

Write your name here

Surname

Other names

Centre Number

Candidate Number

**Edexcel GCSE**

**Chemistry/Science**

**Unit C1: Chemistry in Our World**

**Foundation Tier**

Monday 21 May 2012 – Morning

**Time: 1 hour**

Paper Reference

**5CH1F/01**

**You must have:**

Calculator, ruler

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*

### Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (\*) are ones where the quality of your written communication will be assessed  
– *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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**PEARSON**

# The Periodic Table of the Elements

1	2	3	4	5	6	7	0	
7 <b>Li</b> lithium 3	9 <b>Be</b> beryllium 4	11 <b>Na</b> sodium 11	12 <b>C</b> carbon 6	13 <b>Al</b> aluminium 13	14 <b>N</b> nitrogen 7	15 <b>O</b> oxygen 8	16 <b>F</b> fluorine 9	17 <b>Ne</b> neon 10
19 <b>K</b> potassium 19	20 <b>Ca</b> calcium 20	23 <b>Sc</b> scandium 21	24 <b>Ti</b> titanium 22	25 <b>V</b> vanadium 23	26 <b>Cr</b> chromium 24	27 <b>Mn</b> manganese 25	28 <b>Fe</b> iron 26	29 <b>Co</b> cobalt 27
37 <b>Rb</b> rubidium 37	38 <b>Sr</b> strontium 38	39 <b>Y</b> yttrium 39	40 <b>Zr</b> zirconium 40	41 <b>Nb</b> niobium 41	42 <b>Mo</b> molybdenum 42	43 <b>Tc</b> technetium 43	44 <b>Ru</b> ruthenium 44	45 <b>Rh</b> rhodium 45
55 <b>Cs</b> caesium 55	56 <b>Ba</b> barium 56	57 <b>La*</b> lanthanum 57	58 <b>Hf</b> hafnium 72	59 <b>Ta</b> tantalum 73	60 <b>W</b> tungsten 74	61 <b>Re</b> rhenium 75	62 <b>Os</b> osmium 76	63 <b>Ir</b> iridium 77
87 <b>Fr</b> francium 87	88 <b>Ra</b> radium 88	89 <b>Ac*</b> actinium 89	90 <b>Rf</b> rutherfordium 104	91 <b>Db</b> dubnium 105	92 <b>Sg</b> seaborgium 106	93 <b>Bh</b> bohrium 107	94 <b>Hs</b> hassium 108	95 <b>Mt</b> meitnerium 109
133 <b>Cs</b> caesium 55	137 <b>Ba</b> barium 56	139 <b>La*</b> lanthanum 57	140 <b>Hf</b> hafnium 72	141 <b>Ta</b> tantalum 73	142 <b>W</b> tungsten 74	143 <b>Re</b> rhenium 75	144 <b>Os</b> osmium 76	145 <b>Ir</b> iridium 77
187 <b>Fr</b> francium 87	188 <b>Ra</b> radium 88	189 <b>Ac*</b> actinium 89	190 <b>Rf</b> rutherfordium 104	191 <b>Db</b> dubnium 105	192 <b>Sg</b> seaborgium 106	193 <b>Bh</b> bohrium 107	194 <b>Hs</b> hassium 108	195 <b>Mt</b> meitnerium 109
223 <b>Fr</b> francium 87	226 <b>Ra</b> radium 88	227 <b>Ac*</b> actinium 89	228 <b>Rf</b> rutherfordium 104	229 <b>Db</b> dubnium 105	230 <b>Sg</b> seaborgium 106	231 <b>Bh</b> bohrium 107	232 <b>Hs</b> hassium 108	233 <b>Mt</b> meitnerium 109
