

KULLEGG SAN BENEDITTU Secondary School, Kirkop

Mark

HALF-YEARLY EXAMINATION – 2014/2015

FORM 4

CHEMISTRY

TIME: 1h 30min

Question	1	2	3	4	5	6	7	8	Global Mark
Max. Mark	10	8	6	7	14	15	20	20	100
Mark									

DO NOT WRITE ABOVE THIS LINE

Name: _____

Class: _____

Useful data: $1F = 96500C$; 1 mole of any gas at s.t.p. = $22.4dm^3$

Below is a copy of the periodic table.

PERIODIC TABLE

1	2											3	4	5	6	7	0	
																		4
																		He
7	9											11	12	14	16	19	20	
Li	Be											B	C	N	O	F	Ne	
3	4											5	6	7	8	9	10	
23	24											27	28	31	32	35.5	40	
Na	Mg											Al	Si	P	S	Cl	Ar	
11	12											13	14	15	16	17	18	
39	40	45	48	51	52	55	56	59	59	63.5	65	70	73	75	79	80	84	
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
85	88	89	91	93	96	99	101	103	106	108	112	115	119	122	128	127	131	
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	
133	137	139	178	181	184	186	190	192	195	197	201	204	207	209	210	210	222	
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	

Key

$\frac{a}{X}_b$	relative atomic mass symbol atomic number
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Section A: Answer ALL questions in this section, using the spaces provided.

This section carries 60 marks.

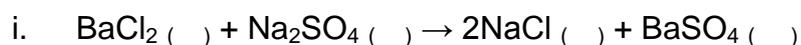
1) Use the periodic table on the front page to give the **symbol** of:

	Description	Symbol of element
A)	A red-brown liquid at room temperature.	
B)	A transition metal whose oxide is used as a catalyst in the preparation of oxygen in the lab.	
C)	The noble gas found in period 3.	
D)	An element which forms ions of valency +2.	
E)	An element which is able to bond with itself forming a diatomic molecule.	
F)	An element which shows magnetic properties.	
G)	The most reactive metal.	
H)	An element that reacts with oxygen to form an amphoteric oxide.	
I)	An alkali metal.	
J)	An element with the electronic configuration 2,8,8,2	

(10 marks)

(Total: 10 marks)

2) A) Write the appropriate **state symbols** within the brackets and then give the **ionic equations** for the following chemical reactions.



Ionic equation: _____



Ionic equation: _____

(6 marks)

B) What **type of reaction** is occurring in (2Ai) and (2Aii) above?

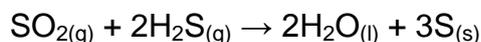
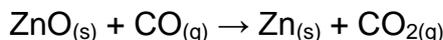
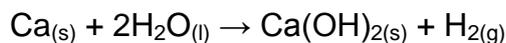
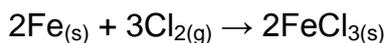
Reaction (Ai): _____

Reaction (Aii): _____

(2 marks)

(Total: 8 marks)

3) A) In **each** of the following reactions, **underline** the substance which has been oxidised:



(4 marks)

B) From the reactions given in (3A) above, **name** one oxidising agent and one reducing agent.

Oxidising agent: _____

Reducing agent: _____

(2 marks)

(Total: 6 marks)

4) Iron is extracted using the blast furnace.

A) i) Name **two** raw materials that go into a Blast Furnace.

(2 marks)

ii) Name **two** substances (apart from iron), that come out of the Blast furnace.

(2 marks)

B) Most of the iron leaving the furnace is converted into steel.

i) Give **one** reason why pig iron is not useful as steel.

(1 mark)

ii) Give **one** use of steel and state the property upon which this use depends.

(2 marks)

(Total: 7 marks)

5) A) Complete the following table by writing the **names** of the products formed, if at all, at the anode and the cathode. If there are no products formed, write '**no products**'.

Sustance	Cathode	Anode
Concentrated NaCl (aq)		
Molten ZnBr ₂		
Solid CaSO ₄		
Dilute AgNO ₃ (aq)		

(8 marks)

B) Choose **one** of the substances in (5A) above whose electrolysis has been successful.

- i. Draw a **labelled diagram** of the apparatus you would use to carry out the electrolysis of the chosen substance.

(4 marks)

- ii. What would be **observed** at the cathode and at the anode if the electrolysis of your chosen substance had to be carried out?

At anode: _____

At cathode: _____

(2 marks)

(Total: 14 marks)

6) A) Briefly describe a simple **laboratory experiment** or reaction to confirm that Group 1 element potassium is more reactive than sodium. Include any **observations** as well as **balanced equations** for the reactions taking place.

(5 marks)

B) A group of chemistry students are investigating the reactivity of the following metals: nickel, lead and zinc. It is suspected that nickel lies between zinc and lead in the electrochemical(reactivity) series.

