



Cambridge IGCSE™

CHEMISTRY

0620/12

Paper 1 Multiple Choice (Core)

May/June 2025

45 minutes

You must answer on the multiple choice answer sheet.



You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- There are **forty** questions on this paper. Answer **all** questions.
- For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages. Any blank pages are indicated.

1 Substance L melts at $-7\text{ }^{\circ}\text{C}$ and is a brown liquid at room temperature.

What is the boiling point of pure L?

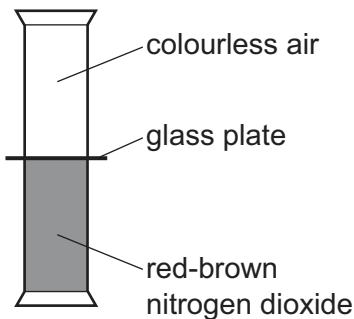
- A $-77\text{ }^{\circ}\text{C}$
- B $-7\text{ }^{\circ}\text{C}$ to $+7\text{ }^{\circ}\text{C}$
- C $59\text{ }^{\circ}\text{C}$
- D $107\text{ }^{\circ}\text{C}$ to $117\text{ }^{\circ}\text{C}$

2 Which row describes how the volume of a gas changes when its temperature is increased at constant pressure and when its pressure is increased at constant temperature?

	temperature is increased at constant pressure	pressure is increased at constant temperature
A	volume decreases	volume decreases
B	volume decreases	volume increases
C	volume increases	volume decreases
D	volume increases	volume increases

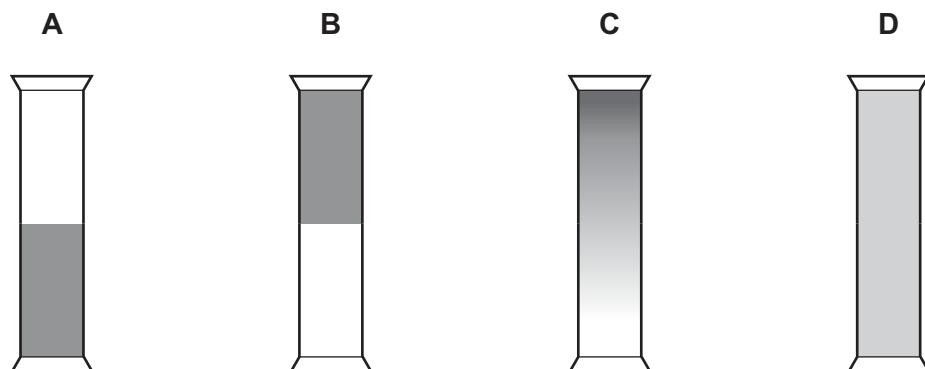
3 Nitrogen dioxide is a red-brown gas which is more dense than air.

The diagram shows the arrangement of two gas jars which contain nitrogen dioxide and air separated with a glass plate.



The glass plate is removed, and the gas jars are left for 24 hours.

Which diagram shows the gas jars after 24 hours?



4 Which substance is a mixture of **one** element and **one** compound?

- A aqueous glucose
- B clean, dry air
- C oxygen dissolved in distilled water
- D stainless steel

5 Which statement defines the atomic number of an element?

- A the group number of the element
- B the mass of one atom of the element
- C the number of particles in the nucleus of one atom of the element
- D the number of protons in the nucleus of one atom of the element

6 What is different for isotopes of the same element?

- A nucleon number
- B number of electron shells
- C number of electrons in the outer electron shell
- D proton number

7 When sodium chloride is formed from its elements, each chlorine atom1..... one2..... .

Which words correctly complete gaps 1 and 2?

