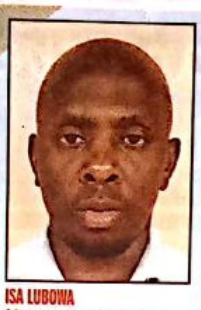
S3 CHEMISTRY

THE TEACHERS



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PRE-TEST 1

Time allowed: 2 ½ hours.
Instructions:
- This paper consists of two sections A and B
- Answer all questions in section A and only 4 questions from section B
- Questions in section B carry equal marks.

Section A: attempt all questions

Section A

1. The chemistry laboratory is a risky place and requires learners to take precaution while conducting experiments. Recently a student sustained an injury shown by the image below.

a) i) Identify the nature of injury.
ii) how can such an injury be handled?
ii) Explain how such an injury can be avoided.
iii) Design a poster or signage with precaution message to display on wall of the laboratory to avoid such injuries.
b) Why are laboratory rules and regulation important?

SECTION B

2. A student working hard on the laboratory experiment that uses a strong acid. Halfway through the laboratory, the student gets hungry and starts eating a bag of chips. When he finished, he started licking his fingers. Another student carefully pours unknown solution from a test tube into a beaker. His friend sneaks up behind him and surprise in friend. The students accidentally drops a beaker on the floor and pieces of glass land on the sandaled feet and both left without cleaning.
a) Identify the safety rules being violated.
b) What possible risks in this scenario and how can you minimize the harm?

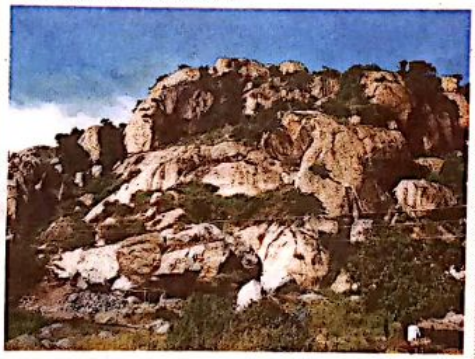
3. Tooth decay begins when bacteria in your mouth break down leftover food to acids. The acids corrode the tooth's surface (enamel). This can lead to a small hole in a tooth, called a cavity. If tooth decay is not treated, it can cause pain, infection, and even tooth loss. Regular brushing of teeth can prevent tooth decay.
a) What is an acid?
b) How do acids corrode the teeth?
c) Explain how brushing the teeth with toothpaste prevents tooth decay?

4. After boiling water for some time, the heating element of a water heater appeared as shown below.

a) What happened to the heating coil?
b) How does the boiled water cause such an effect on the heating coil?

c) Explain how such a problem can be overcome.

5. Rocks in Uganda are found in a number of places. Some rocks are very big and shaped in ways that are amazing. In many societies mystery surrounds the formation of such rocks. Communities belief that rocks are associated with special powers and often perform rituals on rocks.



a) What is a rock?
b) How are rocks formed?
c) Briefly describe how rocks are important to your community?

6. Sugar, sucrose, and cane sugar are the same molecule. Cane sugar got from sugar canes is added to hot water as a sweetener. The sucrose chemical formula is $C_{12}H_{22}O_{11}$. In sugar molecular formula C represents carbon, H represents hydrogen and O represents oxygen. 12 atoms of carbon, 22 atoms of hydrogen, and 11 atoms of oxygen combine to form one molecule of sucrose. It is recommended that 6 teaspoons or 24 grams of sugar for most adult women are required per day.

Mr. Mutaaya the Head Teacher of Vision college takes tea twice a day with each time taking 500cm3. What is the concentration of sugar in tea each time he takes tea?

PRE-TEST 2

Paper 1
Time allowed: 2 ½ hours.
Instructions:
- This paper consists of two sections A and B
- Answer all questions in section A and only 4 questions from section B
- Questions in section B carry equal marks.

Section A: attempt all questions

SECTION B:

2. The trend in oxidising ability of the halogens can be determined by reacting aqueous solutions of halogens with aqueous solutions of potassium halide salts.
(a) Complete the table.

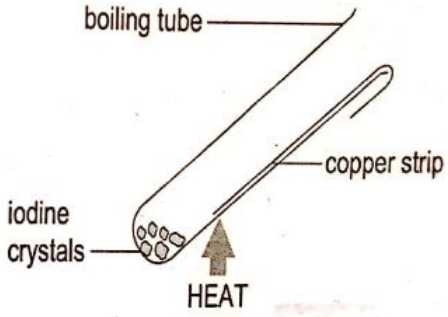
Aqueous solution	Colour of aqueous solution
Chlorine	
Bromine	
Iodine	
Potassium halide	

(b) A 1cm³ portion of each aqueous halogen solution is added separately to 1cm³ of potassium chloride solution in a test tube and any observations noted. The procedure is repeated using potassium bromide solution and also using potassium iodide solution.
(i) Complete the following table, using a tick (✓) to indicate that a reaction occurs and a cross (X) to indicate that no reaction occurs.

