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1. Complete the following table giving the name or the formula of each compound as appropriate.

	Chemical name	Chemical formula
(a)	potassium chloride	
(b)		SO <sub>2</sub>
(c)		Mg(NO <sub>3</sub> ) <sub>2</sub>
(d)	methanol	
(e)		FeBr <sub>2</sub>
(f)	aluminium sulphate	

Q1

(Total 6 marks)

2. Using the Periodic Table provided, complete the following table.

	Name of element	Atomic number	Electronic configuration
(a)	lithium		
(b)		13	
(c)			2.8.7

Q2

(Total 6 marks)



3. State the colour change observed during each of the following reactions.

(a) A few drops of distilled water are placed on anhydrous cobalt chloride paper.

Colour changes from ..... to ..... (1)

(b) Copper powder is heated in air.

Colour changes from ..... to ..... (1)

(c) A freshly prepared solution of iron(II) sulphate is left in a beaker overnight.

Colour changes from ..... to ..... (1)

(d) A piece of sodium metal is cut and the cut surfaces left open to the air.

Colour changes from ..... to ..... (1)

(e) Chlorine gas is bubbled into potassium bromide solution.

Colour changes from ..... to ..... (1)

(Total 5 marks)

Q3

4. Complete the following sentences by writing the missing word in the space provided.

(a)  $^1_1\text{H}$  and  $^2_1\text{H}$  are ..... of the same element. (1)

(b) An atom forms an anion when it gains one or more ..... (1)

(c) The mineral rutile has the formula  $\text{TiO}_2$  and is an ore of the metal ..... (1)

(d) Methyl ethanoate belongs to a group of compounds called ..... (1)

(e) A chemical reaction in which heat is taken in is described as ..... (1)

(f) Butene has the empirical formula ..... (1)

(Total 6 marks)

Q4



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5. From the following list of metals

**aluminium    barium    copper    lithium    iron    potassium**

select the metal that:

(a) is the least reactive element in Group 1 of the Periodic Table

..... (1)

(b) is obtained from its ore in a blast furnace

..... (1)

(c) gives a lilac colour when placed in a non-luminous Bunsen flame

..... (1)

(d) appears to be less reactive than its position in the reactivity series suggests

..... (1)

(e) forms an insoluble sulphate

..... (1)

(f) does NOT react with dilute hydrochloric acid.

..... (1)

**(Total 6 marks)**

**Q5**



6. Calculate the:

(a) number of moles of bromide ions,  $\text{Br}^-$ , in one mole of magnesium bromide,  $\text{MgBr}_2$

.....  
(1)

(b) number of atoms in one molecule of methyl ethanoate,  $\text{CH}_3\text{COOCH}_3$

.....  
(1)

(c) number of moles of carbon dioxide formed from the complete combustion of one mole of propane,  $\text{C}_3\text{H}_8$

.....  
(1)

(d) relative formula mass of iron(III) nitrate,  $\text{Fe}(\text{NO}_3)_3$

.....  
(1)

(e) number of faradays of electrical charge needed to deposit one mole of copper by the electrolysis of copper(II) sulphate solution

.....  
(1)

(f) volume of 1.6 g of oxygen, in  $\text{cm}^3$ , measured at room temperature and normal atmospheric pressure.

.....  
(1)

(Total 6 marks)

Q6



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7. State the reagent needed to make the named gas from the given starting material. Give a simple test and the result to confirm the identity of the gas.

(a) Sulphur dioxide from sodium sulphite.

Method .....

Test .....

Result .....

(3)

(b) Hydrogen chloride from potassium chloride.

Method .....

Test .....

Result .....

(3)

(Total 6 marks)

Q7

8. The following are names of different types of reaction.

**addition**

**combustion**

**displacement**

**neutralisation**

**polymerisation**

**reduction**

Which of these types of reaction is represented by each of the following equations? Each answer can be used once, more than once or not at all.

(a)  $\text{CH}_3\text{CH}=\text{CH}_2 + \text{H}_2 \rightarrow \text{CH}_3\text{CH}_2\text{CH}_3$  .....

(1)

(b)  $\text{LiOH} + \text{HCl} \rightarrow \text{LiCl} + \text{H}_2\text{O}$  .....

(1)

(c)  $\text{Al}^{3+} + 3\text{e}^- \rightarrow \text{Al}$  .....

(1)

(d)  $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$  .....

(1)

(e)  $\text{Cl}_2 + 2\text{I}^- \rightarrow 2\text{Cl}^- + \text{I}_2$  .....

(1)

(f)  $n\text{CH}_2=\text{CH}_2 \rightarrow (\text{CH}_2-\text{CH}_2)_n$  .....

(1)

(Total 6 marks)

Q8



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9. State a reagent that you could use to tell the difference between the following pairs of substances. In each case you should describe what you would observe.

(a) Sodium chloride and sodium bromide.

Reagent .....

Observation for sodium chloride .....

.....

Observation for sodium bromide .....

.....

**(3)**

(b) Ethane and ethene.