285 <b>Cs</b> caesium 55	286 <b>Ba</b> barium 56	287 <b>La*</b> lanthanum 57	288 <b>Hf</b> hafnium 72	289 <b>Ta</b> tantalum 73	290 <b>W</b> tungsten 74	291 <b>Re</b> rhenium 75	292 <b>Os</b> osmium 76	293 <b>Ir</b> iridium 77
337 <b>Cs</b> caesium 55	338 <b>Ba</b> barium 56	339 <b>La*</b> lanthanum 57	340 <b>Hf</b> hafnium 72	341 <b>Ta</b> tantalum 73	342 <b>W</b> tungsten 74	343 <b>Re</b> rhenium 75	344 <b>Os</b> osmium 76	345 <b>Ir</b> iridium 77
401 <b>Cs</b> caesium 55	402 <b>Ba</b> barium 56	403 <b>La*</b> lanthanum 57	404 <b>Hf</b> hafnium 72	405 <b>Ta</b> tantalum 73	406 <b>W</b> tungsten 74	407 <b>Re</b> rhenium 75	408 <b>Os</b> osmium 76	409 <b>Ir</b> iridium 77
449 <b>Cs</b> caesium 55	450 <b>Ba</b> barium 56	451 <b>La*</b> lanthanum 57	452 <b>Hf</b> hafnium 72	453 <b>Ta</b> tantalum 73	454 <b>W</b> tungsten 74	455 <b>Re</b> rhenium 75	456 <b>Os</b> osmium 76	457 <b>Ir</b> iridium 77
501 <b>Cs</b> caesium 55	502 <b>Ba</b> barium 56	503 <b>La*</b> lanthanum 57	504 <b>Hf</b> hafnium 72	505 <b>Ta</b> tantalum 73	506 <b>W</b> tungsten 74	507 <b>Re</b> rhenium 75	508 <b>Os</b> osmium 76	509 <b>Ir</b> iridium 77
561 <b>Cs</b> caesium 55	562 <b>Ba</b> barium 56	563 <b>La*</b> lanthanum 57	564 <b>Hf</b> hafnium 72	565 <b>Ta</b> tantalum 73	566 <b>W</b> tungsten 74	567 <b>Re</b> rhenium 75	568 <b>Os</b> osmium 76	569 <b>Ir</b> iridium 77
621 <b>Cs</b> caesium 55	622 <b>Ba</b> barium 56	623 <b>La*</b> lanthanum 57	624 <b>Hf</b> hafnium 72	625 <b>Ta</b> tantalum 73	626 <b>W</b> tungsten 74	627 <b>Re</b> rhenium 75	628 <b>Os</b> osmium 76	629 <b>Ir</b> iridium 77
681 <b>Cs</b> caesium 55	682 <b>Ba</b> barium 56	683 <b>La*</b> lanthanum 57	684 <b>Hf</b> hafnium 72	685 <b>Ta</b> tantalum 73	686 <b>W</b> tungsten 74	687 <b>Re</b> rhenium 75	688 <b>Os</b> osmium 76	689 <b>Ir</b> iridium 77
741 <b>Cs</b> caesium 55	742 <b>Ba</b> barium 56	743 <b>La*</b> lanthanum 57	744 <b>Hf</b> hafnium 72	745 <b>Ta</b> tantalum 73	746 <b>W</b> tungsten 74	747 <b>Re</b> rhenium 75	748 <b>Os</b> osmium 76	749 <b>Ir</b> iridium 77
801 <b>Cs</b> caesium 55	802 <b>Ba</b> barium 56	803 <b>La*</b> lanthanum 57	804 <b>Hf</b> hafnium 72	805 <b>Ta</b> tantalum 73	806 <b>W</b> tungsten 74	807 <b>Re</b> rhenium 75	808 <b>Os</b> osmium 76	809 <b>Ir</b> iridium 77
861 <b>Cs</b> caesium 55	862 <b>Ba</b> barium 56	863 <b>La*</b> lanthanum 57	864 <b>Hf</b> hafnium 72	865 <b>Ta</b> tantalum 73	866 <b>W</b> tungsten 74	867 <b>Re</b> rhenium 75	868 <b>Os</b> osmium 76	869 <b>Ir</b> iridium 77