	1	2
A	gains	electron
B	gains	proton
C	loses	electron
D	loses	proton

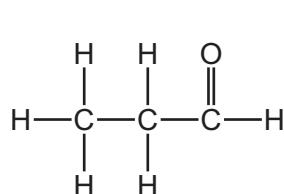
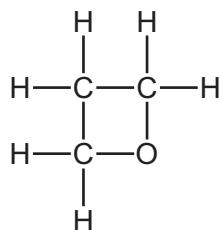
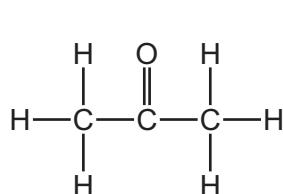
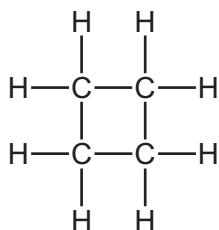
8 In the molecules CH_4 , HCl and H_2O , which atoms use **all** of their outer shell electrons in bonding?

- A C and Cl
- B C and H
- C Cl and H
- D H and O

9 Which substance has a giant covalent structure?

- A sodium chloride
- B ammonia
- C magnesium chloride
- D graphite

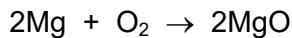
10 The diagrams show the structures of four molecules.



Which statement about these molecules is correct?

- A All four molecules have different molecular formulae.
- B All four molecules have the same molecular formula.
- C Only two molecules have the same molecular formula.
- D Only three molecules have the same molecular formula.

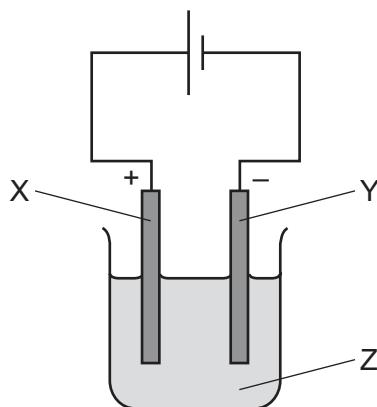
11 The equation for the reaction of magnesium with oxygen is shown.



Which mass of oxygen reacts exactly with 6 g of magnesium?

- A 2 g
- B 4 g
- C 8 g
- D 16 g

12 The diagram shows a simple electrolytic cell for an electrolysis experiment.



Three parts of the electrolytic cell are labelled X, Y and Z.

Which row shows the correct labels to replace X, Y and Z in the diagram?

	X	Y	Z
A	anode	cathode	aqueous salt
B	anode	cathode	solid salt
C	cathode	anode	aqueous salt
D	cathode	anode	solid salt

13 Which equation represents the overall reaction that produces electricity in a hydrogen–oxygen fuel cell?

A $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}_2$

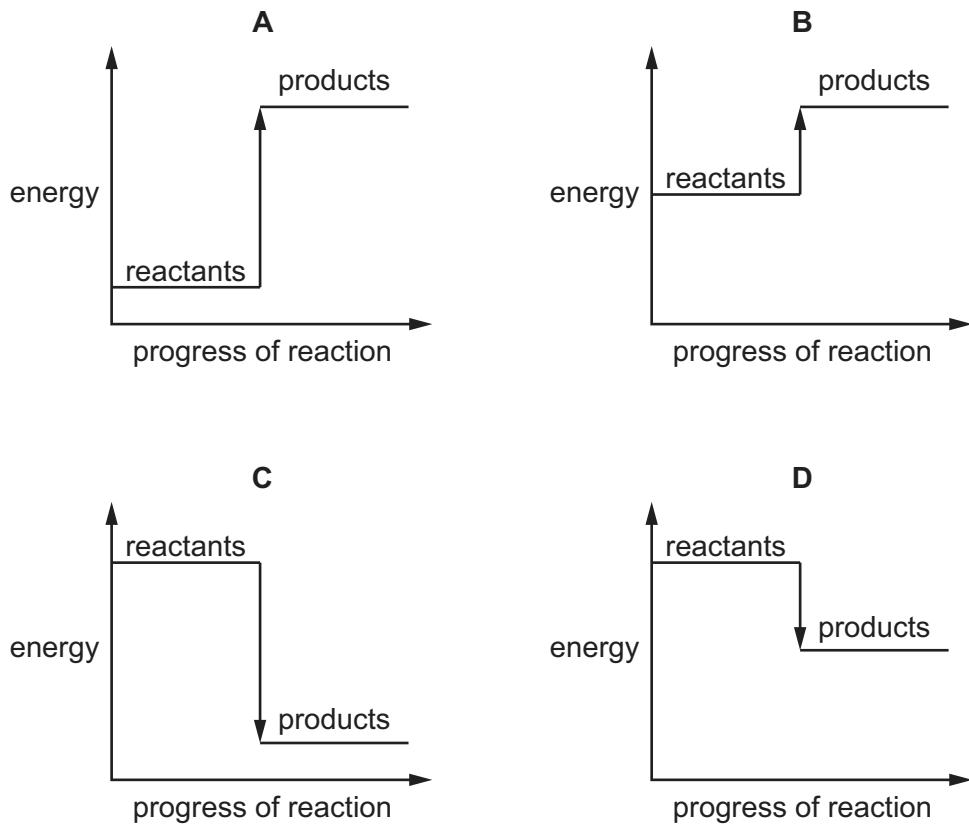
B $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$

