

Candidate Name \_\_\_\_\_

Centre Number

Candidate

Number

--	--

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
**Joint Examination for the School Certificate**  
**and General Certificate of Education Ordinary Level**

**SCIENCE**

**5124/3, 5126/3**

PAPER 3 Chemistry

**OCTOBER/NOVEMBER SESSION 2002**

1 hour 15 minutes

Additional materials:  
Answer paper

**TIME** 1 hour 15 minutes

**INSTRUCTIONS TO CANDIDATES**

Write your name, Centre number and candidate number in the spaces at the top of this page and on all separate answer paper used.

**Section A**

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

**Section B**

Answer any **two** questions.

Write your answers on the lined pages provided and, if necessary, continue on separate answer paper.

At the end of the examination,

1. fasten any separate answer paper securely to the question paper;
2. enter the numbers of the **Section B** questions you have answered in the grid below.

**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets [ ] at the end of each question or part question.

A copy of the Periodic Table is printed on page 12.

FOR EXAMINER'S USE	
Section A	
Section B	
<b>TOTAL</b>	

**This question paper consists of 9 printed pages and 3 lined pages.**



## Section A

Answer **all** the questions.

Write your answers in the spaces provided on the question paper.

- 1 Use the names of the substances in Fig. 1.1 to answer this question.

ammonium sulphate	ethanoic acid	graphite	helium
lime	methanol	oxygen	steel

Fig. 1.1

Name

- (a) an allotrope of carbon, .....[1]
- (b) an alloy, .....[1]
- (c) a fertiliser, .....[1]
- (d) a noble gas, .....[1]
- (e) an oxide. ....[1]

- 2 The process of photosynthesis takes place in green plants.

- (a) Why are **green** plants essential to this process?  
.....[1]
- (b) Name **two** substances that react together to produce glucose during this process.  
.....  
..... [2]
- (c) What type of energy is converted into chemical energy during this process?  
..... [1]

- 3 Fig. 3.1 lists the solubility in water of several substances.

substances	solubility in water
lead(II) carbonate	insoluble
sodium sulphate	soluble
calcium carbonate	insoluble
sodium hydroxide	soluble
lead(II) chloride	insoluble
lead(II) nitrate	soluble
sodium carbonate	soluble
hydrochloric acid	soluble
nitric acid	soluble
sulphuric acid	soluble

**Fig. 3.1**

- (a) Name **two** substances from Fig. 3.1 that when mixed as aqueous solutions form lead(II) carbonate.

..... and .....[1]

- (b) (i) Name **two** substances from Fig. 3.1 that when mixed as aqueous solutions form sodium sulphate.

..... and .....[1]

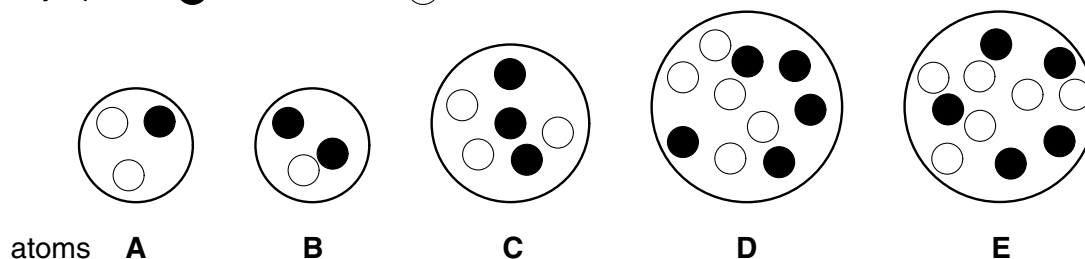
- (ii) How would you obtain pure crystals of sodium sulphate from the mixture of solutions in (i)?

.....  
 .....  
 .....[3]

4 The diagram in Fig. 4.1 represents the nuclei of five different atoms, **A**, **B**, **C**, **D** and **E**.

key:- proton ●

neutron ○



**Fig. 4.1**

Choose from the letters **A**, **B**, **C**, **D** and **E**, to answer the following questions.

(a) Which atom has a nucleon number of 6?

.....[1]

(b) Which **two** atoms have three electrons in their **outermost** electron shell?

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

(c) Which **two** atoms are isotopes of the same element?

..... and .....[1]

(d) Which atom is an isotope of hydrogen?