921 <b>Cs</b> caesium 55	922 <b>Ba</b> barium 56	923 <b>La*</b> lanthanum 57	924 <b>Hf</b> hafnium 72	925 <b>Ta</b> tantalum 73	926 <b>W</b> tungsten 74	927 <b>Re</b> rhenium 75	928 <b>Os</b> osmium 76	929 <b>Ir</b> iridium 77
981 <b>Cs</b> caesium 55	982 <b>Ba</b> barium 56	983 <b>La*</b> lanthanum 57	984 <b>Hf</b> hafnium 72	985 <b>Ta</b> tantalum 73	986 <b>W</b> tungsten 74	987 <b>Re</b> rhenium 75	988 <b>Os</b> osmium 76	989 <b>Ir</b> iridium 77
1041 <b>Cs</b> caesium 55	1042 <b>Ba</b> barium 56	1043 <b>La*</b> lanthanum 57	1044 <b>Hf</b> hafnium 72	1045 <b>Ta</b> tantalum 73	1046 <b>W</b> tungsten 74	1047 <b>Re</b> rhenium 75	1048 <b>Os</b> osmium 76	1049 <b>Ir</b> iridium 77
1101 <b>Cs</b> caesium 55	1102 <b>Ba</b> barium 56	1103 <b>La*</b> lanthanum 57	1104 <b>Hf</b> hafnium 72	1105 <b>Ta</b> tantalum 73	1106 <b>W</b> tungsten 74	1107 <b>Re</b> rhenium 75	1108 <b>Os</b> osmium 76	1109 <b>Ir</b> iridium 77
1161 <b>Cs</b> caesium 55	1162 <b>Ba</b> barium 56	1163 <b>La*</b> lanthanum 57	1164 <b>Hf</b> hafnium 72	1165 <b>Ta</b> tantalum 73	1166 <b>W</b> tungsten 74	1167 <b>Re</b> rhenium 75	1168 <b>Os</b> osmium 76	1169 <b>Ir</b> iridium 77
1221 <b>Cs</b> caesium 55	1222 <b>Ba</b> barium 56	1223 <b>La*</b> lanthanum 57	1224 <b>Hf</b> hafnium 72	1225 <b>Ta</b> tantalum 73	1226 <b>W</b> tungsten 74	1227 <b>Re</b> rhenium 75	1228 <b>Os</b> osmium 76	1229 <b>Ir</b> iridium 77
1281 <b>Cs</b> caesium 55	1282 <b>Ba</b> barium 56	1283 <b>La*</b> lanthanum 57	1284 <b>Hf</b> hafnium 72	1285 <b>Ta</b> tantalum 73	1286 <b>W</b> tungsten 74	1287 <b>Re</b> rhenium 75	1288 <b>Os</b> osmium 76	1289 <b>Ir</b> iridium 77
1341 <b>Cs</b> caesium 55	1342 <b>Ba</b> barium 56	1343 <b>La*</b> lanthanum 57	1344 <b>Hf</b> hafnium 72	1345 <b>Ta</b> tantalum 73	1346 <b>W</b> tungsten 74	1347 <b>Re</b> rhenium 75	1348 <b>Os</b> osmium 76	1349 <b>Ir</b> iridium 77
1401 <b>Cs</b> caesium 55	1402 <b>Ba</b> barium 56	1403 <b>La*</b> lanthanum 57	1404 <b>Hf</b> hafnium 72	1405 <b>Ta</b> tantalum 73	1406 <b>W</b> tungsten 74	1407 <b>Re</b> rhenium 75	1408 <b>Os</b> osmium 76	1409 <b>Ir</b> iridium 77
1461 <b>Cs</b> caesium 55	1462 <b>Ba</b> barium 56	1463 <b>La*</b> lanthanum 57	1464 <b>Hf</b> hafnium 72	1465 <b>Ta</b> tantalum 73	1466 <b>W</b> tungsten 74	1467 <b>Re</b> rhenium 75	1468 <b>Os</b> osmium 76	1469 <b>Ir</b> iridium 77
1521 <b>Cs</b> caesium 55	1522 <b>Ba</b> barium 56	1523 <b>La*</b> lanthanum 57	1524 <b>Hf</b> hafnium 72	1525 <b>Ta</b> tantalum 73	1526 <b>W</b> tungsten 74	1527 <b>Re</b> rhenium 75	1528 <b>Os</b> osmium 76	1529 <b>Ir</b> iridium 77