The students had available samples of the three metals and solutions of their nitrate salts – $Zn(NO_3)_2$, $Pb(NO_3)_2$, $Ni(NO_3)_2$.

i. The following is the table of results the students drew for their experiment. Use a ✓ to show when the displacement reaction occurs and a X to show that the reaction does not occur.

	$Zn(NO_3)_2$	$Pb(NO_3)_2$	$Ni(NO_3)_2$
Zn			
Pb			
Ni			

(6 marks)

ii. Give an equation for one of the displacement reactions that occurs.

(2 marks)

iii. How would you expect nickel to react with dilute sulfuric acid? Give a balanced chemical reaction.

(2 marks)

(Total: 15 marks)

Section B: Answer BOTH questions in this section on the separate sheets provided. This section carries 40 marks.

- 7) Electrolysis is an important technique used in industry for the extraction of aluminium.
- A) What is the name of the raw material (extracted from the Earth) from which aluminium is extracted? (1 mark)
 - B) Draw a labelled diagram of the electrolytic cell used in this industrial process. (4 marks)
 - C) Write the ionic half equations taking place at each electrode. (2 marks)
 - D) What is molten cryolite used for during this electrolysis? (2 marks)
 - E) Why are the anodes changed from time to time? (1 mark)
 - F) Give one benefit of recycling aluminium. (1 mark)
 - G) Give 3 uses of aluminium and the corresponding property upon which this use depends. (6 marks)
 - H) What mass of aluminium will be obtained if a current of 1000A flows for 30 minutes? (3 marks)

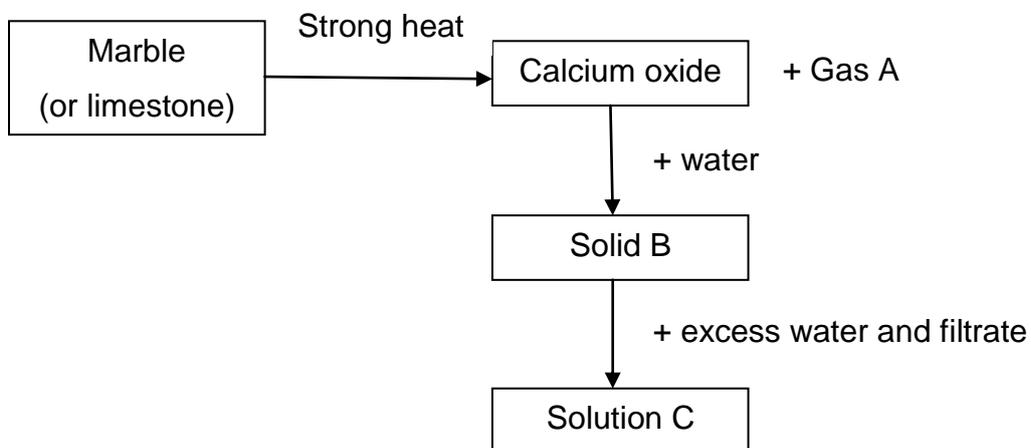
(Total: 20 marks)

- 8) Elements in the same Group of the Periodic Table show a similarity in physical and chemical properties. The elements also show a trend in reactivity.

- A) Barium is in Group 2 of the Periodic Table. Use your knowledge of the Group 2 metals to answer the following questions about Barium.
- i. What is the number of electrons in the outer shell of a barium atom? (1 mark)
 - ii. Write down the formula for the barium ion. (1 mark)
 - iii. Predict one physical property that you would expect barium to show. (1 mark)
 - iv. How would you expect barium to be extracted from its compounds? (1 mark)
 - v. State one thing you would expect to see when barium is added either to water, or to dilute hydrochloric acid. (1 mark)
 - vi. Give a balanced equation for the reaction of barium with water and with dilute hydrochloric acid. (4 marks)
 - vii. Would you expect barium to be more, or less reactive than magnesium and calcium? Why? (3 marks)

B) Calcium is also a member of Group 2 of the periodic table and it forms several important compounds.

- i. Consider the following reaction scheme and **copy and complete** the table accordingly.



	Chemical name	Formula
Marble (or limestone)		
Gas A		
Solid B		

(3 marks)

- ii. The following text refers to solution C in the previous reaction scheme. Fill in the blanks by stating what each letter **A-E** stands for.

Solution C is normally called _____ **(A)** _____. When gas A is bubbled through C, a white precipitate of _____ **(B)** _____ is formed. On bubbling excess of gas A through the resulting suspension, the white precipitate dissolves due to the formation of calcium hydrogen carbonate, which is soluble and has a formula of _____ **(C)** _____. Solution C is alkaline and reacts with dilute hydrochloric acid to produce _____ **(D)** _____ and _____ **(E)** _____.

(5 marks)

(Total: 20 marks)

END OF EXAM