C $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

D $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$

14 Which reaction pathway diagram shows the largest increase in the temperature of the surroundings?

(The scale on the *y*-axis is the same in each diagram.)



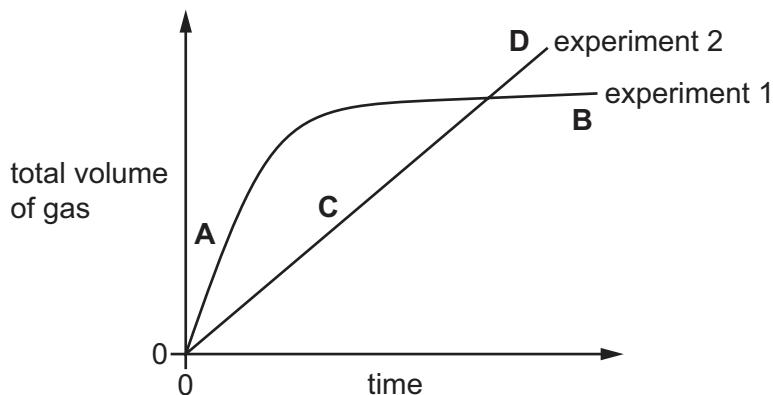
15 Which process involves a chemical change?

- A dissolving copper(II) sulfate
- B distilling ethanol
- C freezing water
- D neutralising copper(II) oxide

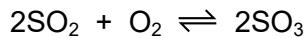
16 The total volume of gas produced in two different experiments is measured against time.

A graph of the results of the two experiments is shown.

Which point shows the fastest rate of reaction?



17 The equation for the reaction of sulfur dioxide with oxygen is shown.



What is meant by the symbol \rightleftharpoons ?

- A redox reaction
- B reversible reaction
- C displacement reaction
- D thermal decomposition reaction

18 Which reactions are redox reactions?

- 1 the incomplete combustion of propane
- 2 the rusting of iron
- 3 the reaction of aqueous chloride ions with acidified aqueous silver nitrate
- 4 the thermal decomposition of calcium carbonate

- A 1 and 2
- B 1 and 3
- C 2 and 4
- D 3 and 4

19 Which row describes an aqueous solution for the pH shown?

	pH	description
A	1	has a very high alkalinity
B	5	is neutral
C	9	turns universal indicator yellow
D	14	contains OH^- ions

20 Which parts of the Periodic Table contain elements that **only** form basic oxides?

- A Group I and Period 3
- B Group I only
- C Group VIII and Period 3
- D Group VIII only

21 Which statement about elements in the Periodic Table is correct?

- A Elements in the same group of the Periodic Table have the same electronic configuration.
- B The atoms of the elements in Group VII form ions with a charge equal to the number of outer shell electrons minus 8.
- C The metallic character of the elements increases from left to right across a period.
- D The Periodic Table is an arrangement of elements in order of increasing nucleon number.

