PEI HWA SECONDARY SCHOOL
SECONDARY FOUR NORMAL (ACADEMIC) SC(CHEM)
WEIGHTED ASSESSMENT 2 2023 (modified)

25

Name : _____ ( ) Class : 4D____

Date : ___ May 2023 TG : 4_____

Duration : 30 min Parent's Signature : _____

Section A – Multiple Choice Questions (5 marks)
Choose the correct answer and write A, B, C or D in the boxes provided.

Question	1	2	3	4	5
Answer	D	A	A	C	A

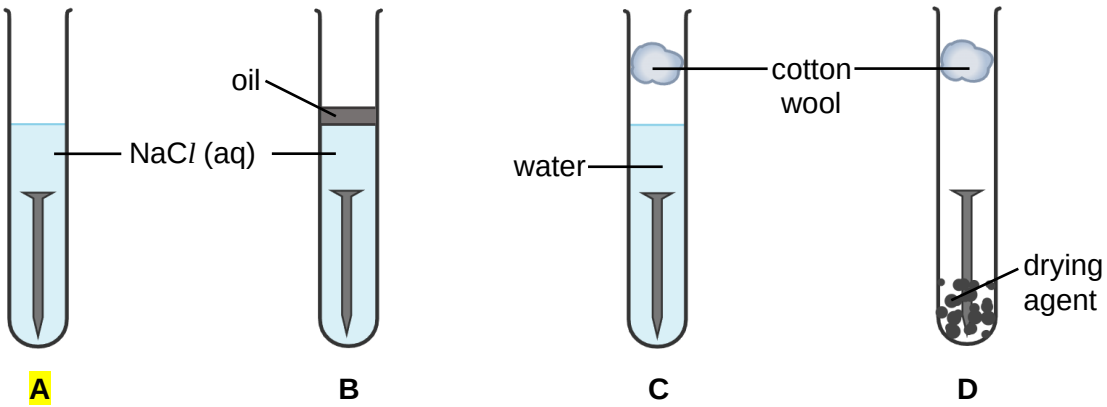
1 Some of the general physical properties of metals are shown.

1	Metals are hard solids.
2	Metals have high densities.
3	Metals have very high melting points.
4	Metals are good conductors of electricity.

Which of these properties does lithium have?

A 1 and 2 only.
B 3 and 4 only.
C 2 only.
D 4 only.

2 In which test tube will the rusting of the iron nail occur the fastest?



3 The table gives information about the reactivity of three metals **P**, **Q** and **R**.

metal	reaction with air	reaction with steam	reaction with dilute hydrochloric acid
P	burns with sparks	forms an oxide	forms hydrogen
Q	slowly forms an oxide	no reaction	no reaction
R	slowly forms an oxide	no reaction	forms hydrogen

What is the order of reactivity of **P**, **Q** and **R**?

	most reactive →		least reactive
A	P	R	Q
B	P	Q	R
C	Q	R	P
D	R	P	Q

4 The table below shows the results obtained when different metals were placed in different salt solutions.

A tick (√) means that a solid was deposited.

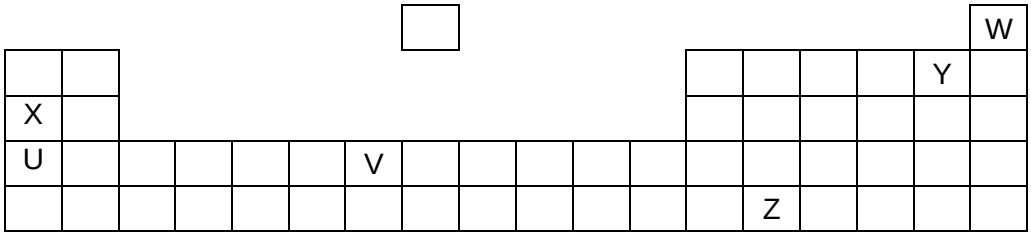
A cross (×) means that there is no visible reaction.

metal	aqueous salt solution of metal			
	barium nitrate	chromium(III) nitrate	tin(IV) nitrate	caesium nitrate
barium		√	√	×
chromium	×		√	×
tin	×	×		×
caesium	√	√	√	

Which row correctly arranges the four metals in order of increasing reactivity?

	Least reactive →			Most reactive
A	caesium	barium	chromium	tin
B	chromium	barium	tin	caesium
C	tin	chromium	barium	caesium
D	barium	caesium	tin	chromium

5 The diagram shows an outline of the Periodic Table.



Which of the following statements is true?