1581 <b>Cs</b> caesium 55	1582 <b>Ba</b> barium 56	1583 <b>La*</b> lanthanum 57	1584 <b>Hf</b> hafnium 72	1585 <b>Ta</b> tantalum 73	1586 <b>W</b> tungsten 74	1587 <b>Re</b> rhenium 75	1588 <b>Os</b> osmium 76	1589 <b>Ir</b> iridium 77
1641 <b>Cs</b> caesium 55	1642 <b>Ba</b> barium 56	1643 <b>La*</b> lanthanum 57	1644 <b>Hf</b> hafnium 72	1645 <b>Ta</b> tantalum 73	1646 <b>W</b> tungsten 74	1647 <b>Re</b> rhenium 75	1648 <b>Os</b> osmium 76	1649 <b>Ir</b> iridium 77
1701 <b>Cs</b> caesium 55	1702 <b>Ba</b> barium 56	1703 <b>La*</b> lanthanum 57	1704 <b>Hf</b> hafnium 72	1705 <b>Ta</b> tantalum 73	1706 <b>W</b> tungsten 74	1707 <b>Re</b> rhenium 75	1708 <b>Os</b> osmium 76	1709 <b>Ir</b> iridium 77
1761 <b>Cs</b> caesium 55	1762 <b>Ba</b> barium 56	1763 <b>La*</b> lanthanum 57	1764 <b>Hf</b> hafnium 72	1765 <b>Ta</b> tantalum 73	1766 <b>W</b> tungsten 74	1767 <b>Re</b> rhenium 75	1768 <b>Os</b> osmium 76	1769 <b>Ir</b> iridium 77
1821 <b>Cs</b> caesium 55	1822 <b>Ba</b> barium 56	1823 <b>La*</b> lanthanum 57	1824 <b>Hf</b> hafnium 72	1825 <b>Ta</b> tantalum 73	1826 <b>W</b> tungsten 74	1827 <b>Re</b> rhenium 75	1828 <b>Os</b> osmium 76	1829 <b>Ir</b> iridium 77
1881 <b>Cs</b> caesium 55	1882 <b>Ba</b> barium 56	1883 <b>La*</b> lanthanum 57	1884 <b>Hf</b> hafnium 72	1885 <b>Ta</b> tantalum 73	1886 <b>W</b> tungsten 74	1887 <b>Re</b> rhenium 75	1888 <b>Os</b> osmium 76	1889 <b>Ir</b> iridium 77
1941 <b>Cs</b> caesium 55	1942 <b>Ba</b> barium 56	1943 <b>La*</b> lanthanum 57	1944 <b>Hf</b> hafnium 72	1945 <b>Ta</b> tantalum 73	1946 <b>W</b> tungsten 74	1947 <b>Re</b> rhenium 75	1948 <b>Os</b> osmium 76	1949 <b>Ir</b> iridium 77
2001 <b>Cs</b> caesium 55	2002 <b>Ba</b> barium 56	2003 <b>La*</b> lanthanum 57	2004 <b>Hf</b> hafnium 72	2005 <b>Ta</b> tantalum 73	2006 <b>W</b> tungsten 74	2007 <b>Re</b> rhenium 75	2008 <b>Os</b> osmium 76	2009 <b>Ir</b> iridium 77
2061 <b>Cs</b> caesium 55	2062 <b>Ba</b> barium 56	2063 <b>La*</b> lanthanum 57	2064 <b>Hf</b> hafnium 72	2065 <b>Ta</b> tantalum 73	2066 <b>W</b> tungsten 74	2067 <b>Re</b> rhenium 75	2068 <b>Os</b> osmium 76	2069 <b>Ir</b> iridium 77
2121 <b>Cs</b> caesium 55	2122 <b>Ba</b> barium 56	2123 <b>La*</b> lanthanum 57	2124 <b>Hf</b> hafnium 72	2125 <b>Ta</b> tantalum 73	2126 <b>W</b> tungsten 74	2127 <b>Re</b> rhenium 75	2128 <b>Os</b> osmium 76	2129 <b>Ir</b> iridium 77