22 Which row identifies the trends in properties of the elements lithium to sodium to potassium?

	melting point	density	reactivity
A	decreasing	increasing	increasing
B	increasing	increasing	decreasing
C	increasing	decreasing	increasing
D	decreasing	decreasing	increasing

23 Which statements about the halogens are correct?

- 1 They are all diatomic molecules.
- 2 They are all gases at room temperature and pressure.
- 3 The density of the elements increases down the group.
- 4 The reactivity of the elements increases down the group.

- A 1 and 2
- B 1 and 3
- C 2 and 4
- D 3 and 4

24 Zirconium is a transition element.

What is a property of zirconium?

- A high density
- B does **not** conduct heat
- C forms white compounds only
- D low melting point

25 Some gases exist as single atoms, are unreactive and have eight electrons in their outer electron shell.

Which gases fit this description?

1 helium

2 argon

3 oxygen

4 krypton

A 1, 2 and 4

B 1 and 3

C 2 and 4 only

D 3 only

26 Which statements about metals are correct?

1 Calcium reacts faster than magnesium with cold water.

2 Aluminium is more easily extracted than iron from its ore.

3 Copper reacts faster than iron with dilute hydrochloric acid.

4 Potassium and silver are both good conductors of electricity.

A 1 and 2

B 1 and 4

C 2 and 3

D 3 and 4

27 Four metals, P, Q, R and S, are separately reacted with dilute hydrochloric acid.

The table shows the observation for each metal.

metal	observation
P	lots of bubbles produced
Q	few bubbles produced
R	no bubbles produced
S	very few bubbles produced

What is the order of reactivity of these four metals, from most reactive to least reactive?

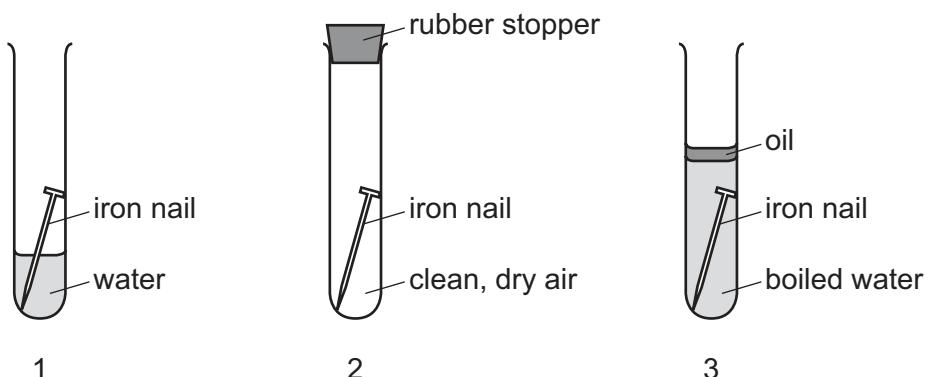
A R → S → Q → P

B P → S → Q → R

C P → Q → S → R

D Q → R → P → S

28 The diagram shows iron nails which are left for one week in separate test-tubes with the conditions shown.



Which test-tubes show evidence of rusting after one week?

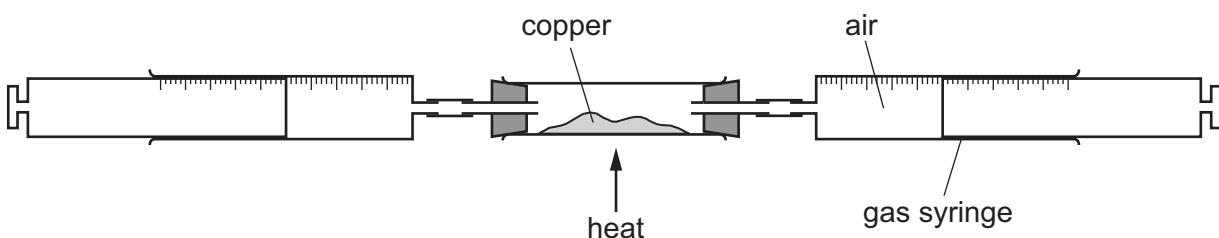
A 1 and 3 B 1 only C 2 and 3 D 2 only

29 Pure metals can be combined to make alloys.

Why are the alloys sometimes used rather than the metals they are made from?

