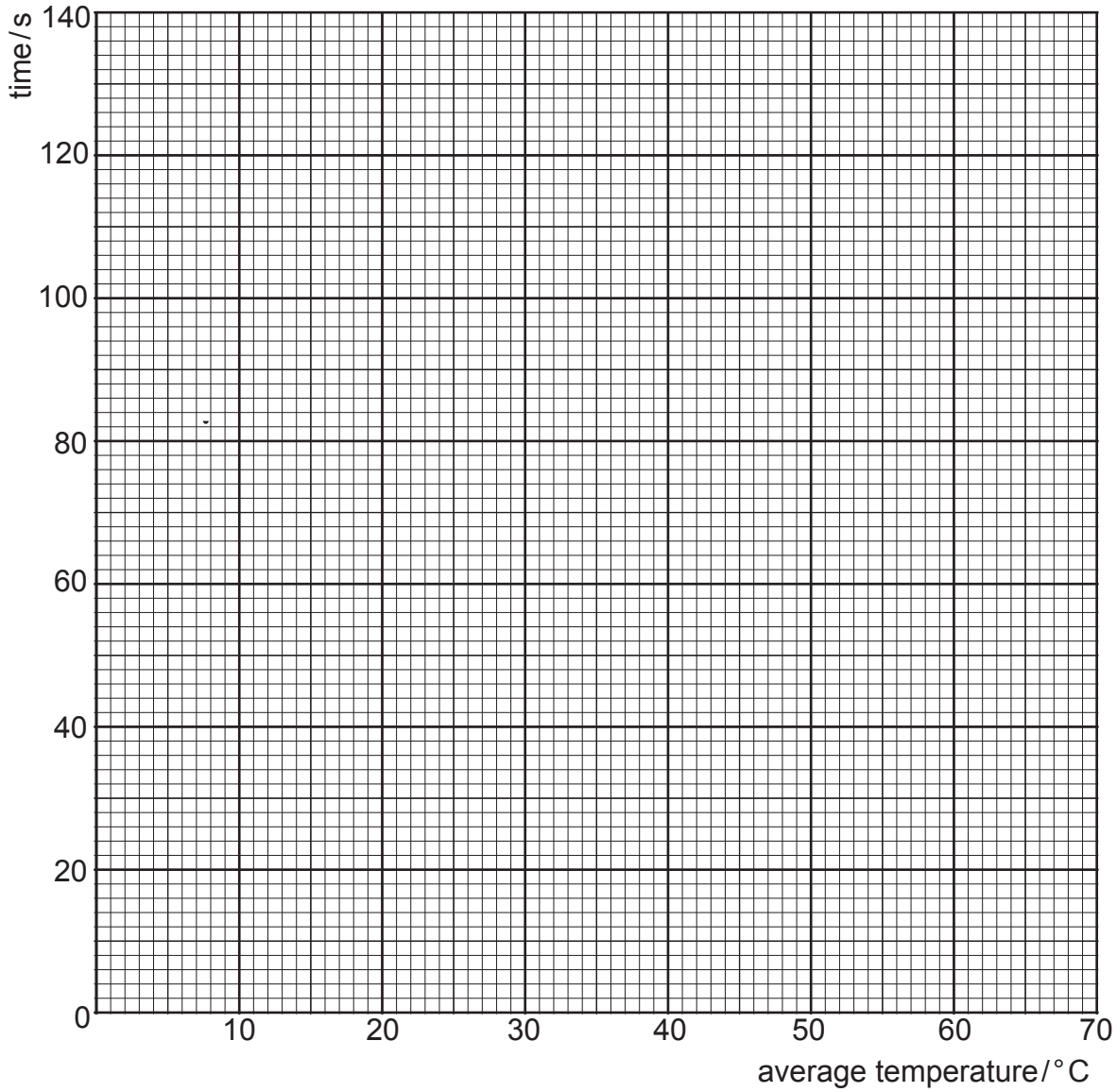

Fig. 1.3

[3]

(j) With reference to kinetic particle theory, explain the trend in the speed of reaction.

.....

.....

..... [2]

(k) Explain why the same volume of sodium thiosulfate and the same volume of hydrochloric acid are used in each experiment.

.....

..... [1]

(l) Use your graph to determine the time taken for the cross to disappear if the average temperature was 70°C.

Show clearly on your graph how you did this.

..... [2]

(m) On Fig. 1.3, sketch the curve you would expect if the experiments were repeated using the same volume of sodium thiosulfate solution at a lower concentration. [2]

[20]

2 Read all instructions in this question first before you start the experiment.

You need to check that you have all equipment to do the following investigation.

In this experiment you are to investigate how potential difference and current are related for a light bulb and for a copper wire.

Fig. 2.1 shows the circuit you will be using.

The circuit has been setup for you.

