



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY (US)

0439/11

Paper 1 Multiple Choice (Core)

October/November 2018

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)



READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, Center number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

DO NOT WRITE IN ANY BARCODES.

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 separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 16.

Electronic calculators may be used.

This document consists of **16** printed pages.

- 1 A beaker containing solid carbon dioxide is placed in a fume cupboard at room temperature. The carbon dioxide becomes gaseous.

Which process describes this change of state?

- A boiling
 - B condensation
 - C evaporation
 - D sublimation
- 2 The pressure of a sample of gas is decreased. The temperature is kept constant.

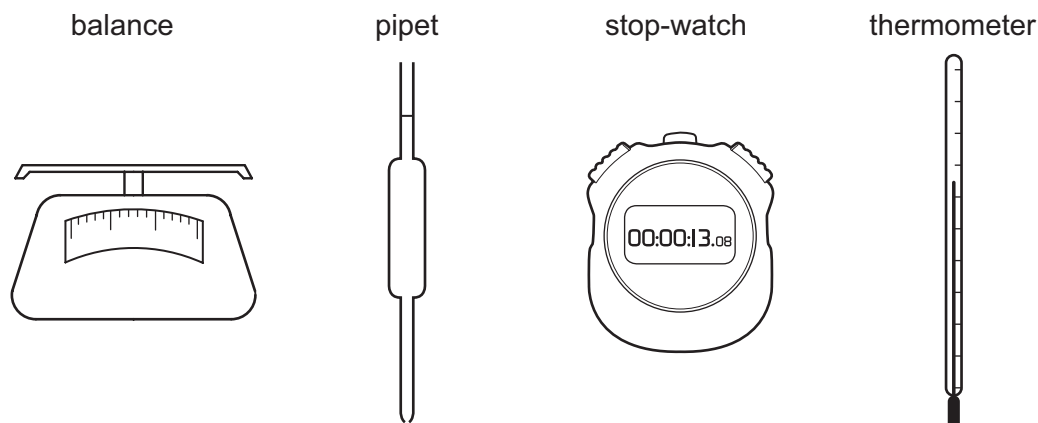
Which row describes the effects on the particles?

	movement of particles	collisions between particles
A	slower	occur less often
B	slower	occur with more force
C	no change in speed	occur less often
D	no change in speed	occur with more force

- 3 Which statement about paper chromatography is correct?

- A A solvent is needed to dissolve the paper.
- B Paper chromatography separates mixtures of solvents.
- C The solvent should cover the baseline.
- D The baseline should be drawn in pencil.

4 The diagrams show four pieces of laboratory equipment.



Which equipment is essential to find out if dissolving a salt in water is an exothermic process?

	balance	pipet	stop-watch	thermometer
A	x	x	x	✓
B	✓	x	x	✓
C	x	✓	x	✓
D	✓	x	✓	x

5 Iodine, I, has a lower relative atomic mass than tellurium, Te, but is placed after it in the Periodic Table.

The diagram shows a partial periodic table with the following structure:

- Period 1: 2 boxes.
- Period 2: 8 boxes.
- Period 3: 8 boxes.
- Period 4: 18 boxes. The 16th box is labeled 'Te' and the 17th box is labeled 'I'.
- Period 5: 18 boxes.
- Period 6: 18 boxes.
- Period 7: 18 boxes.

There are also two boxes above the main body of the table: one in the middle (above the 10th box of period 4) and one at the far right (above the 18th box of period 4).

Which statement explains why iodine is placed after tellurium in the Periodic Table?

- A** Iodine has fewer neutrons than tellurium.
- B** Iodine has fewer protons than tellurium.
- C** Iodine has more neutrons than tellurium.
- D** Iodine has more protons than tellurium.

- 6 Substance Q has a high melting point and conducts electricity both when molten and when dissolved in water.

What is Q?