A Alloys are easier to extract and cheaper.
 B Alloys are easier to hammer into different shapes.
 C Alloys are harder and keep their shape better.
 D Alloys contain only atoms of the same size but pure metals do **not**.

30 In the experiment shown, 100 cm^3 of clean, dry air is passed backwards and forwards through a tube containing heated copper until there is no further decrease in the volume of the air.



All of the gas is pushed into **one** syringe.

What is the final reading on this gas syringe?

A 0 cm^3 B 21 cm^3 C 79 cm^3 D 100 cm^3

31 Sulfur dioxide, carbon monoxide and oxides of nitrogen are gaseous pollutants found in the air.

Which pollutants contribute to acid rain?

- A carbon monoxide and sulfur dioxide
- B oxides of nitrogen and sulfur dioxide
- C oxides of nitrogen only
- D sulfur dioxide only

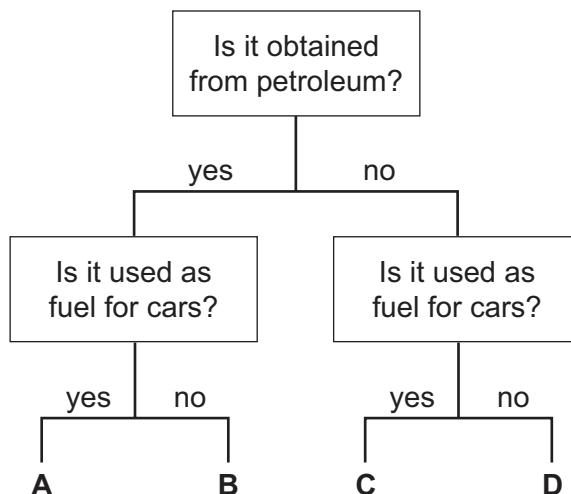
32 The formulae for three organic compounds are listed.

- 1 C_2H_4
- 2 C_4H_8
- 3 C_4H_{10}

Which compounds belong to the same homologous series?

- A 1, 2 and 3
- B 1 and 2 only
- C 1 and 3 only
- D 2 and 3 only

33 Which fuel could be gasoline?



34 Three hydrocarbons are separately mixed with aqueous bromine.

Which row gives the correct observation for each hydrocarbon?

	$\begin{array}{c} \text{H} \\ \\ \text{H}—\text{C}—\text{H} \\ \\ \text{H} \end{array}$	$\begin{array}{c} \text{H} & \text{H} \\ & \\ \text{H}—\text{C} & —\text{C}—\text{H} \\ & \\ \text{H} & \text{H} \end{array}$	$\begin{array}{c} \text{H} & & \text{H} \\ & \diagdown & \diagup \\ & \text{C}=\text{C} \\ & \diagup & \diagdown \\ \text{H} & & \text{H} \end{array}$
A	colour changes from orange to colourless	colour stays unchanged	colour changes from orange to colourless
B	colour changes from orange to colourless	colour changes from orange to colourless	colour stays unchanged
C	colour stays unchanged	colour stays unchanged	colour changes from orange to colourless
D	colour stays unchanged	colour changes from orange to colourless	colour stays unchanged

35 Which compound is formed when ethene reacts with steam?

- A** ethane
- B** ethanoic acid
- C** ethanol
- D** poly(ethene)

