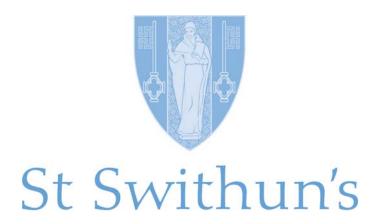# St Swithun's

Chemistry

6th Form Assessment

Past Paper

Time allowed : 1 hour

Instructions to Candidates

Candidates should answer all the questions. If you need extra space for q4 please use lined paper and attach to your answer booklet.

The total mark for the paper is 60 marks.

Further Information

A   Periodic table is provided.

Calculators may be used.

Please show all stages in calculations

1. a) Why does Gold naturally occur as an element but Iron is always found as a compound?

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    …………………………………………………………………………… …(1)

    b) Iron is found as Iron (III) oxide, why is it necessary to have the (III) after the Iron

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

    c) Iron (III) oxide reacts with carbon to form Iron, what is the advantage of making Iron this way

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

    d) i) Iron (III) oxide reacts with Aluminium, write a balanced chemical equation for this reaction

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

    ii) How would you classify this reaction, justify your answer

    …………………………….…………………………………...…………………......

    ………………………………………………………………………………………(2)

    iii) Why is this reaction important

    …………………………………………………….…… …....(1)

    e) i) Iron is a metal, what kind of bonding is present in Iron?

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ii) Describe this bonding; you might find it helpful to draw a diagram

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

iii) Why does Iron have a high melting point?

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Total mark

14

2. a) Why is Potassium more reactive than Lithium

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b) i What do you see if Bromine is added to aqueous Lithium iodide

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

ii) Give a balanced ionic equation including state symbols

…………………………………………………………...(3)

iii) Which element was oxidised, explain your answer and give a half ionic equation

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…………………………………………………………………......................

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

c) What is the trend in melting points in Group 7

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

d) What do you think Astatine looks like at room temperature

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

Total mark

11

3. a) Why is the relative atomic mass of Chlorine 35.5

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

b) i) Phosphorus forms an oxide which contains 43.66% Phosphorus. What is the empirical formula?

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ii) the molecular mass of the oxide is 284 What is the molecular formula?

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4   a) What were the key ideas behind the development of the Periodic Table

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b) How do modern ideas of the position of electrons in an atom agree with the
    structure of the Periodic table

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

                                        Total mark

5a) To make crude oil more useful it is separated into different fractions.

40°C → Petrol

110°C →

180°C → Kerosene

260°C → Gas oil

350°C → Fuel oil

400°C →

Over 400°C →

Crude oil →

Heat

(a) Explain, as fully as you can, how fractional distillation works.

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(3)

(b)   Each fraction is a mixture of compounds. Most of these compounds are hydrocarbons,

   (i)   Explain the difference between a mixture and a compound.

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(2)

c) What is a hydrocarbon

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

d) propene is an alkene and has the formula C $_3$H $_6$.
   i) Draw a diagram to show the bonding in this molecule

(2)

   ii) Propene reacts with chlorine to form $C_3H_6Cl_2$.
   Draw out the structure of this compound showing all the bonds

(2)

What is the relative fomula mass of this compound C $_3$H$_6$Cl$_2$.

………………………………………………………………………….(1)

12

6   ANSWER EITHER 6A or 6B

6A

Citric acid (relative formula mass = 210) is found in lemons. One lemon produced $53cm^3$ of juice. 25 cm^3 of the juice was placed in a conical flask and $37.2cm^3$ of 0.2M   Sodium hydroxide was needed to neutralise the acid.
          The formula of citric acid can be shown as HA.

i)   Write a chemical equation for the reaction

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

ii)   How many moles of NaOH were used

          …………………………………………………………….....................

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

iii)   What is the concentration of citric acid in the lemon juice.in mol dm^{-3} and g dm^{-3}

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iv)   What is the total mass of citric acid in the lemon juice

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

v)   Suggest 2 ways you could improve this experiment

          …………………………………………………………….....................

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

6 B

   i) Electrolysis was used to breakdown an oxide of an Iron. Why must the oxide be heated before electrolysis can take place

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ii)   Give the equation for the reaction at the anode

………………………………………………………...(1)

iii)   Calculate the moles of electrons produced when a current of 2 amps was passed for 30 minutes using the following equations;

Charge (coulombs) = time (sec) x Current (amps)

Moles of electrons = $\dfrac{\text{charge(coulombs)}}{96500}$

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iv)   If 0.696g of iron was produced was the compound Iron(II) oxide or Iron (III) oxide? Explain your answer

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3. The Periodic Table of Elements

Key

| relative atomic mass |
| **atomic symbol** |
| name |
| atomic (proton) number |

1	2											3	4	5	6	7	0
																	4 **He** helium 2
7 **Li** lithium 3	9 **Be** beryllium 4					1 **H** hydrogen 1						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	63.5 **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	[209] **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							

Elements with atomic numbers 112–116 have been reported but not fully authenticated

* The Lanthanides (atomic numbers 58–71) and the Actinides (atomic numbers 90–103) have been omitted.

Cu and Cl have not been rounded to the nearest whole number.