



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.

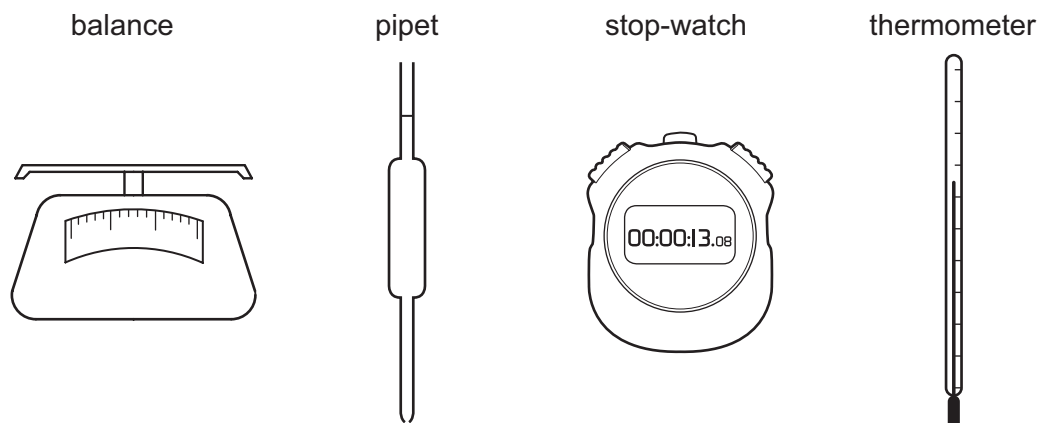
Which row describes the effects on the particles?

	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 simplified periodic table with 18 columns and 5 rows. The elements Te and I are located in the 4th row, 16th and 17th columns respectively. There is a gap in the 2nd row between the 10th and 11th columns, and another gap in the 3rd row between the 10th and 11th columns. The labels 'Te' and 'I' are placed in the 16th and 17th columns of the 4th row.

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?

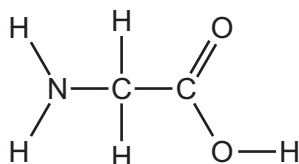
- A calcium chloride
- B diamond
- C iron
- D silver chloride

- 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

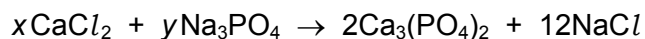
- 8 The structure of glycine is shown.



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?

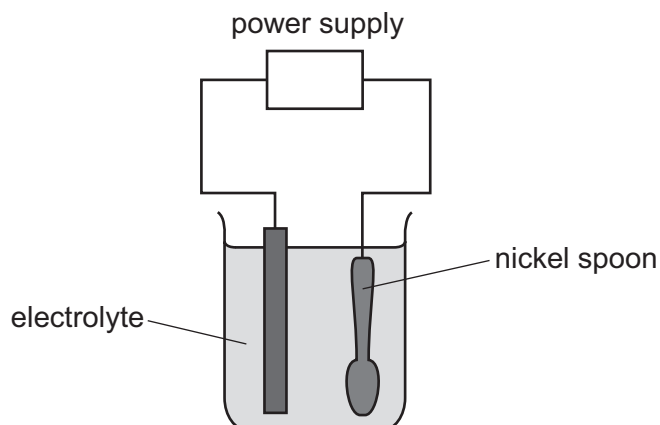
	x	y
A	2	2
B	3	4
C	6	3
D	6	4

- 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.



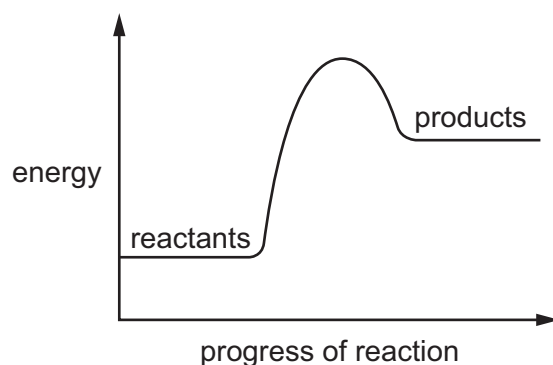
Which row correctly describes the positive electrode, the negative electrode and the electrolyte?