36 Which statements about ethanoic acid are correct?

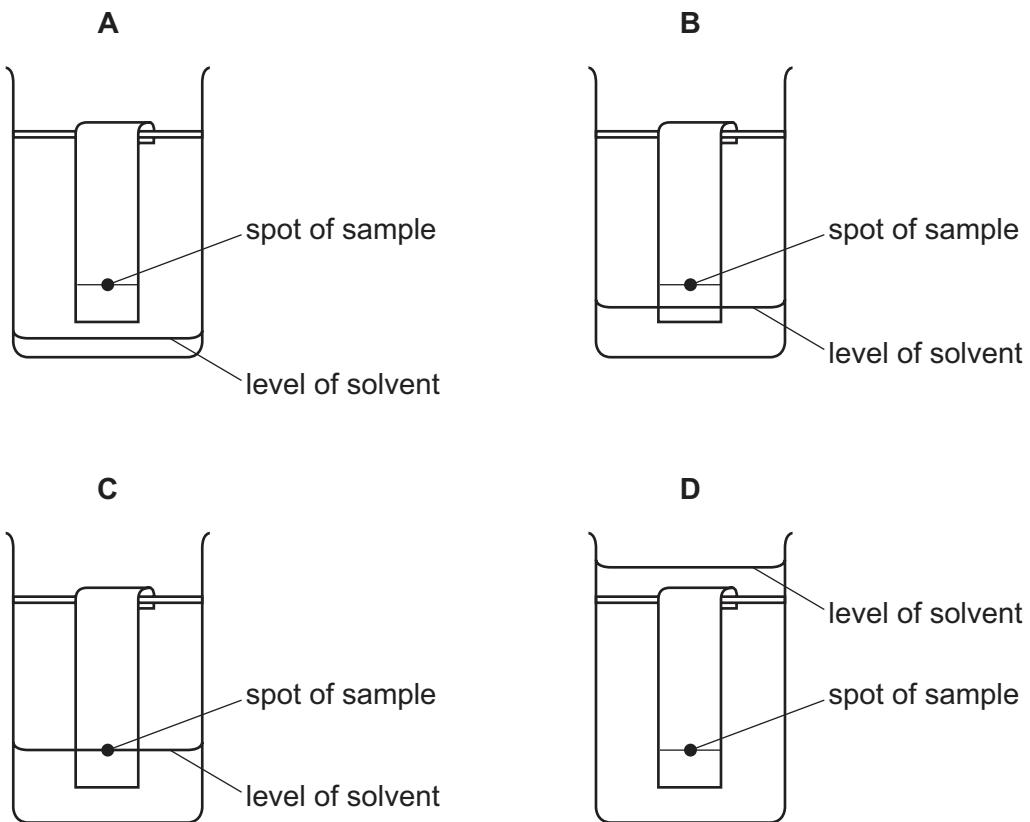
- 1 Its aqueous solution has a pH value of 10.
- 2 It reacts with metal carbonates to produce carbon dioxide gas.
- 3 It reacts with magnesium metal to produce hydrogen gas.

- A** 1, 2 and 3
- B** 1 and 2 only
- C** 1 and 3 only
- D** 2 and 3 only

37 Which statement explains why plastic bags made from poly(ethene) accumulate in oceans?

- A** Poly(ethene) is a saturated molecule.
- B** Poly(ethene) is made from hydrocarbon monomers.
- C** Poly(ethene) reacts with water.
- D** Poly(ethene) does **not** decompose in water.

38 Which diagram shows the correct level of solvent at the start of a chromatography experiment?



39 Which process is used to separate a mixture of liquids with different boiling points?

- A dissolving
- B crystallisation
- C filtration
- D fractional distillation

40 Four different colourless solutions are each tested separately with aqueous sodium hydroxide and with acidified aqueous silver nitrate.