A U is more reactive than X.

B V is a soft metal that can be cut with a knife.

C W is a very reactive metallic element.

D Y is an inert gas.

Section B – Short-Answer Questions (12 marks)

Answer **ALL** the questions in the spaces provided.

6 **(a)** Element Q forms a fluoride with a chemical formula QF.

QF has a melting point of 988 °C.

(i) Suggest whether Q is a metal or a non-metal.

Metal [1]

(ii) Deduce the group number which Q is found in the Periodic Table and given that Q is found in Period 3, identify Q.

1, sodium [1]

(ii) Q reacts with water vigourosly to form an alkali and a gas.

By using Q identified in **(a)(ii)**, name the products formed.

alkali: **sodium hydroxide** gas: **hydrogen gas** [2]

(iv) Describe how you can test for the gas produced in **(a)(ii)**.

Use a lighted splint and if it gets extinguished with a 'pop' sound, gas produced is hydrogen. [1]

(b) Unlike Q, argon gas will not react with fluorine or oxygen to form compounds.

Explain why.

Argon has a fully-filled valence shell / completely-filled valence shell / stable octet configuration and hence do not need to gain, lose or share electrons with other atoms. **[1]**

7 (a) Coal-fire power station emit sulfur dioxide into the atmosphere.

Sulfur dioxide is a pollutant that damages the environment.

(i) State a source of sulfur dioxide gas.

Volcano eruption / combustion of fossil fueks [1]

(ii) What type of oxide is sulfur dioxide classified as?

Type of oxide: **acidic** oxide [1]

(iii) Explain the environmental harmful effects of sulfur dioxide.

Sulfur dioxide being an acidic oxide will dissolve in rainwater to produce acid rain. Acid rain

- **corrodes buildings and sculptures made from metal or stone**
- **lowers the pH of soil below what many plant species can tolerate, killing them**
- **lowers the pH of soil below what many plant species can tolerate, killing them**
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[2]

(b) Both sulfur and oxygen belong to the same group but different periods in the Periodic Table.

Using their electronic configurations, explain why

(i) sulfur and oxygen belong to the same group,

They both have 6 valence electrons.

(ii) sulfur and oxygen belong to different periods.

They both have different number of electron shells, sulfur having 3 and oxygen 2.

[2]

Section C – Free-Response Questions (8 marks)
Answer **ALL** the questions in the spaces provided.

9 (a) The table below gives the boiling points of some members of Group 18 in the Periodic Table.

element	boiling point / °C
fluorine	-188
chlorine	-34
bromine	59
iodine	184

(i) State the common name given to Group 17 elements.

Halogens [1]

(ii) Explain why fluorine, chlorine, bromine, and iodine are placed in the same group in the Periodic Table.

All four elements have the same number of valence electrons / 7 valence electrons. [1]

(iii) Suggest the colour and physical state of chlorine at room temperature.

colour **yellow green** physical state **gas** [1]

(iv) In Group 17, astatine comes after iodine.

Using the data in the table, predict the boiling point of astatine.

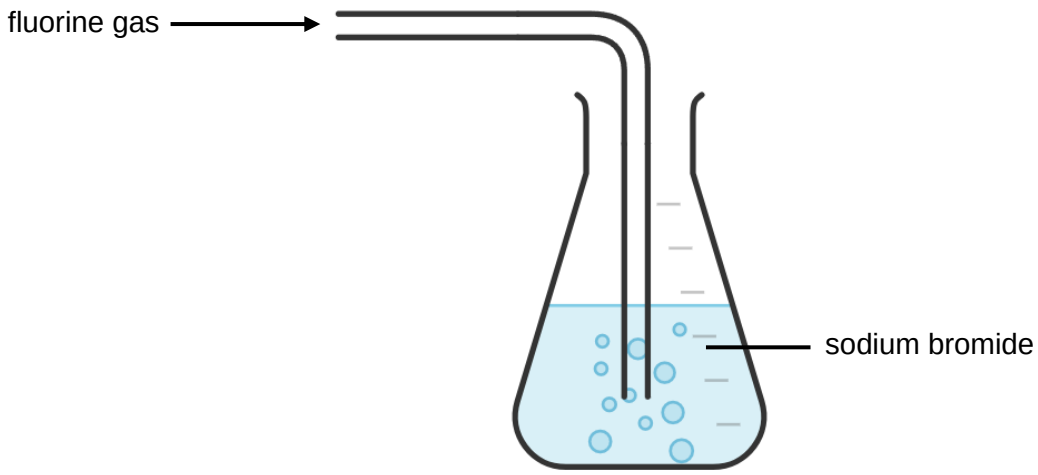
Any boiling point between **300 - 350°C** [1]

(v) Other than changes in melting and boiling point, suggest one more trend in the physical properties going down Group 17.