2181 <b>Cs</b> caesium 55	2182 <b>Ba</b> barium 56	2183 <b>La*</b> lanthanum 57	2184 <b>Hf</b> hafnium 72	2185 <b>Ta</b> tantalum 73	2186 <b>W</b> tungsten 74	2187 <b>Re</b> rhenium 75	2188 <b>Os</b> osmium 76	2189 <b>Ir</b> iridium 77
2241 <b>Cs</b> caesium 55	2242 <b>Ba</b> barium 56	2243 <b>La*</b> lanthanum 57	2244 <b>Hf</b> hafnium 72	2245 <b>Ta</b> tantalum 73	2246 <b>W</b> tungsten 74	2247 <b>Re</b> rhenium 75	2248 <b>Os</b> osmium 76	2249 <b>Ir</b> iridium 77
2301 <b>Cs</b> caesium 55	2302 <b>Ba</b> barium 56	2303 <b>La*</b> lanthanum 57	2304 <b>Hf</b> hafnium 72	2305 <b>Ta</b> tantalum 73	2306 <b>W</b> tungsten 74	2307 <b>Re</b> rhenium 75	2308 <b>Os</b> osmium 76	2309 <b>Ir</b> iridium 77
2361 <b>Cs</b> caesium 55	2362 <b>Ba</b> barium 56	2363 <b>La*</b> lanthanum 57	2364 <b>Hf</b> hafnium 72	2365 <b>Ta</b> tantalum 73	2366 <b>W</b> tungsten 74	2367 <b>Re</b> rhenium 75	2368 <b>Os</b> osmium 76	2369 <b>Ir</b> iridium 77
2421 <b>Cs</b> caesium 55	2422 <b>Ba</b> barium 56	2423 <b>La*</b> lanthanum 57	2424 <b>Hf</b> hafnium 72	2425 <b>Ta</b> tantalum 73	2426 <b>W</b> tungsten 74	2427 <b>Re</b> rhenium 75	2428 <b>Os</b> osmium 76	2429 <b>Ir</b> iridium 77
2481 <b>Cs</b> caesium 55	2482 <b>Ba</b> barium 56	2483 <b>La*</b> lanthanum 57	2484 <b>Hf</b> hafnium 72	2485 <b>Ta</b> tantalum 73	2486 <b>W</b> tungsten 74	2487 <b>Re</b> rhenium 75	2488 <b>Os</b> osmium 76	2489 <b>Ir</b> iridium 77
2541 <b>Cs</b> caesium 55	2542 <b>Ba</b> barium 56	2543 <b>La*</b> lanthanum 57	2544 <b>Hf</b> hafnium 72	2545 <b>Ta</b> tantalum 73	2546 <b>W</b> tungsten 74	2547 <b>Re</b> rhenium 75	2548 <b>Os</b> osmium 76	2549 <b>Ir</b> iridium 77
2601 <b>Cs</b> caesium 55	2602 <b>Ba</b> barium 56	2603 <b>La*</b> lanthanum 57	2604 <b>Hf</b> hafnium 72	2605 <b>Ta</b> tantalum 73	2606 <b>W</b> tungsten 74	2607 <b>Re</b> rhenium 75	2608 <b>Os</b> osmium 76	2609 <b>Ir</b> iridium 77
2661 <b>Cs</b> caesium 55	2662 <b>Ba</b> barium 56	2663 <b>La*</b> lanthanum 57	2664 <b>Hf</b> hafnium 72	2665 <b>Ta</b> tantalum 73	2666 <b>W</b> tungsten 74	2667 <b>Re</b> rhenium 75	2668 <b>Os</b> osmium 76	2669 <b>Ir</b> iridium 77
2721 <b>Cs</b> caesium 55	2722 <b>Ba</b> barium 56	2723 <b>La*</b> lanthanum 57	2724 <b>Hf</b> hafnium 72	2725 <b>Ta</b> tantalum 73	2726 <b>W</b> tungsten 74	2727 <b>Re</b> rhenium 75	2728 <b>Os</b> osmium 76	2729 <b>Ir</b> iridium 77
2781 <b>Cs</b> caesium 55	2782 <b>Ba</b> barium 56	2783 <b>La*</b> lanthanum 57	2784 <b>Hf</b> hafnium 72	2785 <b>Ta</b> tantalum 73	2786 <b>W</b> tungsten 74	2787 <b>Re</b> rhenium 75	2788 <b>Os</b> 	

