

THIS IS A NEW SPECIFICATION

**F**

Wednesday 18 January 2012 – Morning

**GCSE TWENTY FIRST CENTURY SCIENCE
CHEMISTRY A****A171/01** Modules C1 C2 C3 (Foundation Tier)

Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR supplied materials:
None

Other materials required:

- Pencil
- Ruler (cm/mm)

Duration: 1 hour


Candidate forename		Candidate surname	
-----------------------	--	----------------------	--

Centre number						Candidate number				
---------------	--	--	--	--	--	------------------	--	--	--	--

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

-  Where you see this icon you will be awarded marks for the quality of written communication in your answer.
- The Periodic Table is printed on the back page.
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- This document consists of **16** pages. Any blank pages are indicated.

2

Answer **all** the questions.

- 1 The table gives information about dry air from two different places.

One is in a town and the other is in the countryside.

gas present	town %	countryside %
argon	1.00	1.00
nitrogen	78.00	78.00
oxygen	20.80	20.96
carbon dioxide		0.04
carbon monoxide	0.10	0
nitrogen oxides	0.05	0
Total	100.00	100.00

- (a) Work out the percentage (%) of carbon dioxide in the town.

Show your working.

Write your result in the table.

[2]

- (b) (i) The carbon dioxide concentration is higher in the town.

Suggest why.

.....

 [2]

- (ii) Some of the carbon dioxide in air is used by plants.

What is the name for this process?

Put a **ring** around the correct answer.

combustion

electrolysis

photosynthesis

polymerisation

respiration

[1]

3

(c) The nitrogen oxides in the town come from car engines.

Describe how nitrogen oxides are made in car engines.

.....

.....

.....

.....

.....

..... [3]

[Total: 8]

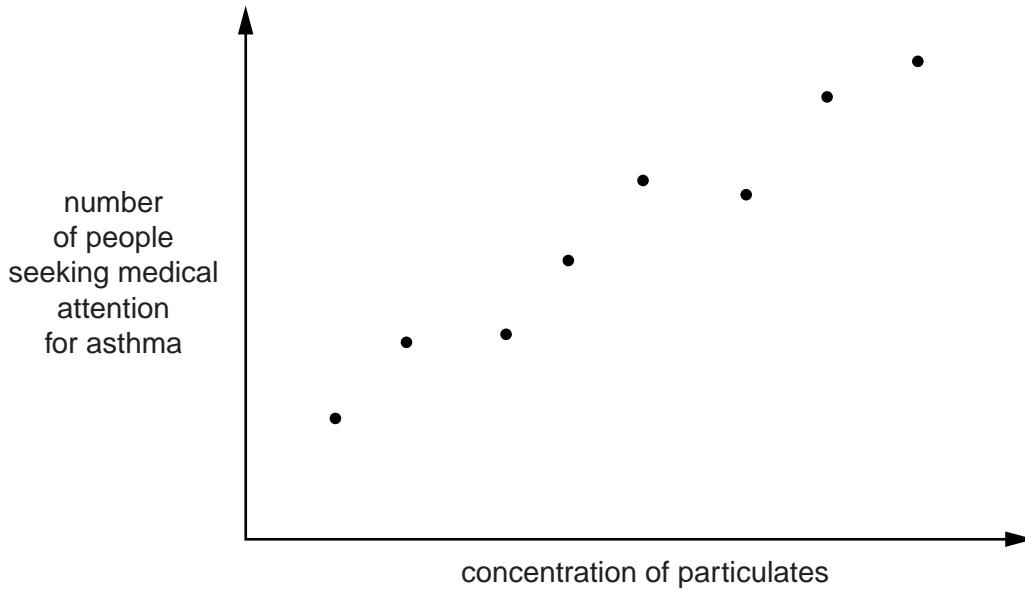
4

2 Scientists measure the concentration of particulates in the air in a town centre.

They do this on several days.

They also count the number of people seeking medical attention for asthma on the same days.

They plot their results on a scatter graph.



(a) The data show a correlation.

Complete the sentence to describe this correlation.