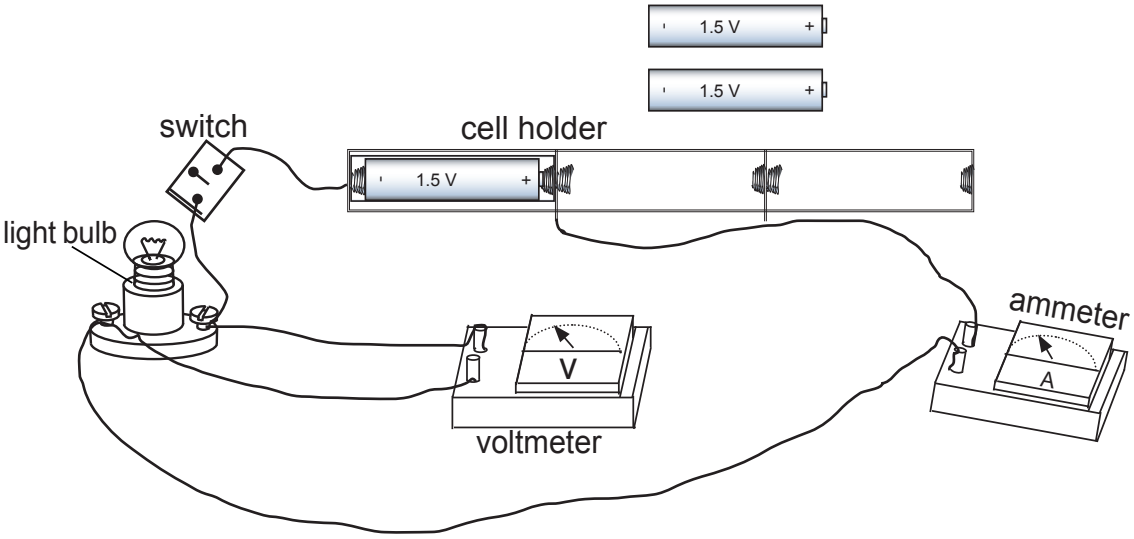

Fig. 2.1

You will use this circuit to study the resistance of the light bulb and that of the copper wire when the circuit is closed.

(a) Draw a circuit diagram of this circuit.

[3]

(b) Close the switch and record readings for current and potential difference.

Open the switch as soon as you have taken your readings.

Current.....

Potential difference..... [2]

(c) Complete the column headings in the table in Fig. 2.2 and transfer your readings from **(b)** into it. [2]

	number of cell	current/.....	P.d /.....
light bulb	1		
	2		
	3		

Fig. 2.2

(d) Use the other torch cells to repeat **(b)** for a two torch cell battery and a three torch cell battery.

Record your readings below and in the table in Fig. 2.2.

(i) For a two torch cell battery.

Current.....

Potential difference ..... [1]

(ii) For a three torch cell battery.

Current.....

Potential difference ..... [1]

(e) Replace the light bulb with 1 m of copper wire.

Extend the table in Fig 2.2 to allow you to include **three** sets of readings for this experiment using copper wire instead of the light bulb. [2]

(f) Repeat **(b)** and **(d)** to obtain three sets of readings for the copper wire experiment.

Record all your readings in your extended table in Fig. 2.2. [3]

[Turn over

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(g) In Fig. 2.3 plot two separate graphs, using the same axes, of current (y-axis) against potential difference (x-axis).

Use all three sets of data from both experiments.

Draw a separate line for each experiment.

Label the light bulb line **L** and the copper wire line **C**.