	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	✓

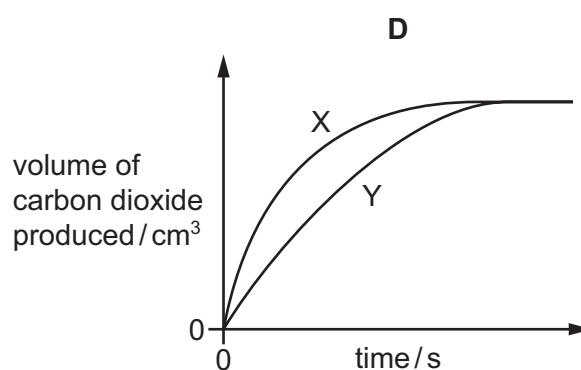
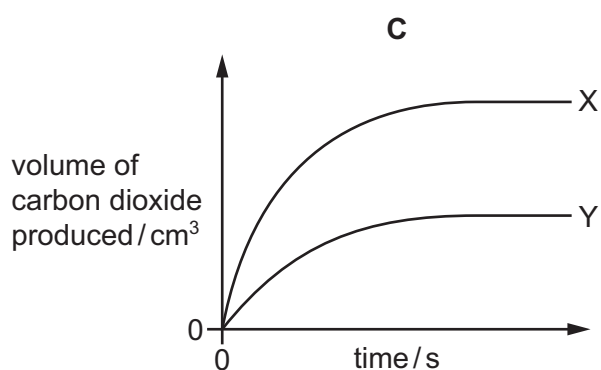
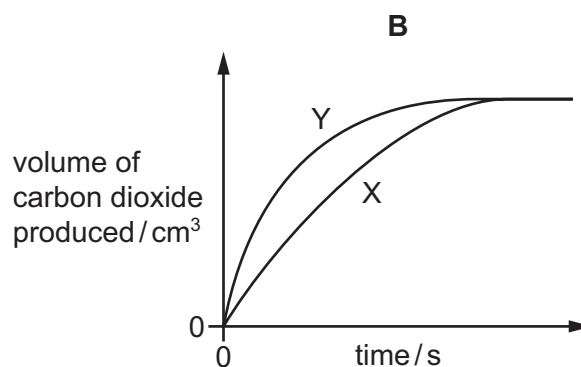
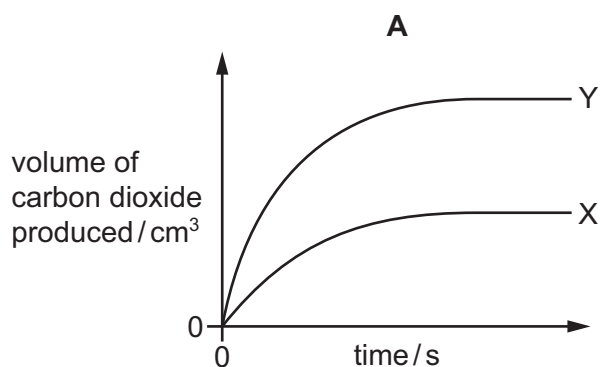
15 Which equation shows reduction of an iron compound?

- 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?

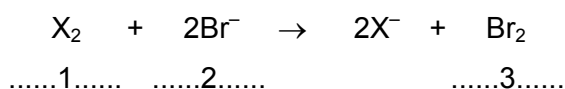
- A It can be used to find the atomic number of an element.
- B It can be used to find the physical state of an element.
- C It can be used to find the symbol of an element.
- D It can be used to predict the properties of an element.

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?

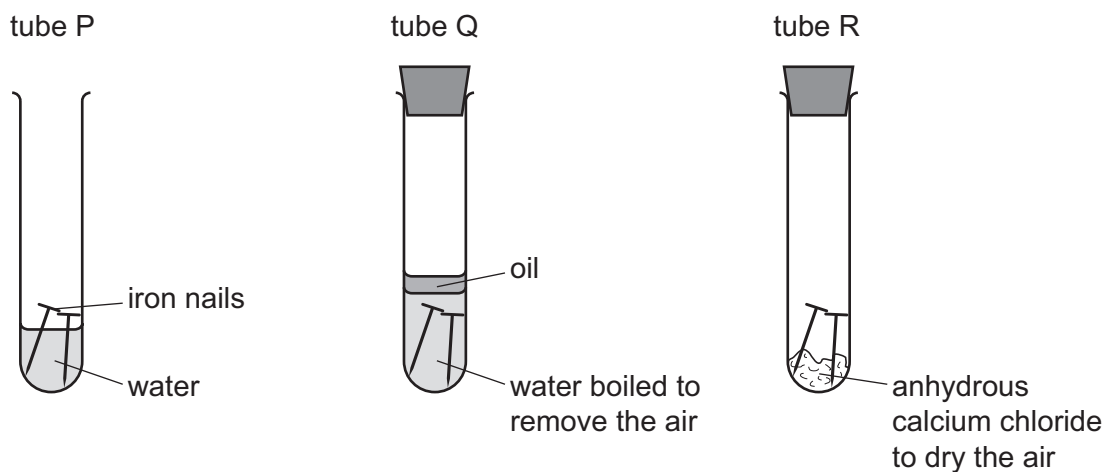
	aluminum	copper	mild steel
A	aircraft manufacture	food containers	cutlery
B	cutlery	electrical wiring	chemical plant
C	electrical wiring	aircraft manufacture	cooking utensils
D	food containers	cooking utensils	car bodies

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.