As the concentration of particulates increases, the number of people seeking medical attention for asthma

[1]

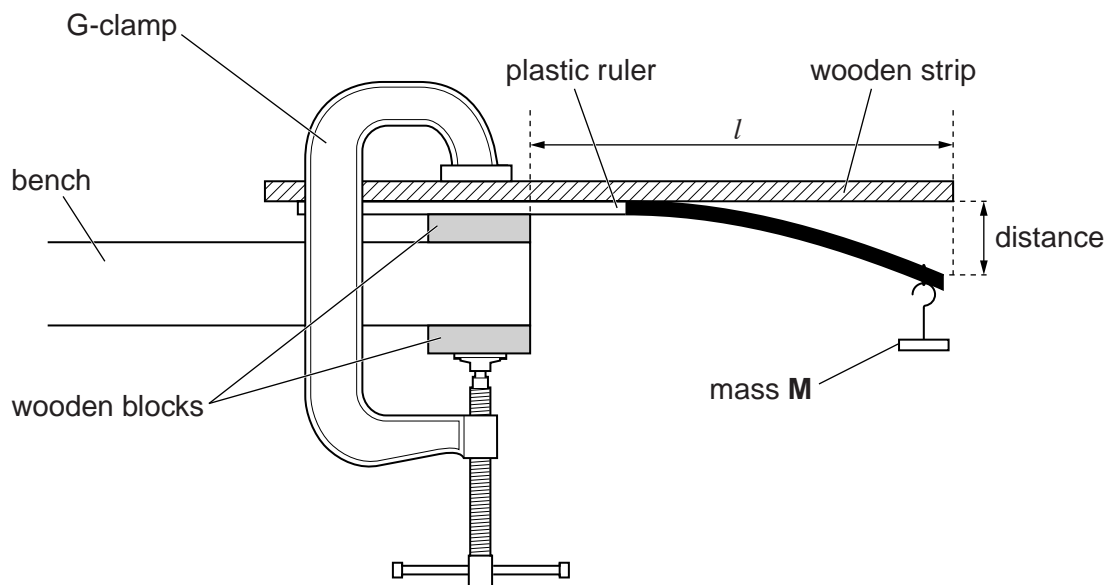
6

3 A company wants to make rulers from a polymer.

The company wants to know if the polymer is suitable for this job.

Scientists test sample rulers made from this polymer.

They use this apparatus.



The scientists hang a mass, M , from the end of each sample.

They measure the distance that each ruler bends.

Their results are shown in the table.

distance ruler bends in mm					
sample 1	sample 2	sample 3	sample 4	sample 5	sample 6
34	32	34	35	33	36

(a) The apparatus contains a horizontal wooden strip.

Explain why this is important.

.....
 [1]

(b) (i) The scientists make sure that mass **M** is the same size for each sample.

Explain why this makes it a fair test.

.....
.....
..... [2]

(ii) State one other factor that should also be kept the same for each sample.

..... [1]

(c) (i) The true value for the distance the ruler bends lies within a range.

What is this range?

The range is from to mm. [1]

(ii) Work out a best estimate for the distance the ruler bends.

best estimate = mm [2]

(iii) How likely is it that your best estimate is the true value for the distance the ruler bends?

Use the data to explain your answer.

.....
.....
..... [2]

8

(d) The company want the rulers to be more flexible.

Suggest how the polymer could be made more flexible.

Explain how this makes the polymer more flexible.



The quality of written communication will be assessed in your answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [6]

[Total: 15]

- 4 Most tennis racquets are made from a polymer reinforced with carbon fibres.

Nanotechnology is used to make better tennis racquets.

Nanoparticles are added to fill gaps in the reinforced polymer.

- (a) Explain the meaning of the term **nanotechnology**.

.....

 [2]

- (b) Suggest how these new tennis racquets are better than those that do not contain nanoparticles.

..... [1]

- (c) Nanoparticles are used in a wide variety of products.

Some scientists are worried about this.

Which two statements give reasons for their concern?

Put ticks (✓) in the boxes next to the **two** correct answers.

Nanoparticles do not occur in nature.

Nanoparticles have a smaller surface area than larger particles.