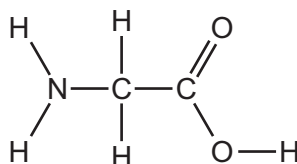
- A calcium chloride
- B diamond
- C iron
- D silver chloride

- 7 Elements X and Y form an ionic compound, XY.

In which group of the Periodic Table is X found and how is the bond between X and Y formed?

	group in which X is found	how the bond between X and Y is formed
A	I	by X gaining one electron from Y
B	I	by X transferring one electron to Y
C	VII	by X sharing electrons with Y
D	VII	by X transferring one electron to Y

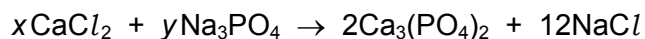
- 8 The structure of glycine is shown.



Which row is correct?

	formula of glycine	number of different elements in glycine
A	CH ₅ O ₂ N	10
B	C ₂ H ₅ O ₂ N	4
C	C ₂ H ₅ O ₂ N	10
D	H ₂ NCHCOOH	4

- 9 Calcium phosphate forms when calcium chloride and sodium phosphate solutions react together.



Which values of x and y balance the equation?

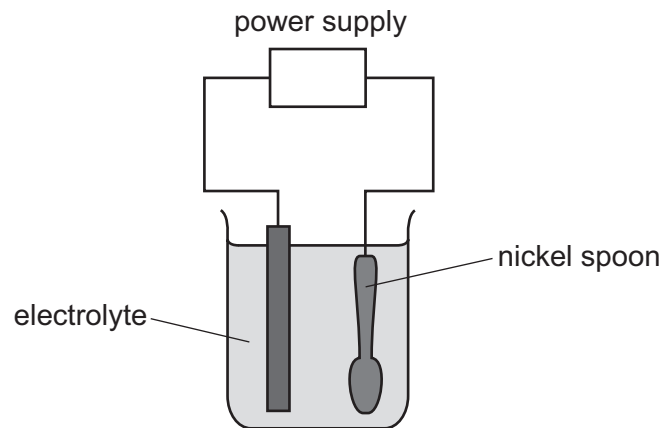
	x	y
A	2	2
B	3	4
C	6	3
D	6	4

- 10 During the electrolysis of concentrated aqueous sodium chloride, chlorine gas is produced at the positive electrode.

What happens at the negative electrode and to the solution?

	product at the negative electrode	the solution becomes
A	hydrogen	acidic
B	hydrogen	alkaline
C	sodium	acidic
D	sodium	alkaline

11 The diagram shows an experiment to electroplate a nickel spoon with silver.



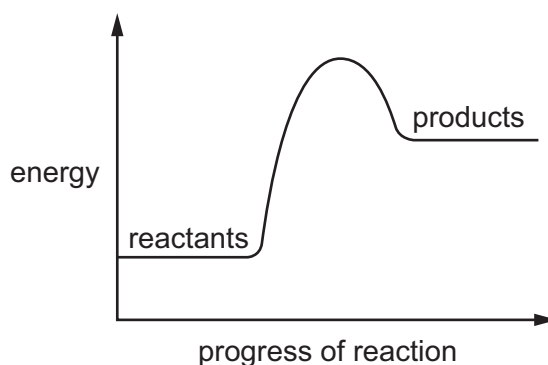
Which row correctly describes the positive electrode, the negative electrode and the electrolyte?

	positive electrode	negative electrode	electrolyte
A	nickel spoon	pure nickel	silver nitrate solution
B	nickel spoon	pure silver	nickel nitrate solution
C	pure nickel	nickel spoon	silver nitrate solution
D	pure silver	nickel spoon	silver nitrate solution

12 Which substance does **not** use oxygen to produce heat energy?

- A** coal
- B** hydrogen
- C** natural gas
- D** uranium

13 An energy level diagram for a reaction is shown.



Which statement about the reaction is correct?

- A Heat is released.
- B It is a combustion reaction.
- C It is an endothermic reaction.
- D The temperature increases.