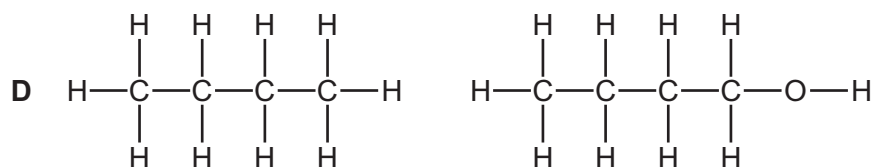
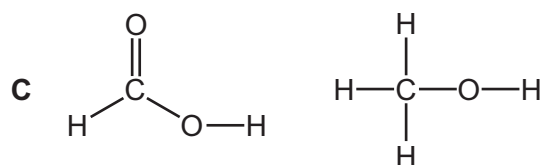
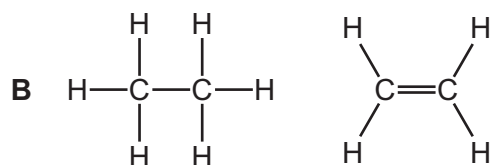
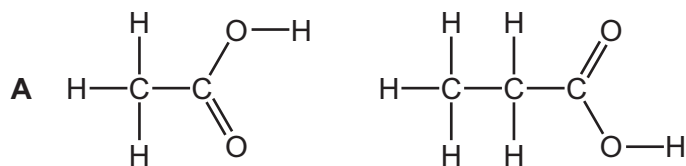
Which process is used to separate the petroleum into groups of similar hydrocarbons?

- 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	11 Na sodium 23	12 Mg magnesium 24	19 K potassium 39	20 Ca calcium 40	37 Rb rubidium 85	55 Cs cesium 133	87 Fr francium —	1 H hydrogen 1	2 He helium 4			
57 La lanthanum 139	89 Ac actinium —	72 Hf hafnium 178	74 W tungsten 184	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	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 —
58 Ce cerium 140	90 Th thorium 232	73 Ta tantalum 181	75 Re rhenium 186	79 Au gold 197	80 Cd cadmium 112	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —	87 Fr francium —	88 Ra radium —	89 Ac actinium —
59 Pr praseodymium 141	91 Pa protactinium 231	74 Zr zirconium 91	76 Ru ruthenium 101	77 Rh rhodium 103	78 Pd palladium 106	80 Zn zinc 65	81 In indium 115	82 Sn tin 119	83 Sb antimony 122	84 Te tellurium 128	85 I iodine 127	86 Xe xenon 131	87 Cs cesium 133
60 Nd neodymium 144	92 U uranium 238	75 Nb niobium 93	77 Tc technetium —	78 Pt platinum 195	80 Zn zinc 65	81 In indium 115	82 Sn tin 119	83 Sb antimony 122	84 Te tellurium 128	85 I iodine 127	86 Xe xenon 131	87 Cs cesium 133	88 Ra radium —
61 Pm promethium —	93 Np neptunium —	76 Fe iron 56	77 Co cobalt 59	78 Ni nickel 59	80 Zn zinc 65	81 In indium 115	82 Sn tin 119	83 Sb antimony 122	84 Te tellurium 128	85 I iodine 127	86 Xe xenon 131	87 Cs cesium 133	88 Ra radium —
62 Sm samarium 150	94 Pu plutonium —	78 Os osmium 190	79 Ir iridium 192	80 Pt platinum 195	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —	87 Cs cesium 133	88 Ra radium —	89 Ac actinium —	90 Th thorium 232
63 Eu europium 152	95 Am americium —	79 Au gold 197	80 Cd cadmium 112	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —	87 Cs cesium 133	88 Ra radium —	89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231
64 Gd gadolinium 157	96 Cm curium —	80 Zn zinc 65	81 In indium 115	82 Sn tin 119	83 Sb antimony 122	84 Po polonium —	85 At astatine —	86 Rn radon —	87 Cs cesium 133	88 Ra radium —	89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231
65 Tb terbium 159	97 Bk berkelium —	81 In indium 115	82 Sn tin 119	83 Sb antimony 122	84 Po polonium —	85 At astatine —	86 Rn radon —	87 Cs cesium 133	88 Ra radium —	89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238
66 Dy dysprosium 163	98 Cf californium —	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —	87 Cs cesium 133	88 Ra radium —	89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium —
67 Ho holmium 165	99 Es einsteinium —	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —	87 Cs cesium 133	88 Ra radium —	89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium —	94 Pu plutonium —
68 Er erbium 167	100 Fm fermium —	84 Po polonium —	85 At astatine —	86 Rn radon —	87 Cs cesium 133	88 Ra radium —	89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium —	94 Pu plutonium —	95 Am americium —
69 Tm thulium 169	101 Md mendelevium —	85 I iodine 127	86 Xe xenon 131	87 Cs cesium 133	88 Ra radium —	89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium —	94 Pu plutonium —	95 Am americium —	96 Cm curium —
70 Yb ytterbium 173	102 No nobelium —	86 Xe xenon 131	87 Cs cesium 133	88 Ra radium —	89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium —	94 Pu plutonium —	95 Am americium —	96 Cm curium —	97 Bk berkelium —
71 Lu lutetium 175	103 Lr lawrencium —	87 Cs cesium 133	88 Ra radium —	89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium —	94 Pu plutonium —	95 Am americium —	96 Cm curium —	97 Bk berkelium —	98 Cf californium —

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids

actinoids

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).