The effects of nanoparticles have not yet been fully investigated.

Nanoparticles are larger than 1000 nm.

Nanoparticles may be harmful to health.

Nanoparticles are too small to be seen by the unaided eye.

[2]

[Total: 5]

(c) Sodium chloride can be used to make sodium carbonate, a valuable chemical.

In the 19th century sodium carbonate was made by the Leblanc process.

This process has two stages

- sodium chloride reacts with sulfuric acid to make sodium sulfate and hydrogen chloride gas
- sodium sulfate reacts with calcium carbonate and carbon to make sodium carbonate, calcium sulfide and carbon dioxide.

(i) The Leblanc process caused a great deal of pollution to the local area.

Which of these statements explain why?

Put ticks (✓) in the boxes next to the **two** best answers.

Sulfuric acid is a strong acid that harms living things.

Hydrogen chloride is an acidic gas that is very harmful.

Sodium sulfate is a poisonous chemical.

The carbon used was in the form of coke.

Calcium sulfide is a solid waste that gives off poisonous hydrogen sulfide gas.

Carbon dioxide is an acidic gas that is toxic.

[2]

(ii) Pollution problems can sometimes be solved by turning waste materials into useful chemicals.

One of the waste materials from the Leblanc process was used to make the useful chemical chlorine.

Which waste material was this?

..... [1]

12

(d) Chlorine is added to drinking water.

(i) Describe and explain one advantage of adding chlorine to drinking water.

.....
.....
..... [2]

(ii) The addition of chlorine to drinking water may be harmful to health.

Which statement describes why?

Put a tick (✓) in the box next to the correct answer.

The water may give off poisonous chlorine gas.

Chlorine can react with organic materials to produce toxic chemicals.

Chlorine reacts with water to form an acidic solution.

Chlorine can react with and damage water pipes.

[1]

[Total: 14]

13

BLANK PAGE

PLEASE DO NOT WRITE ON THIS PAGE

Turn over for question 6

6 Many foods contain salt that was added during manufacture.

(a) Why is salt added to food?

.....
 [1]

(b) The Department of Health recommends that no more than 6.0g of salt should be eaten each day.

The table shows how much salt is in a number of everyday foods.

food	mass of salt in g
baked beans, 100 g	1.0
baked potato, 100 g	0
cornflakes, 30 g	0.5
crisps, 25 g	0.5
chips, 100 g	0.5
hamburger, 200 g	2.0
green beans, 100 g	0
steamed fish, 200 g	0.5
pizza, 200 g	3.0

This list shows the meals eaten by Sam during one day.

breakfast

30 g cornflakes

lunch

200 g hamburger

25 g crisps

dinner

100 g chips

200 g pizza

100 g baked beans

15

- (i) Work out the mass of salt eaten by Sam for each meal and the total mass of salt he eats on this day.

Write your answers in the table.

	mass of salt eaten in g
breakfast	
lunch	
dinner	
total for the day	

[2]

- (ii) How does the amount of salt that Sam eats in these meals compare with the maximum intake recommended by the Department of Health?

Put a tick (✓) next to the correct answer.

more than the recommended daily intake

equal to the recommended daily intake

less than the recommended daily intake

[1]

- (iii) Sam wants to lower his total daily intake of salt whilst still eating the same amount of food.

Use the tables to suggest ways he could do this.

.....

.....

..... [2]

[Total: 6]

END OF QUESTION PAPER



Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

The Periodic Table of the Elements

	1	2	3	4	5	6	7	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 1 H hydrogen 1 </div>						<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 4 He helium 2 </div>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> relative atomic mass atomic symbol name atomic (proton) number </div>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
7	Li lithium 3	9 Be beryllium 4	11	12	13	14	15	16	17	18																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
23	Na sodium 11	24 Mg magnesium 12	27	28	29	30	31	32	33	34	35	36	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
[223]	Fr francium 87	[226]	Ra radium 88	[227]	Ac* actinium 89	[261]	Rf rutherfordium 104	[262]	Db dubnium 105	[266]	Sg seaborgium 106	[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 lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.