Which row shows the results for sodium chloride?

	aqueous sodium hydroxide	acidified aqueous silver nitrate
A	no visible reaction	white precipitate
B	no visible reaction	no visible reaction
C	white precipitate	no visible reaction
D	white precipitate	white precipitate

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The Periodic Table of Elements

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3	Li	4	Be	5	Sc	6	Ti	7	V	8	Cr	9	Mn	10	Fe	11	Co	12	Ni	13	Ga	14	Ge	15	B	16	C	17	N	18	H	19	He	20	Ne	21	He	22	Li	23	Na	24	Mg	25	Al	26	Si	27	Al	28	Si	29	Al	30	Zn	31	Ge	32	Se	33	Br	34	Se	35	Br	36	Kr	37	Ca	38	Sc	39	Ti	40	Sc	41	V	42	Cr	43	Cr	44	Fe	45	Co	46	Ni	47	Zn	48	Ge	49	As	50	As	51	Ge	52	As	53	As	54	Xe	55	K	56	Ca	57	Sc	58	Ti	59	Sc	60	V	61	Cr	62	Cr	63	Fe	64	Co	65	Ni	66	Zn	67	Ge	68	As	69	As	70	Ge	71	As	72	As	73	Kr	74	Sc	75	Sc	76	Ti	77	Sc	78	V	79	Cr	80	Cr	81	Fe	82	Co	83	Ni	84	Zn	85	Ge	86	As	87	Ca	88	Sc	89	Ti	90	Sc	91	V	92	Cr	93	Cr	94	Fe	95	Co	96	Ni	97	Zn	98	Ge	99	As	100	As	101	Ge	102	As	103	As	104	Ca	105	Sc	106	Ti	107	Sc	108	V	109	Cr	110	Cr	111	Fe	112	Co	113	Ni	114	Zn	115	Ge	116	As	117	As	118	Ge	119	As	120	As	121	Ge	122	As	123	As	124	Ge	125	As	126	As	127	Ge	128	As	129	As	130	Ge	131	As	132	As	133	Ge	134	As	135	As	136	Ge	137	As	138	As	139	Ge	140	As	141	As	142	Ge	143	As	144	As	145	Ge	146	As	147	As	148	Ge	149	As	150	As	151	Ge	152	As	153	As	154	Ge	155	As	156	As	157	Ge	158	As	159	As	160	Ge	161	As	162	As	163	Ge	164	As	165	As	166	Ge	167	As	168	As	169	Ge	170	As	171	As	172	Ge	173	As	174	As	175	Ge	176	As	177	As	178	Ge	179	As	180	As	181	Ge	182	As	183	As	184	Ge	185	As	186	As	187	Ge	188	As	189	As	190	Ge	191	As	192	As	193	Ge	194	As	195	As	196	Ge	197	As	198	As	199	Ge	200	As	201	As	202	Ge	203	As	204	As	205	Ge	206	As	207	As	208	Ge	209	As	210	As	211	Ge	212	As	213	As	214	Ge	215	As	216	As	217	Ge	218	As	219	As	220	Ge	221	As	222	As	223	Ge	224	As	225	As	226	Ge	227	As	228	As	229	Ge	230	As	231	As	232	Ge	233	As	234	As	235	Ge	236	As	237	As	238	Ge	239	As	240	As	241	Ge	242	As	243	As	244	Ge	245	As	246	As	247	Ge	248	As	249	As	250	Ge	251	As	252	As	253	Ge	254	As	255	As	256	Ge	257	As	258	As	259	Ge	260	As	261	As	262	Ge	263	As	264	As	265	Ge	266	As	267	As	268	Ge	269	As	270	As	271	Ge	272	As	273	As	274	Ge	275	As	276	As	277	Ge	278	As	279	As	280	Ge	281	As	282	As	283	Ge	284	As	285	As	286	Ge	287	As	288	As	289	Ge	290	As	291	As	292	Ge	293	As	294	As	295	Ge	296	As	297	As	298	Ge	299	As	300	As	301	Ge	302	As	303	As	304	Ge	305	As	306	As	307	Ge	308	As	309	As	310	Ge	311	As	312	As	313	Ge	314	As	315	As	316	Ge	317	As	318	As	319	Ge	320	As	321	As	322	Ge	323	As	324	