	Potassium chloride	Potassium bromide	Potassium iodide
Chlorine			✓
Bromine			
Iodine			

(ii) Write an equation for the reaction of chlorine with potassium iodide.
(iii) Some hexane was added to the test tube after the reaction of aqueous chlorine with potassium iodide solution was complete. The test tube was stoppered and shaken for one minute. The contents were allowed to settle. What would be observed?
(c) Chlorine reacts with water and with sodium hydroxide solution. (i) Write an equation for the reaction of chlorine with water.
(ii) State the conditions required for the reaction between chlorine and sodium hydroxide solution which yield products containing chlorine in the same oxidation states as those in (c)(i).
(iii) Suggest why ozone is often preferred to chlorine in water treatment.

3. The empirical formula of copper iodide may be determined using the apparatus below.

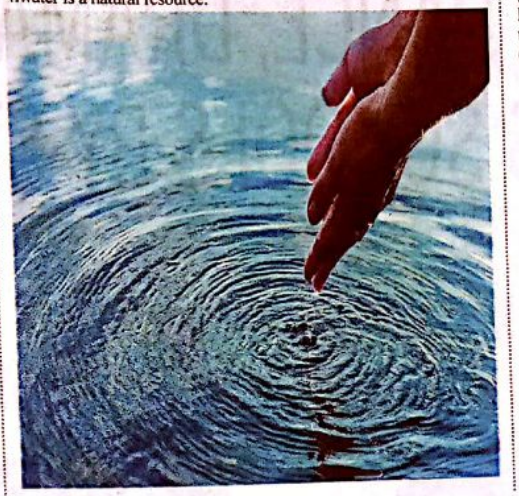


A small quantity of iodine crystals is added to the boiling tube. A clean copper strip is placed into the boiling tube and bent at one end so that it fits over the mouth of the boiling tube. The part of the copper strip nearest the iodine crystals is heated gently in a fume cupboard until no more purple vapour is observed. Once the boiling tube is cool, the copper strip is carefully removed and reweighed. The yellow coating of copper iodide is scraped from the surface of the copper strip and the copper strip reweighed. The following results are obtained.

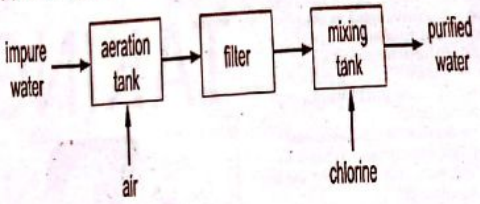
	Mass /g
Initial mass of copper strip	2.94
Mass of copper strip and copper iodide	3.28
Final mass of copper strip	2.77

(a) Explain why the iodine crystals are not heated directly.
(b) Suggest why the procedure is carried out in a fume cupboard.
(c) Calculate the mass of iodine that reacted.
(d) Calculate the mass of copper that reacted.
(e) Calculate the empirical formula of the copper iodide formed

4.water is a natural resource.



(a) The water in rivers often contains pollutants such as acids. Describe how universal indicator paper can be used to determine the pH value of the water.
(b) The diagram shows some of the stages in water treatment.



(i) Air is blown through the aeration tank. Name the two gases that make up most of the air.
(ii) After aeration, the water still contains large insoluble particles. The filter is made up of fine sand and stones. Explain how the filter helps purify the water.
(iii) Explain why chlorine is used in water treatment.
(iv) Anhydrous cobalt(II) chloride is used to test for water. State the colour change in this test.

THE PERIODIC TABLE OF ELEMENTS

Group

I	II	III	IV	V	VI	VII	0
1	2	3 4 5 6 7 8 9 10 11 12	13	14	15	16	17	18
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	98 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	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86
223 Fr Francium 87	226 Ra Radium 88	227 Ac† Actinium 89	261 Rf Rutherfordium 104	262 Db Dubnium 105	266 Sg Seaborgium 106	264 Bh Bohrium 107	277 Hs Hassium 108	268 Mt Meitnerium 109	271 Ds Darmstadtium 110	272 Rg Roentgenium 111	285 Cn Copernicium 112						

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	145 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	231 Pa Protactinium 91	238 U Uranium 92	237 Np Neptunium 93	242 Pu Plutonium 94	243 Am Americium 95	247 Cm Curium 96	245 Bk Berkelium 97	251 Cf Californium 98	254 Es Einsteinium 99	253 Fm Fermium 100	256 Md Mendelevium 101	254 No Nobelium 102	257 Lr Lawrencium 103

* 58 – 71 Lanthanum series
† 90 – 103 Actinium series

$^{a}_{b}X$ a = relative atomic mass (approx)
x = atomic symbol
b = atomic number

SOLUTIONS NEXT WEDNESDA