.....[1]

5 Use the Periodic Table on page 12 to help answer this question.

(a) State one way in which the elements in Group I differ from the elements in Group VII.

.....[1]

(b) Which Group contains only

(i) relatively soft metals, .....[1]

(ii) diatomic non-metals? .....[1]

(c) Which element

(i) is in Group V and in period 3, .....[1]

(ii) has a proton number of 79? .....[1]

- 6 Fig. 6.1 shows some properties and reactions of several substances.

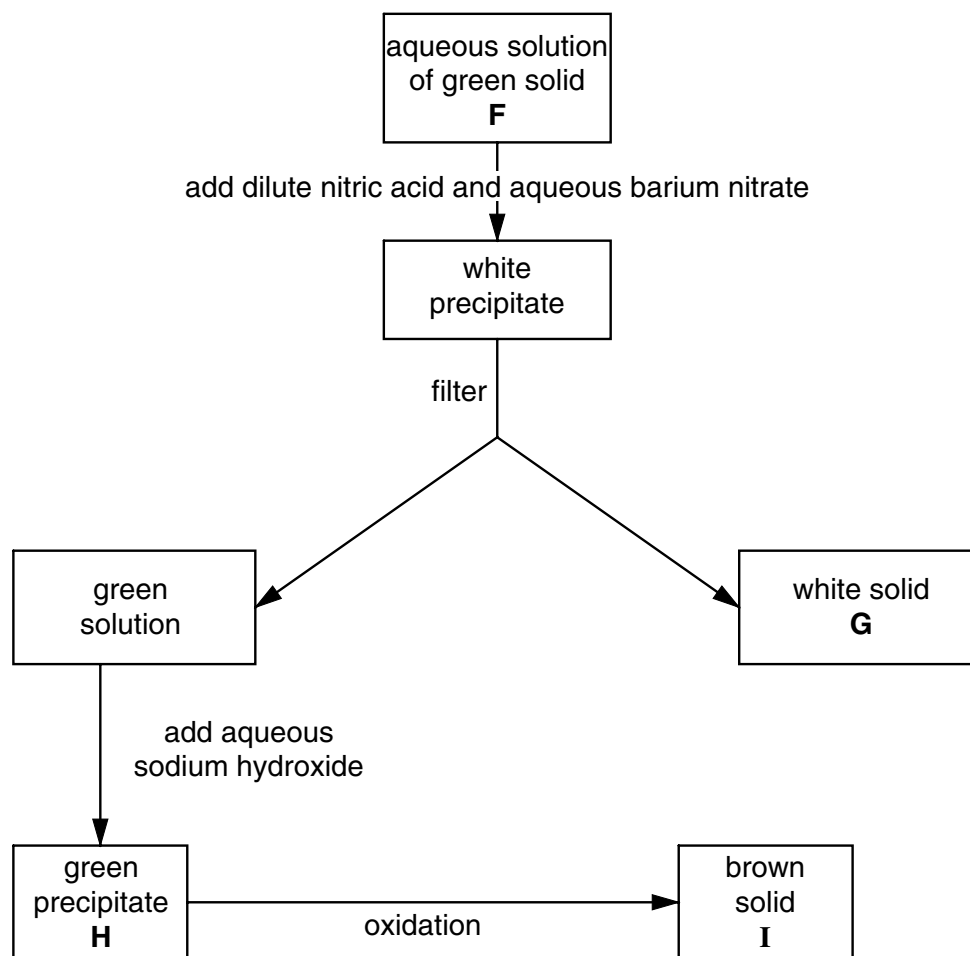


Fig. 6.1

- (a) Identify:

- (i) white solid **G**, .....[1]  
 (ii) green precipitate **H**, .....[1]  
 (iii) brown solid **I**, .....[1]  
 (iv) green solid **F**, .....[1]

- (b) Write an equation for any **one** of the reactions in Fig. 6.1.

.....[2]

7 (a) Complete the table in Fig. 7.1.

solution	colour with Universal Indicator solution
(i) 0.1 mol / dm <sup>3</sup> hydrochloric acid	
(ii) 0.1 mol / dm <sup>3</sup> sodium hydroxide solution	
(iii) a mixture of equal volumes of (i) and (ii)	

Fig. 7.1

[3]

(b) Calculate the relative molecular mass of sodium hydroxide, NaOH.