14 Two reactions are done.

- 1 Hydrated cobalt(II) chloride is heated. It changes color.
- 2 Water is added to the product of reaction 1. It becomes hotter. The original color is produced.

Which types of reaction have occurred in reactions 1 and 2?

	endothermic	exothermic	neutralization	reversible
A	✓	✓	✓	✓
B	✓	✓	✓	x
C	✓	✓	x	✓
D	✓	x	x	✓

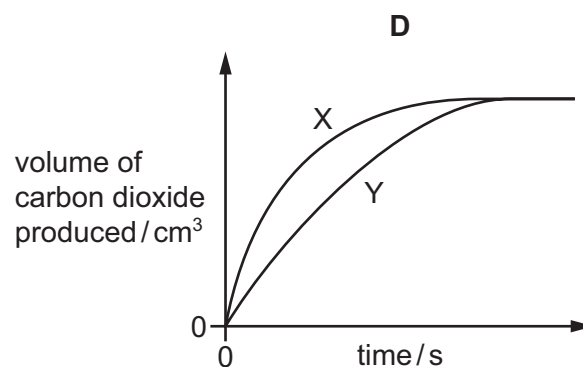
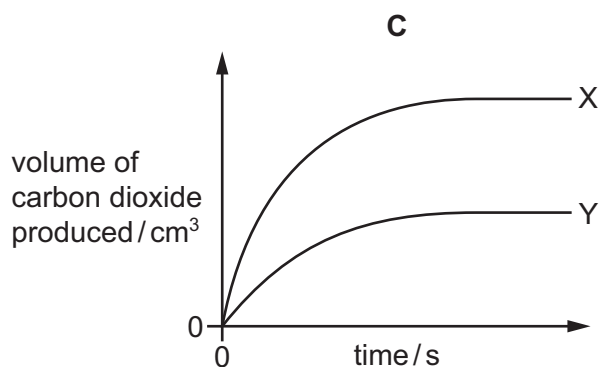
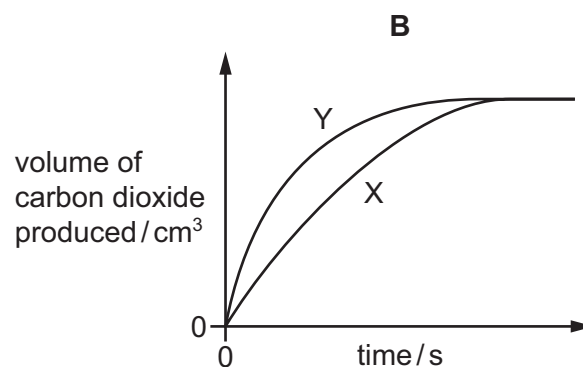
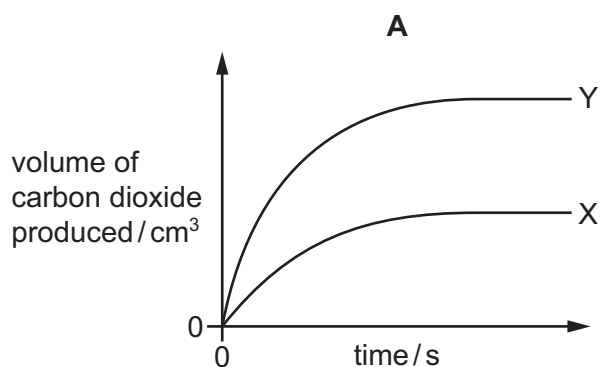
15 Which equation shows reduction of an iron compound?

- A $4\text{Fe} + 3\text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$
- B $\text{Fe} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2$
- C $4\text{FeO} + \text{O}_2 \rightarrow 2\text{Fe}_2\text{O}_3$
- D $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$

- 16 Calcium carbonate reacts with dilute hydrochloric acid to make carbon dioxide gas. Graph X shows the results of this experiment.