***Any of the following* [1]** [1]

- **Colour intensity increases down the group**
- **Density increases down the group**

(b) A student uses the set-up below to bubble fluorine gas through a colourless solution of sodium bromide. A displacement reaction occurred.



(i) Describe what would is observed when fluorine gas is bubbled through the colourless solution of sodium bromide.

A reddish-brown solution is formed / Solution turns reddish brown. [1]

(ii) Complete the word equation for the reaction that occurs between fluorine and sodium bromide.

fluorine + sodium bromide → **bromine** + **sodium fluoride** [1]

(iii) Explain why a reaction can occur between fluorine and sodium bromide.

Fluorine is more reactive than bromine and hence able to displace bromine from sodium bromide. [1]

- END -

The Periodic Table of the Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H Hydrogen 1										2 He Helium 4
3 Li Lithium 7	4 Be Beryllium 9	Key: proton (atomic) number; atomic symbol; name; relative atomic mass										5 B Boron 11	6 C Carbon 12	7 N Nitrogen 14	8 O Oxygen 16	9 F Fluorine 19	10 Ne Neon 20
11 Na Sodium 23	12 Mg Magnesium 24											13 Al Aluminium 27	14 Si Silicon 28	15 P Phosphorus 31	16 S Sulfur 32	17 Cl Chlorine 35.5	18 Ar Argon 40
19 K Potassium 39	20 Ca Calcium 40	21 Sc Scandium 45	22 Ti Titanium 48	23 V Vanadium 51	24 Cr Chromium 52	25 Mn Manganese 55	26 Fe Iron 56	27 Co Cobalt 59	28 Ni Nickel 59	29 Cu Copper 64	30 Zn Zinc 65	31 Ga Gallium 70	32 Ge Germanium 73	33 As Arsenic 75	34 Se Selenium 79	35 Br Bromine 80	36 Kr Krypton 84
37 Rb Rubidium 85	38 Sr Strontium 88	39 Y Yttrium 89	40 Zr Zirconium 91	41 Nb Niobium 93	42 Mo Molybdenum 96	43 Tc Technetium -	44 Ru Ruthenium 101	45 Rh Rhodium 103	46 Pd Palladium 106	47 Ag Silver 108	48 Cd Cadmium 112	49 In Indium 115	50 Sn Tin 119	51 Sb Antimony 122	52 Te Tellurium 128	53 I Iodine 127	54 Xe Xenon 131
55 Cs Caesium 133	56 Ba Barium 137	57 – 71 lanthanoids	72 Hf Hafnium 178	73 Ta Tantalum 181	74 W Tungsten 184	75 Re Rhenium 186	76 Os Osmium 190	77 Ir Iridium 192	78 Pt Platinum 195	79 Au Gold 197	80 Hg Mercury 201	81 Tl Thallium 204	82 Pb Lead 207	83 Bi Bismuth 209	84 Po Polonium -	85 At Astatine -	86 Rn Radon -
87 Fr Francium -	88 Ra Radium -	90 - 103 actinoids	104 Rf Rutherfordium -	105 Db Dubnium -	106 Sg Seaborgium -	107 Bh Bohrium -	108 Hs Hassium -	109 Mt Meitnerium -	110 Ds Darmstadtium -	111 Rg Roentgenium -	112 Cn Copemecium -		114 Fl Fierovium -		116 Lv Livermorium -		
lanthanoids			57 La Lanthanum 139	58 Ce Cerium 140	59 Pr Praseodymium 141	60 Nd Neodymium 144	61 Pm Promethium -	62 Sm Samarium 150	63 Eu Europium 152	64 Gd Gadolinium 157	65 Tb Terbium 159	66 Dy Dysprosium 163	67 Ho Holmium 165	68 Er Erbium 167	69 Tm Thulium 169	70 Yb Ytterbium 173	71 Lu Lutetium 175
actinoids			89 Ac Actinium -	90 Th Thorium 232	91 Pa Protactinium 231	92 U Uranium 238	93 Np Neptunium -	94 Pu Plutonium -	95 Am Americium -	96 Cm Curium -	97 Bk Berkelium -	98 Cf Californium -	99 Es Einsteinium -	100 Fm Fermium -	101 Md Mendelevium -	102 No Nobelium -	103 Lr Lawrencium -

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