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**Questions begin on next page.**



**Answer ALL questions.**

**Some questions must be answered with a cross in a box . If you change your mind about an answer, put a line through the box  and then mark your new answer with a cross .**

**Iron**

**1** Iron occurs in the Earth's crust as an ore.



iron ore

The ore is mainly iron oxide,  $\text{Fe}_2\text{O}_3$ .

(a) Give the name of the element combined with iron in iron oxide.

(1)

---

(b) When iron oxide is heated with carbon, the products are iron and carbon dioxide.

(i) Complete the word equation for this reaction.

(2)

iron oxide + .....  $\rightarrow$  iron + .....

(ii) What happens to the iron oxide during this reaction?

Put a cross () in the box next to your answer.

(1)

- A** the iron oxide burns
- B** the iron oxide is neutralised
- C** the iron oxide is oxidised
- D** the iron oxide is reduced



(c) Iron corrodes when it is left in moist air.

This list shows iron and three other metals in reactivity series order, with the most reactive metal at the top.

most reactive	magnesium
	iron
	lead
least reactive	silver

Explain which metal in the list will corrode faster than iron.

(2)

.....

.....

.....

.....

(d) Stainless steel is an alloy containing iron and chromium.

(i) State the meaning of the term **alloy**.

(1)

.....

.....

(ii) Cutlery is made of stainless steel.

Give a reason why cutlery is not made of pure iron.

(1)

.....

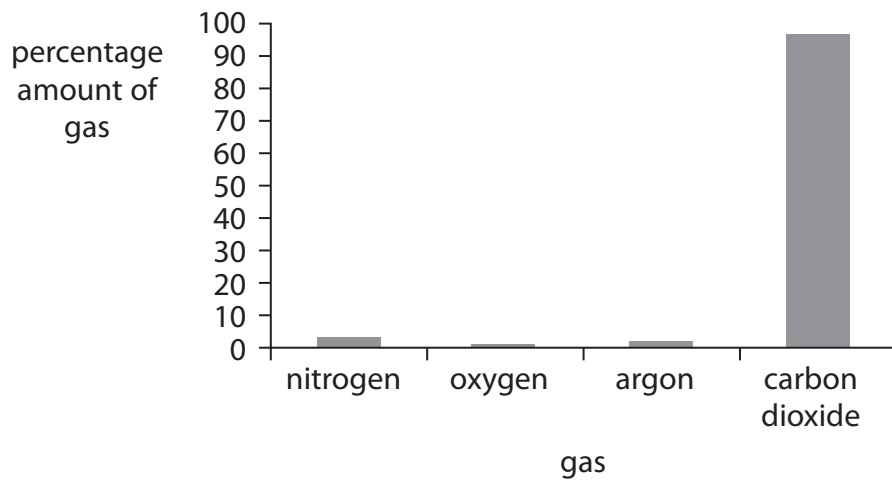
.....

**(Total for Question 1 = 8 marks)**



## The Earth's atmosphere

- 2 The amounts of some gases in the Earth's early atmosphere are shown on the bar chart.



- (a) Complete the sentence by putting a cross (☒) in the box next to your answer.

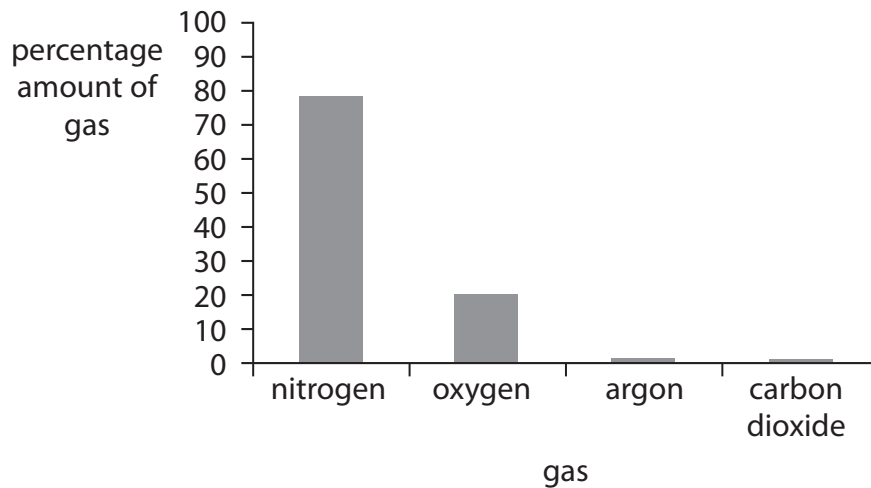
The earth's earliest atmosphere was formed by

(1)

- A animals breathing
- B trees burning
- C plants photosynthesising
- D volcanoes erupting



(b) The amounts of some gases in the atmosphere on Earth today are shown on this bar chart.



Which gas has decreased by the largest amount from the Earth's early atmosphere to the atmosphere of the Earth today?

Use this bar chart and the bar chart in (a).

Put a cross (☒) in the box next to your answer.

(1)

- A** argon
- B** carbon dioxide
- C** nitrogen
- D** oxygen



(c) There was also a large amount of water vapour in the Earth's early atmosphere. There is a much smaller amount of water vapour in the atmosphere on Earth today.