The particle size of the calcium carbonate is increased and the experiment is repeated. All other conditions are kept the same. Graph Y shows the results of this experiment.

Which diagram is correct for the two experiments?



- 17 Part of the Periodic Table is shown.

Which element forms an oxide that reacts with dilute acid to form a salt and water?

I	II		III	IV	V	VI	VII	VIII
					A		B	
	C				D			

18 An excess of substance Z is added to some spilt acid.

The solution produced as a result is neutral.

What is Z?

- A aqueous ammonia
- B aqueous sodium hydroxide
- C calcium carbonate
- D water

19 Aqueous sodium hydroxide is added to solid Q in a test-tube.

A gas is produced which turns damp red litmus blue.

What is Q?

- A aluminum
- B ammonia
- C ammonium chloride
- D sodium nitrate

20 Potassium hydroxide is a base.

Which statement describes a reaction of potassium hydroxide?

- A Chlorine is formed when it is heated with ammonium chloride.
- B It turns Universal Indicator green.
- C It reacts with an acid to produce a salt and water.
- D It turns methyl orange red.

21 Which statement about the Periodic Table is **not** correct?

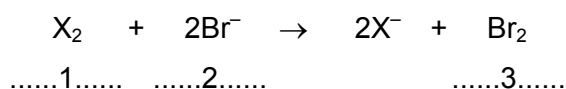
- A It can be used to find the atomic number of an element.
- B It can be used to find the physical state of an element.
- C It can be used to find the symbol of an element.
- D It can be used to predict the properties of an element.

22 Elements in Group I of the Periodic Table react with water.

Which row describes the products made in the reaction and the trend in reactivity of the elements?

	products	trend in reactivity
A	metal hydroxide and hydrogen	less reactive down the group
B	metal hydroxide and hydrogen	more reactive down the group
C	metal oxide and hydrogen	less reactive down the group
D	metal oxide and hydrogen	more reactive down the group

23 The equation shows the reaction between a halogen and aqueous bromide ions.



Which words complete gaps 1, 2 and 3?

	1	2	3
A	chlorine	brown	colorless
B	chlorine	colorless	brown
C	iodine	brown	colorless
D	iodine	colorless	brown

24 An inert gas R is used to fill weather balloons.

Which descriptions of R are correct?

	number of outer shell electrons in atoms of R	structure of gas R
A	2	diatomic molecules
B	2	single atoms
C	8	diatomic molecules
D	8	single atoms

25 Metal X reacts with steam but not with cold water.

What is X?

- A calcium
- B copper
- C sodium
- D zinc

26 Which process is used to extract aluminum from bauxite?

- A heating bauxite in air
- B heating bauxite with carbon
- C heating bauxite with hydrogen
- D passing electricity through purified bauxite

27 Which row shows uses of the metals listed?

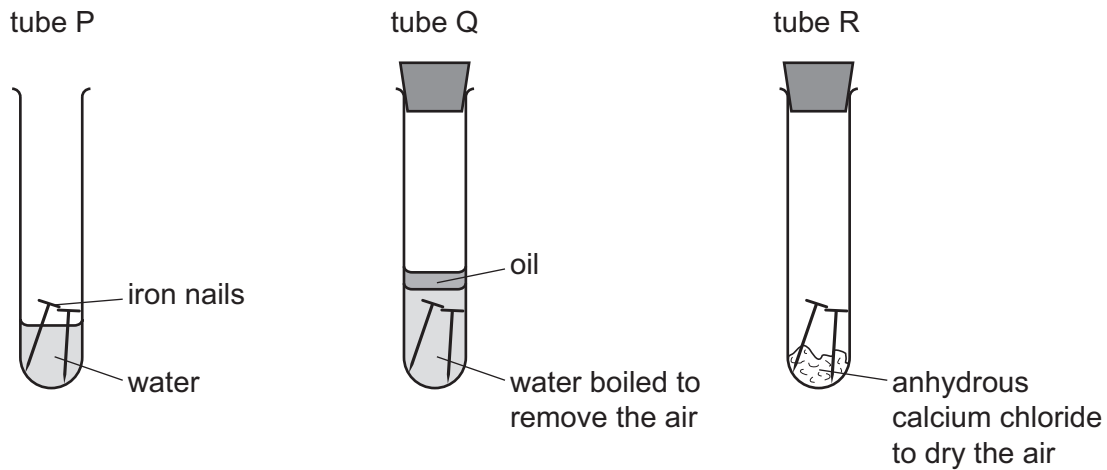
	aluminum	copper	mild steel
A	aircraft manufacture	food containers	cutlery
B	cutlery	electrical wiring	chemical plant
C	electrical wiring	aircraft manufacture	cooking utensils
D	food containers	cooking utensils	car bodies