[Relative atomic masses:  $A_r$ : H, 1; O, 16; Na, 23]

.....  
 .....[1]

(c) Calculate the mass of sodium hydroxide in

(i) 1000 cm<sup>3</sup> of 1.0 mol / dm<sup>3</sup> sodium hydroxide solution,

.....  
 .....[1]

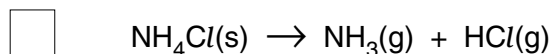
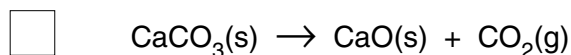
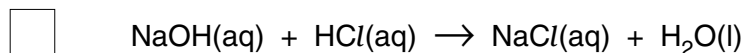
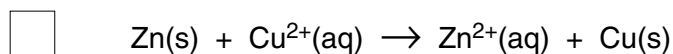
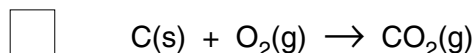
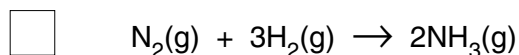
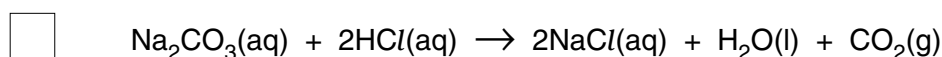
(ii) 1000 cm<sup>3</sup> of 0.1 mol / dm<sup>3</sup> sodium hydroxide solution,

.....  
 .....[1]

(iii) 20 cm<sup>3</sup> of 0.1 mol / dm<sup>3</sup> sodium hydroxide solution.

.....  
 .....[1]

8 Which three of the reactions below involve **both** oxidation **and** reduction?  
 Show these reactions by ticking **three** of the boxes.



[3]

9 The diagrams in Fig. 9.1 show the structures of five compounds.

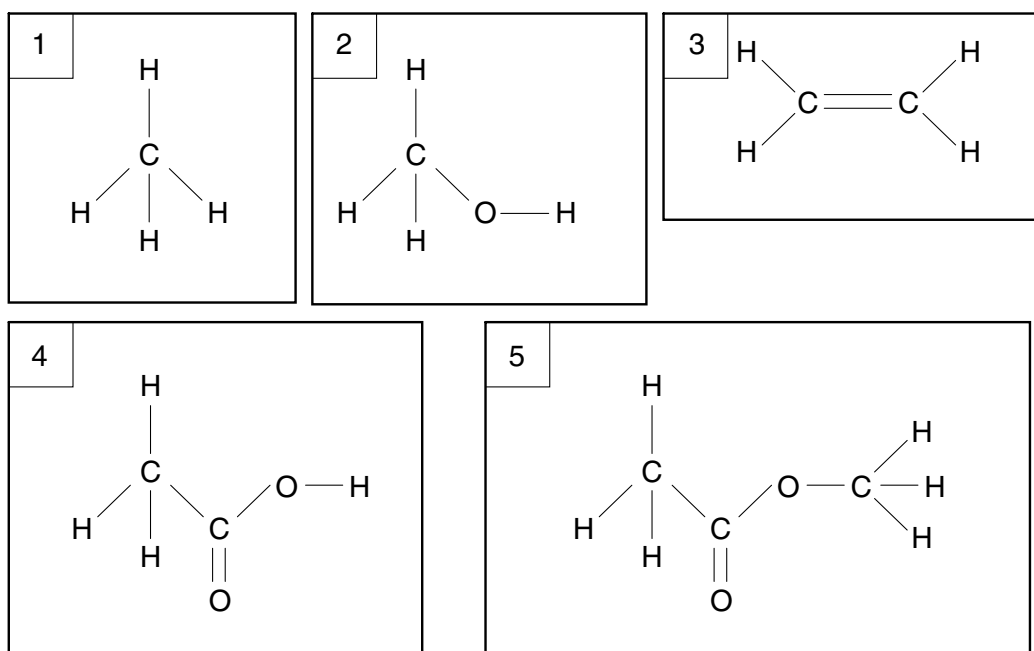


Fig. 9.1

Answer the questions below by stating the numbers of the diagrams.