Explain how the amount of water in the Earth's atmosphere decreased.

(2)

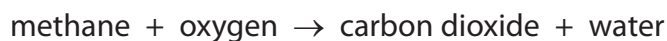
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(d) Methane burns in air.



This causes small changes in the amounts of some gases in today's atmosphere.

Explain why burning methane changes the amounts of gases in the atmosphere.

(2)

.....

.....

.....

.....

(e) Apart from burning fossil fuels, state **two** other activities that affect the amounts of gases in the atmosphere.

(2)

.....

.....

.....

.....

**(Total for Question 2 = 8 marks)**





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### Hydrochloric acid

- 3 (a) Dilute hydrochloric acid can be used to make salts.  
The salts produced are chlorides.

Some copper compounds react with dilute hydrochloric acid to produce copper chloride.

Which of the following compounds will **not** neutralise dilute hydrochloric acid to produce copper chloride?

Put a cross (☒) in the box next to your answer.

(1)

- A copper carbonate
- B copper hydroxide
- C copper oxide
- D copper sulfate

- (b) Use words from the box to complete the word equation for the reaction of magnesium carbonate to produce magnesium chloride.

(2)

carbon dioxide	hydrochloric acid	nitric acid
oxygen	sulphuric acid	

magnesium + ..... → magnesium + ..... + water  
carbonate chloride

- (c) Indigestion tablets neutralise excess hydrochloric acid in the stomach.  
Two tablets, A and B, were tested.

The table shows the cost of each tablet and the volume of hydrochloric acid neutralised by each tablet.

tablet	cost of one tablet / p	volume of hydrochloric acid neutralised by one tablet / cm <sup>3</sup>
A	2.5	30.6
B	1.2	10.2

Explain which tablet, A or B, is the best value for money.

(2)

.....

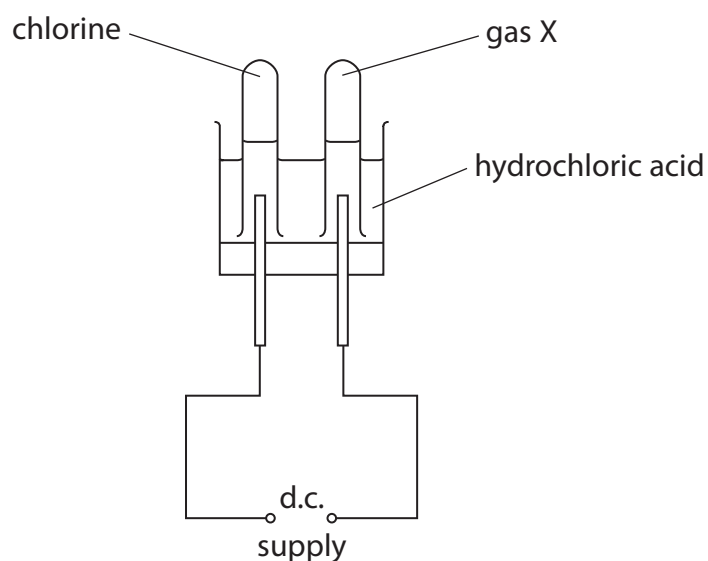
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(d) Hydrochloric acid was electrolysed using the apparatus shown.



(i) Chlorine gas was collected in one of the test tubes.

Describe a test to show the gas is chlorine.

(2)

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(ii) Gas X was collected in the other test tube.

When gas X was mixed with air and ignited, it burned with a squeaky pop.

Give the name of gas X.

(1)

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(e) In industry, large amounts of chlorine are produced.

Explain why it could be dangerous to produce large amounts of chlorine in a factory.

(2)

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**(Total for Question 3 = 10 marks)**



## Fuels

4 Different car engines are designed to use different fuels. These fuels include diesel, ethanol, hydrogen, LPG (liquefied petroleum gas) and petrol.

(a) LPG contains the compound propane.

(i) Complete the structure of a molecule of propane,  $C_3H_8$ , showing all bonds. (1)



(ii) Propane burns completely to produce carbon dioxide and water.

Describe how you would use limewater to show that carbon dioxide is produced.

(2)

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(iii) Incomplete combustion occurs when propane burns with insufficient oxygen available for complete combustion.

Explain a problem caused by the products of this incomplete combustion.