28 Argon is a noble gas used to fill light bulbs.

What is the approximate percentage of argon in air?

- A 1%
- B 20%
- C 79%
- D 99%

29 The diagrams show experiments involving the rusting of iron.



A student predicted the following results.

- 1 In tube P, the iron nails rust.
- 2 In tube Q, the iron nails do not rust.
- 3 In tube R, the iron nails do not rust.

Which predictions are correct?

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

30 Which statement about air pollutants is **not** correct?

- A** Carbon monoxide is formed from the complete combustion of petroleum.
B Lead compounds are formed from some types of petrol.
C Oxides of nitrogen are formed from the combustion reactions inside car engines.
D Sulfur dioxide is formed from the combustion of coal.

31 The table describes three types of water.

water type	source of water	appearance before treatment	treatment	appearance after treatment
P	river	muddy	none	muddy
Q	river	muddy	filtration and chlorination	clear
R	well	clear	chlorination only	clear

Which statement is correct?

- A Only Q and R are suitable for drinking, while P could be used for irrigation.
- B Only Q and R are suitable for drinking, while P is unsuitable for any purpose.
- C Only Q is suitable for drinking. R could be used for washing cars and P for irrigation.
- D P, Q and R are suitable for irrigation and washing cars, but are not suitable for drinking.

32 Which compound would **not** be used as an important part of a garden fertilizer?

- A $\text{Ca}_3(\text{PO}_4)_2$ B KNO_3 C $\text{Mg}(\text{OH})_2$ D $(\text{NH}_4)_2\text{SO}_4$

33 Carbon dioxide and methane both contribute to climate change.

Which process produces both gases?

- A complete combustion of natural gas
- B farming cattle
- C heating calcium carbonate
- D respiration

34 Which reaction is endothermic?

- A $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
- B $\text{CaO} + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2\text{O}$
- C $2\text{Ca} + \text{O}_2 \rightarrow 2\text{CaO}$
- D $\text{Ca} + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2$

35 Petroleum is a mixture of different hydrocarbons.

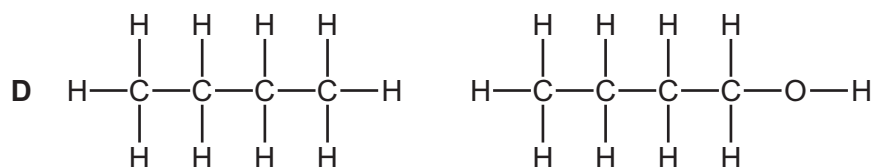
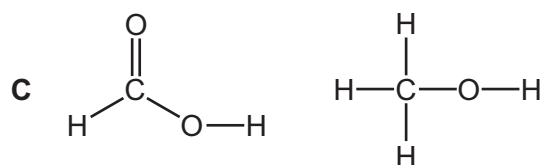
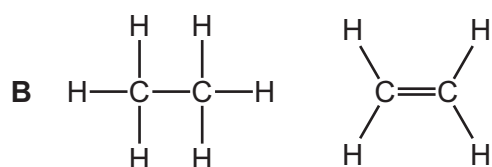
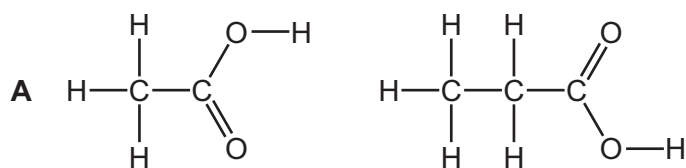
Which process is used to separate the petroleum into groups of similar hydrocarbons?