(a) Which diagram shows

- (i) methane, .....[1]  
 (ii) a compound which is acidic, .....[1]  
 (iii) a compound which decolourises aqueous bromine, .....[1]  
 (iv) an alcohol? .....[1]

(b) Which **two** compounds react together to form the compound shown in diagram 5?

..... and .....[1]

**Section B**

Answer any **two** questions.

Write your answers on the lined pages provided, and, if necessary, continue on separate answer paper.

- 10 (a)** Describe, using **one** suitable example, the formation of covalent bonds between two non-metals. [4]
- (b)** Describe how ionic and covalent compounds differ in solubility and electrical conductivity. Use suitable examples to illustrate your answer. [6]
- 11 (a)** A solid and a liquid react to form a gas which is insoluble in water. Design and draw a labelled diagram of an apparatus that could be used to collect this gas. [3]
- (b)** Explain how your apparatus can be used to measure the **rate of reaction** between the solid and the liquid. [3]
- (c)** How can your results from **(b)** be displayed to show how the rate of reaction gradually slows down and eventually stops? [4]
- 12 (a)** Describe how iron can be manufactured from a named ore using coke, C, and limestone,  $\text{CaCO}_3$ . Write equations for the decomposition of limestone and for the reduction of the ore. [6]
- (b)** Calculate the maximum mass of carbon dioxide that will be formed by decomposing 25 tonnes of limestone.
- [Relative atomic masses:  $A_r$ : C, 12; O, 16; Ca, 40] [4]









**DATA SHEET**  
**The Periodic Table of the Elements**

		Group																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
		I	II	III	IV	V	VI	VII	0																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
		<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 10%;">1</td> <td style="width: 10%;"><b>H</b> Hydrogen 1</td> <td colspan="8"></td> <td style="width: 10%;">4</td> <td style="width: 10%;"><b>He</b> Helium 2</td> </tr> </table>										1	<b>H</b> Hydrogen 1									4	<b>He</b> Helium 2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
1	<b>H</b> Hydrogen 1									4	<b>He</b> Helium 2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
7	9											19	20																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
<b>Li</b> Lithium	<b>Be</b> Beryllium	<b>B</b> Boron	<b>C</b> Carbon	<b>N</b> Nitrogen	<b>O</b> Oxygen	<b>F</b> Fluorine	<b>Ne</b> Neon	<b>Al</b> Aluminium	<b>Si</b> Silicon	<b>P</b> Phosphorus	<b>S</b> Sulphur	<b>Cl</b> Chlorine	<b>Ar</b> Argon	<b>K</b> Potassium	<b>Ca</b> Calcium	<b>Sc</b> Scandium	<b>Ti</b> Titanium	<b>V</b> Vanadium	<b>Cr</b> Chromium	<b>Mn</b> Manganese	<b>Fe</b> Iron	<b>Co</b> Cobalt	<b>Ni</b> Nickel	<b>Cu</b> Copper	<b>Zn</b> Zinc	<b>Ga</b> Gallium	<b>Ge</b> Germanium	<b>As</b> Arsenic	<b>Se</b> Selenium	<b>Br</b> Bromine	<b>Kr</b> Krypton	<b>Rb</b> Rubidium	<b>Sr</b> Strontium	<b>Y</b> Yttrium	<b>Zr</b> Zirconium	<b>Nb</b> Niobium	<b>Mo</b> Molybdenum	<b>Tc</b> Technetium	<b>Ru</b> Ruthenium	<b>Rh</b> Rhodium	<b>Pd</b> Palladium	<b>Ag</b> Silver	<b>Cd</b> Cadmium	<b>In</b> Indium	<b>Sn</b> Tin	<b>Sb</b> Antimony	<b>Te</b> Tellurium	<b>I</b> Iodine	<b>Xe</b> Xenon	<b>Cs</b> Caesium	<b>Ba</b> Barium	<b>La</b> Lanthanum	<b>Hf</b> Hafnium	<b>Ta</b> Tantalum	<b>W</b> Tungsten	<b>Re</b> Rhenium	<b>Os</b> Osmium	<b>Ir</b> Iridium	<b>Pt</b> Platinum	<b>Au</b> Gold	<b>Hg</b> Mercury	<b>Tl</b> Thallium	<b>Pb</b> Lead	<b>Bi</b> Bismuth	<b>Po</b> Polonium	<b>At</b> Astatine	<b>Rn</b> Radon																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	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