(2)

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(b) Biofuels can be used as alternatives to non-renewable, fossil fuels.

(i) Which of the following can be produced as a biofuel?

Put a cross (☒) in the box next to your answer.

(1)

- A** ethanol
- B** hydrogen
- C** LPG
- D** petrol

(ii) Explain how a biofuel is different from a fossil fuel.

(2)

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(c) The table shows information about two fuels, A and B, used in car engines.

<b>fuel</b>	<b>physical state</b>	<b>cost of 1 kg / £</b>	<b>energy produced by complete combustion of 1 kg / MJ</b>	<b>availability at fuel station</b>
A	gas	2.13	142	limited
B	liquid	1.95	47	good

Explain which fuel, A or B, would be best for powering a car.

(2)

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**(Total for Question 4 = 10 marks)**



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## Calcium carbonate

5 (a) Limestone is a rock which often contains fossils.



What type of rock is limestone?

Put a cross (☒) in the box next to your answer.

(1)

- A igneous
- B lava
- C metamorphic
- D sedimentary

(b) Limestone is an important raw material.

Which of these is made using limestone as a raw material?

Put a cross (☒) in the box next to your answer.

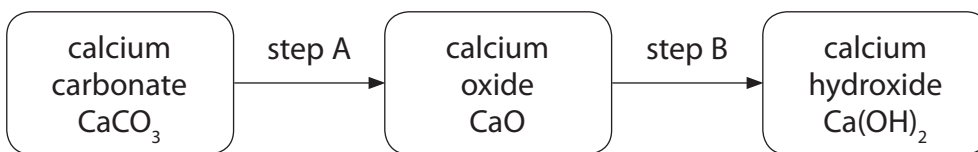
(1)

- A bleach solution
- B cement
- C fertilisers
- D soap



(c) Limestone contains calcium carbonate.

Calcium carbonate can be converted into calcium oxide.  
Calcium oxide can then be converted into calcium hydroxide.



(i) A lump of calcium carbonate is heated to convert it into calcium oxide in step A.

Explain why the mass of calcium oxide formed is less than the original mass of calcium carbonate.

(2)

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(ii) Write the word equation for the reaction in step B.

(2)

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## Polymers

6 Polymer molecules are made by joining large numbers of small molecules (monomers) together.

(a) The table shows some information about three polymers and the monomers used to make them.

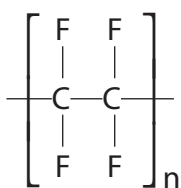
Complete the table.

(3)

name of polymer	structure of polymer molecule	name of the monomer used to make the polymer molecule	structure of monomer molecule
poly(ethene)	$\left[ \begin{array}{cc} \text{H} & \text{H} \\   &   \\ -\text{C} & -\text{C}- \\   &   \\ \text{H} & \text{H} \end{array} \right]_n$	.....	$\begin{array}{ccc} \text{H} & & \text{H} \\ & \diagdown & / \\ & \text{C} = \text{C} & \\ & / & \diagdown \\ \text{H} & & \text{H} \end{array}$
.....	$\left[ \begin{array}{ccc} & & \text{H} \\ & &   \\ \text{H} & \text{H} & -\text{C} & -\text{H} \\ & &   \\ -\text{C} & & -\text{C}- \\ & &   \\ \text{H} & & \text{H} \end{array} \right]_n$	propene	$\begin{array}{ccc} & & \text{H} & & \text{H} \\ & &   & &   \\ \text{H} & & -\text{C} & - & \text{C} & -\text{H} \\ & &   & &   \\ \text{H} & & \text{C} = \text{C} & & \text{H} \\ & &   & &   \\ & & \text{H} & & \text{H} \end{array}$
poly(chloroethene)	$\left[ \begin{array}{cc} \text{H} & \text{Cl} \\   &   \\ -\text{C} & -\text{C}- \\   &   \\ \text{H} & \text{H} \end{array} \right]_n$	chloroethene	.....



(b) The structure of the polymer poly(tetrafluoroethene), PTFE, is



State why this polymer is **not** a hydrocarbon.

(1)

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(c) Poly(chloroethene), PVC, is used to make gutters and drainpipes.



One property of poly(chloroethene) is that it is easy to shape.

Describe other properties of poly(chloroethene) that make it suitable for gutters and drainpipes.

(2)

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