- A combustion
- B cracking
- C fractional distillation
- D reduction

36 Which two compounds are molecules which both contain a double bond?

- A ethane and ethanoic acid
- B ethane and ethanol
- C ethene and ethanoic acid
- D ethene and ethanol

37 Which pair of diagrams shows compounds belonging to the same homologous series?



38 Ethanol can be formed by:

- 1 fermentation
- 2 reaction between steam and ethene.

Which of these processes use a catalyst?

	1	2
A	✓	✓
B	✓	x
C	x	✓
D	x	x

39 Which statement about ethanoic acid is correct?

- A** It fizzes with magnesium ribbon.
- B** It forms a salt with hydrochloric acid.
- C** It is a hydrocarbon.
- D** It forms a solution in water with a pH greater than pH 7.

40 Which statement about *Terylene* is correct?

- A** It is a form of protein.
- B** It is a natural polymer.
- C** It is also called poly(ethene).
- D** It is used to make clothes.

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The Periodic Table of Elements

		Group																																																																																																																																																																																																																																																																																																												
I	II	III	IV	V	VI	VII	VIII																																																																																																																																																																																																																																																																																																							
3 Li lithium 7	4 Be beryllium 9	1 H hydrogen 1	5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20																																																																																																																																																																																																																																																																																																						
11 Na sodium 23	12 Mg magnesium 24	Key atomic number atomic symbol name relative atomic mass																																																																																																																																																																																																																																																																																																												
19 K potassium 39	20 Ca calcium 40	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84																																																																																																																																																																																																																																																																																																		
37 Rb rubidium 85	38 Sr strontium 88	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131																																																																																																																																																																																																																																																																																																		
55 Cs cesium 133	56 Ba barium 137	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —																																																																																																																																																																																																																																																																																																		
87 Fr francium —	88 Ra radium —	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	116 Lv livermorium —	—																																																																																																																																																																																																																																																																																																		
57 La lanthanum 139	89 Ac actinium —	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84																																																																																																																																																																																																																																																																																													
58 Ce cerium 140	90 Th thorium 232	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131																																																																																																																																																																																																																																																																																													
59 Pr praseodymium 141	91 Pa protactinium 231	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —																																																																																																																																																																																																																																																																																													
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89 La lanthanum 139	90 Th thorium 232	91 Pr praseodymium 141	92 Nd neodymium 144	93 Pm promethium —	94 Pu plutonium 238	95 Am americium —	96 Cm curium —	97 Bk berkelium —	98 Cf californium —	99 Es einsteinium —	100 Fm fermium —	101 Md mendelevium —	102 No nobelium —	103 Lr lawrencium —	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	113 Nh nihonium —	114 Fl flerovium —	115 Mc moscovium —	116 Lv livermorium —	117 Ts tennessine —	118 Og oganesson —	119 Uu unbinilium —	120 Uub unbinilium —	121 Uut unbinilium —	122 Uuq unbinilium —	123 Uuq unbinilium —	124 Uuq unbinilium —	125 Uuq unbinilium —	126 Uuq unbinilium —	127 Uuq unbinilium —	128 Uuq unbinilium —	129 Uuq unbinilium —	130 Uuq unbinilium —	131 Uuq unbinilium —	132 Uuq unbinilium —	133 Uuq unbinilium —	134 Uuq unbinilium —	135 Uuq unbinilium —	136 Uuq unbinilium —	137 Uuq unbinilium —	138 Uuq unbinilium 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