Reagent .....

Observation for ethane .....

.....

Observation for ethene .....

.....

**(3)**

(c) Potassium sulphate and potassium sulphite.

Reagent .....

Observation for potassium sulphate .....

.....

Observation for potassium sulphite .....

.....

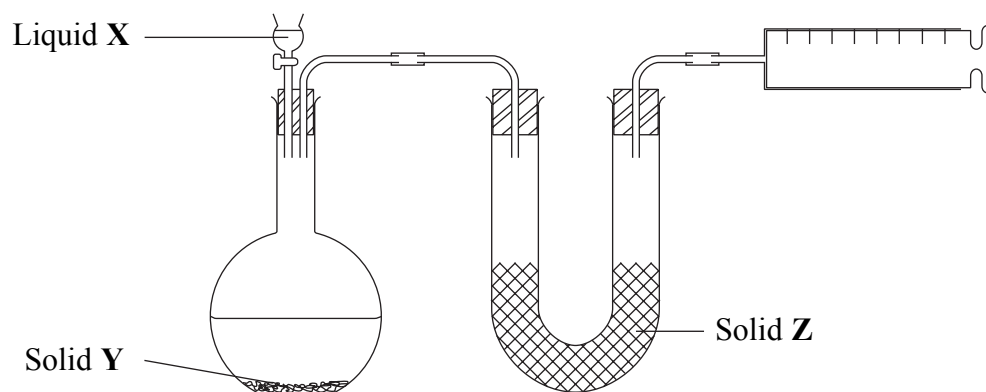
**(3)**

**Q9**

**(Total 9 marks)**



10. The following diagram shows the apparatus used to prepare dry hydrogen in the laboratory.



(a) Identify by name or formula:

(i) liquid X ..... (1)

(ii) solid Y ..... (1)

(iii) solid Z. .... (1)

(b) What is the function of solid Z?

..... (1)

(c) State a test you could use to demonstrate that the gas produced was hydrogen.

..... (1)

(d) Write an equation for the combustion of hydrogen.

..... (1)

(Total 6 marks)

Q10





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11. Sodium reacts with nitrogen to form a compound called sodium nitride. The chemical formula of sodium nitride is  $\text{Na}_x\text{N}$ .

A sample of sodium in a porcelain boat was heated in a combustion tube while nitrogen gas was passed over it. The following masses were recorded.

Mass of porcelain boat when empty = 14.84 g

Mass of porcelain boat + sodium = 15.13 g

Mass of porcelain boat + sodium nitride = 15.19 g

(a) (i) What mass of sodium was used?

..... (1)

(ii) What mass of sodium nitride was formed?

..... (1)

(iii) What mass of nitrogen reacted with the sodium?

..... (1)

(b) Calculate the empirical formula of sodium nitride.

.....  
.....  
..... (3)

(c) Write an equation for the formation of sodium nitride.

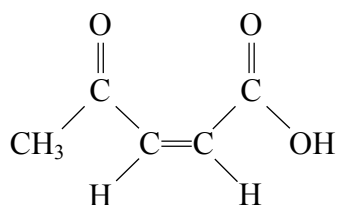
..... (2)

(Total 8 marks)

Q11



12. The following diagram shows the structure of a molecule of an organic compound.



(a) Give the names of two functional groups present in the molecule.

1 .....

2 .....

(2)

(b) Is the compound saturated or unsaturated? Explain your answer.

.....  
 .....

(1)

(c) Is the compound a hydrocarbon? Explain your answer.

.....  
 .....

(1)

(d) Would you expect an aqueous solution of the compound to be acidic, neutral or alkaline? Explain your answer.

.....  
 .....  
 .....  
 .....

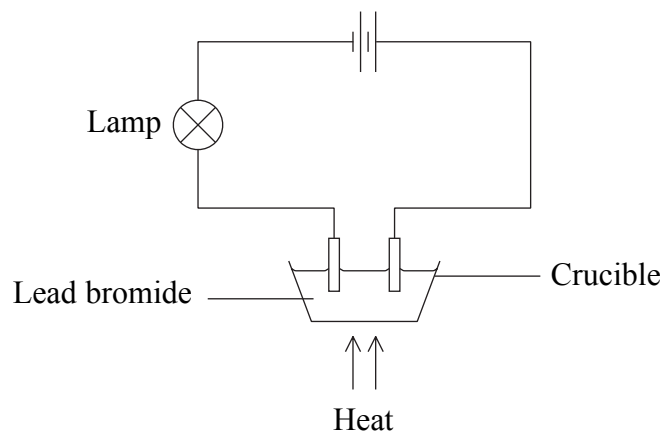
(2)

(Total 6 marks)

Q12



13. The following diagram shows the apparatus used for the electrolysis of molten lead bromide,  $\text{PbBr}_2$ .



(a) Give the formulae of the ions present in lead bromide.

..... (1)

(b) Write ionic equations to represent the reactions that take place at:

(i) the positive electrode

..... (1)

(ii) the negative electrode.