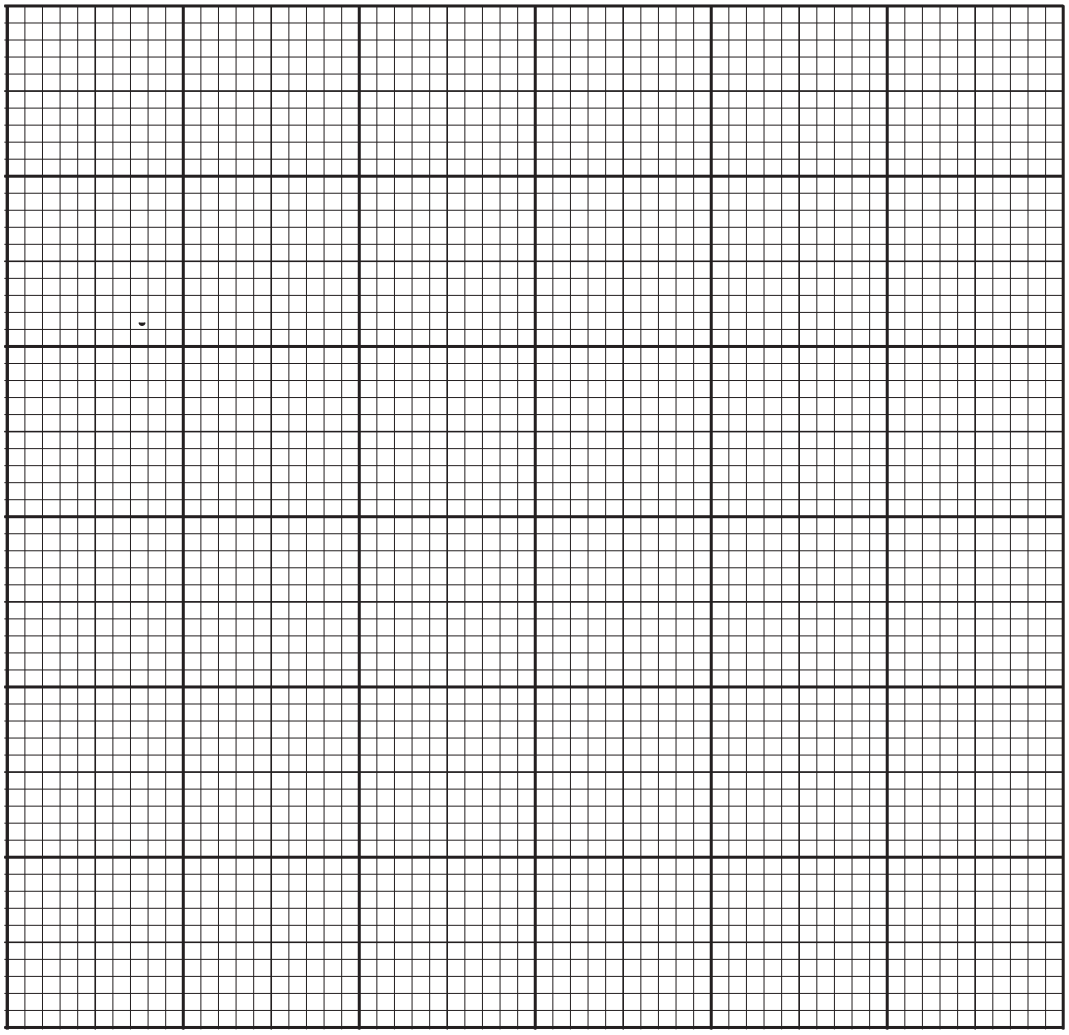


Fig. 2.3

[4]

(h) Compare and explain the different shapes of the lines.

.....

.....

.....

..... [2]

[20]

DATA SHEET
The Periodic Table of the Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H Hydrogen 1										4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35,5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

***58 - 71 Lanthanoid series**
†90 - 103 Actinoid series

Key

a	a = relative atomic mass
X	X = atomic symbol
b	b = proton (atomic) number

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).

CHEMISTRY PRACTICAL NOTES

Test for anions

anion	*test*	*test result*
carbonate (CO_3^{2-})	add dilute acid	effervescence, carbon dioxide produced
chloride (Cl^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	white ppt.
iodide (I^-) [in solution]	acidify with dilute nitric acid, then add aqueous lead (II) nitrate	yellow ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide, then aluminium foil, warm carefully	ammonia produced
sulfate (SO_4^{2-}) [in solution]	acidify with dilute nitric acid, then add aqueous barium nitrate	white ppt.

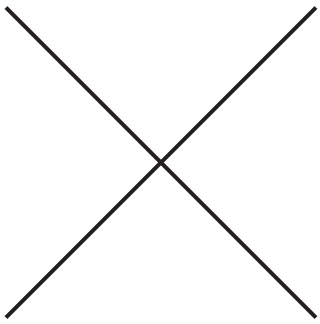
Tests for aqueous cations

cation	*effect of aqueous sodium hydroxide*	*effect of aqueous ammonia*
aluminium (Al^{3+})	white ppt., soluble in excess, giving a colourless solution	white ppt., insoluble in excess
ammonium (NH_4^+)	ammonia produced on warming	–
calcium (Ca^{2+})	white ppt., insoluble in excess	no ppt., or very slight white ppt.
copper(II) (Cu^{2+})	light blue ppt., insoluble in excess	light blue ppt., soluble in excess, giving a dark blue solution
iron(II) (Fe^{2+})	green ppt., insoluble in excess	green ppt., insoluble in excess
iron(III) (Fe^{3+})	red-brown ppt., insoluble in excess	red-brown ppt., insoluble in excess
zinc (Zn^{2+})	white ppt., soluble in excess, giving a colourless solution	white ppt., soluble in excess, giving a colourless solution

Test for gases

gas	*test and test result*
ammonia (NH_3)	turns damp red litmus paper blue
carbon dioxide (CO_2)	turns limewater milky
chlorine (Cl_2)	bleaches damp litmus paper
hydrogen (H_2)	‘pops’ with a lighted splint
oxygen (O_2)	relights a glowing splint

Insert for Question 1



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