As	325	Ge	326	As	327	As	328	Ge	329	As	330	As	331	Ge	332	As	333	As	334	Ge	335	As	336	As	337	Ge	338	As	339	As	340	Ge	341	As	342	As	343	Ge	344	As	345	As	346	Ge	347	As	348	As	349	Ge	350	As	351	As	352	Ge	353	As	354	As	355	Ge	356	As	357	As	358	Ge	359	As	360	As	361	Ge	362	As	363	As	364	Ge	365	As	366	As	367	Ge	368	As	369	As	370	Ge	371	As	372	As	373	Ge	374	As	375	As	376	Ge	377	As	378	As	379	Ge	380	As	381	As	382	Ge	383	As	384	As	385	Ge	386	As	387	As	388	Ge	389	As	390	As	391	Ge	392	As	393	As	394	Ge	395	As	396	As	397	Ge	398	As	399	As	400	Ge	401	As	402	As	403	Ge	404	As	405	As	406	Ge	407	As	408	As	409	Ge	410	As	411	As	412	Ge	413	As	414	As	415	Ge	416	As	417	As	418	Ge	419	As	420	As	421	Ge	422	As	423	As	424	Ge	425	As	426	As	427	Ge	428	As	429	As	430	Ge	431	As	432	As	433	Ge	434	As	435	As	436	Ge	437	As	438	As	439	Ge	440	As	441	As	442	Ge	443	As	444	As	445	Ge	446	As	447	As	448	Ge	449	As	450	As	451	Ge	452	As	453	As	454	Ge	455	As	456	As	457	Ge	458	As	459	As	460	Ge	461	As	462	As	463	Ge	464	As	465	As	466	Ge	467	As	468	As	469	Ge	470	As	471	As	472	Ge	473	As	474	As	475	Ge	476	As	477	As	478	Ge	479	As	480	As	481	Ge	482	As	483	As	484	Ge	485	As	486	As	487	Ge	488	As	489	As	490	Ge	491	As	492	As	493	Ge	494	As	495	As	496	Ge	497	As	498	As	499	Ge	500	As	501	As	502	Ge	503	As	504	As	505	Ge	506	As	507	As	508	Ge	509	As	510	As	511	Ge	512	As	513	As	514	Ge	515	As	516	As	517	Ge	518	As	519	As	520	Ge	521	As	522	As	523	Ge	524	As	525	As	526	Ge	527	As	528	As	529	Ge	530	As	531	As	532	Ge	533	As	534	As	535	Ge	536	As	537	As	538	Ge	539	As	540	As	541	Ge	542	As	543	As	544	Ge	545	As	546	As	547	Ge	548	As	549	As	550	Ge	551	As	552	As	553	Ge	554	As	555	As	556	Ge	557	As	558	As	559	Ge	560	As	561	As	562	Ge	563	As	564	As	565	Ge	566	As	567	As	568	Ge	569	As	570	As	571	Ge	572	As	573	As	574	Ge	575	As	576	As	577	Ge	578	As	579	As	580	Ge	581	As	582	As	583	Ge	584	As	585	As	586	Ge	587	As	588	As	589	Ge	590	As	591	As	592	Ge	593	As	594	As	595	Ge	596	As	597	As	598	Ge	599	As	600	As	601	Ge	602	As	603	As	604	Ge	605	As	606	As	607	Ge	608	As	609	As	610	Ge	611	As	612	As	613	Ge	614	As	615	As	616	Ge	617	As	618	As	619	Ge	620	As	621	As	622	Ge	623	As	624	As	625	Ge	626	As	627	As	628	Ge	629	As	630	As	631	Ge	632	As	633	As	634	Ge	635	As	636	As	637	Ge	638	As	639	As	640	Ge	641	As	642	As	643	Ge	644	As	645	As	646	Ge	647	As	648	As	649	Ge	650	As	651	As	652	Ge	653	As	654	As	655	Ge	656	As	657	As	658	Ge	659	As	660	As	661	Ge	662	As	663	As	664	Ge	665	As	666	As	667	Ge	668	As	669	As	670	Ge	671	As	672	As	673	Ge	674	As	675	As	676	Ge	677	As	678	As	679	Ge	680	As	681	As	682	Ge	683	As	684	As	685	Ge	686	As	687	