..... (1)

(c) When the lead bromide was molten, the lamp was lit but when the heat was removed, the crucible cooled and the lamp went out. Explain why.

.....  
 .....  
 .....  
 ..... (2)

(d) What mass of lead would be deposited by a charge of 0.1 faraday?

.....  
 ..... (2)

(Total 7 marks)

Q13



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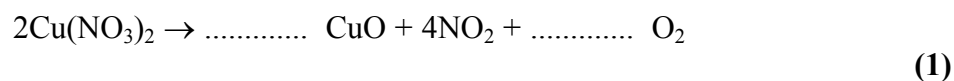
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14. When copper(II) nitrate is strongly heated, it decomposes to give copper(II) oxide, nitrogen dioxide and oxygen.

(a) Complete the equation for this reaction.



(b) What evidence is there that nitrogen dioxide is given off?

.....  
.....  
(1)

(c) Calculate the volume of nitrogen dioxide, at room temperature and normal atmospheric pressure, that would be given off when 1.875 g of copper(II) nitrate is heated until there is no more reaction.

.....  
.....  
.....  
(3)

(d) Name one other metal nitrate that, when heated, reacts:

(i) in a similar way to copper(II) nitrate

.....  
(1)

(ii) in a different way to copper(II) nitrate.

.....  
(1)

(Total 7 marks)

Q14



15. (a) The pH of soil determines how well a crop will grow. Here are the best soil pH values for growing some crops.

Vegetable	Soil pH
bean	6.0
cabbage	5.4
cauliflower	5.6
celery	6.3
lettuce	6.1
onions	5.7
swede	5.3
parsley	5.1

Which crop grows best in the:

(i) most acidic soil ..... **(1)**

(ii) least acidic soil? ..... **(1)**

(b) The pH of soil can be raised by adding hydrated lime,  $\text{Ca}(\text{OH})_2$ .

(i) What is the chemical name of hydrated lime?  
 ..... **(1)**

(ii) How is hydrated lime made from calcium oxide?  
 ..... **(1)**

(iii) Write an equation to show how hydrated lime can neutralise an acid. Represent the acid in your equation by  $\text{H}^+$ .  
 ..... **(1)**



- (c) A farmer has measured the pH of the soil at four different places on a field with the following results.

Location	pH
A	5.6
B	5.7
C	5.3
D	5.4
<b>Average pH of the soil</b>	

Calculate the average pH of the soil in the field and put the answer in the table.

(1)

- (d) The amount of hydrated lime needed to raise the pH of a soil depends on the type of soil and how much the pH is to be raised.

Type of soil	Mass, in g, of hydrated lime needed per square metre to raise soil pH by 1
Clay	405
Loam	270
Sandy	135

The field is 150 m long and 100 m wide, and has clay soil. The farmer wants to raise the pH of the soil to 7.5. What mass of hydrated lime, in kg, will he need to spread over the whole field?

.....

.....

.....

.....

(2)

- (e) A farmer could also raise the pH of soil by adding crushed limestone. Explain why this would work and give an equation, representing the acid by H<sup>+</sup>.

.....

.....

.....

(2)

Q15

(Total 10 marks)

**TOTAL FOR PAPER: 100 MARKS**

**END**



# THE PERIODIC TABLE

Period 1 2 3 4 5 6 7 0 Group

1																	2																																																			
1	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>1</td> <td>H</td> <td colspan="14"></td> <td>2</td> </tr> <tr> <td></td> <td>Hydrogen</td> <td colspan="14"></td> <td>He</td> </tr> <tr> <td></td> <td>1</td> <td colspan="14"></td> <td>4</td> </tr> </table>																1	H															2		Hydrogen															He		1															4	He
1	H															2																																																				
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2	Li	Be											B	C	N	O	F	Ne																																																		
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	7	9											11	12	14	16	19	20																																																		
3	11	12											13	14	15	16	17	18																																																		
3	Na	Mg											Al	Si	P	S	Cl	Ar																																																		
	Sodium	Magnesium											Aluminium	Silicon	Phosphorus	Sulphur	Chlorine	Argon																																																		
	23	24											27	28	31	32	35.5	40																																																		
4	19	20											31	32	33	34	35	36																																																		
4	K	Ca											Ga	Ge	As	Se	Br	Kr																																																		
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	39	40											70	73	75	79	80	84																																																		
5	37	38											49	50	51	52	53	54																																																		
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	Rubidium	Strontium											Indium	Tin	Antimony	Tellurium	Iodine	Xenon																																																		
	86	88											115	119	122	128	127	131																																																		
6	55	56											81	82	83	84	85	86																																																		
6	Cs	Ba											Tl	Pb	Bi	Po	At	Rn																																																		
	Caesium	Barium											Thallium	Lead	Bismuth	Polonium	Astatine	Radon																																																		
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	223	226											204	207	209	210	210	222																																																		

1	H	2
	Hydrogen	He
	1	4

2	He
	Helium
	4

## Key

Atomic number
Symbol
Name
Relative atomic mass

