



Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

0653/12

Paper 1 Multiple Choice (Core)

May/June 2019

45 minutes

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

* 5 0 4 5 7 7 6 2 1 7 *



READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

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

Write your name, centre 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 **15** printed pages and **1** blank page.



1 What are the outermost layers of an animal cell and a plant cell?

	animal cell	plant cell
A	cell membrane	cell membrane
B	cell membrane	cell wall
C	cell wall	cell membrane
D	cell wall	cell wall

2 What is a definition of the net movement of molecules by diffusion?

- A** movement down a concentration gradient from a higher to lower concentration
- B** movement down a concentration gradient from a lower to higher concentration
- C** movement up a concentration gradient from a higher to lower concentration
- D** movement up a concentration gradient from a lower to higher concentration

3 Which row shows the elements contained in a fat molecule?

	carbon	hydrogen	nitrogen	oxygen
A	✓	✓	✓	✓
B	✓	x	✓	x
C	✓	✓	x	✓
D	x	✓	✓	✓

4 Which two components of cow's milk are essential for strong teeth and bones?

- A** minerals and vitamins
- B** fats and proteins
- C** carbohydrates and vitamins
- D** minerals and water

5 What is a function of the small intestine?

- A** It cuts food into small pieces.
- B** It provides a large surface area for absorption.
- C** It provides space for the storage of faeces.
- D** It stores food.

6 What is the route for carbon dioxide passing out of the body?

- A** alveoli → capillaries → bronchioles → bronchi → trachea → larynx
B alveoli → capillaries → bronchi → bronchioles → larynx → trachea
C capillaries → alveoli → bronchi → bronchioles → trachea → larynx
D capillaries → alveoli → bronchioles → bronchi → trachea → larynx

7 How does adrenaline affect blood glucose concentration and pulse rate?

	blood glucose concentration	pulse rate
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

8 Diagram 1 shows a growing seedling after the first few days' growth.

The seedling was then rotated, held in the position shown in diagram 2 and placed in the dark for three days.

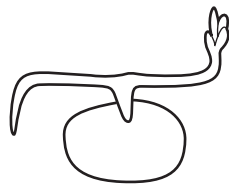


diagram 1

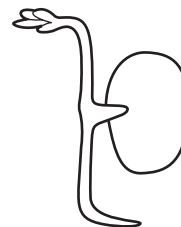


diagram 2

What is the shape of the seedling three days later?

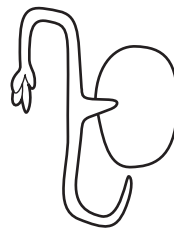
A



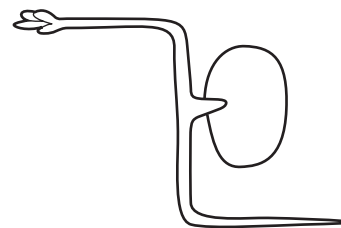
B



C



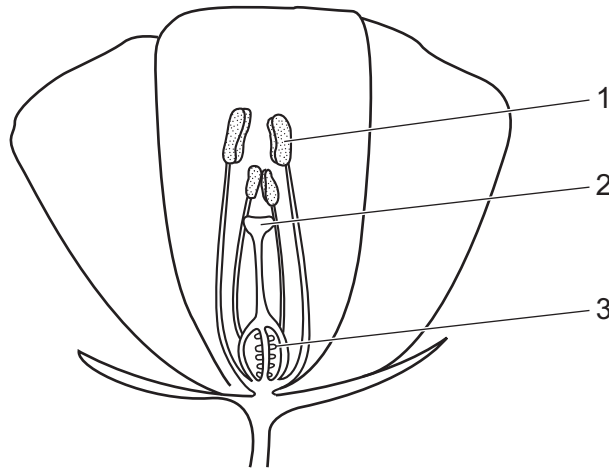
D



9 What are the features of sexual reproduction?

	fusion of nuclei	nature of offspring
A	no	genetically dissimilar
B	yes	genetically identical
C	no	genetically identical
D	yes	genetically dissimilar

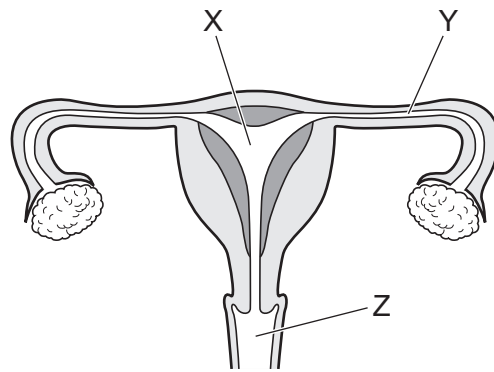
10 The diagram shows half a flower.



Where are the female and male gametes made?

	female	male
A	1	2
B	1	3
C	2	1
D	3	1

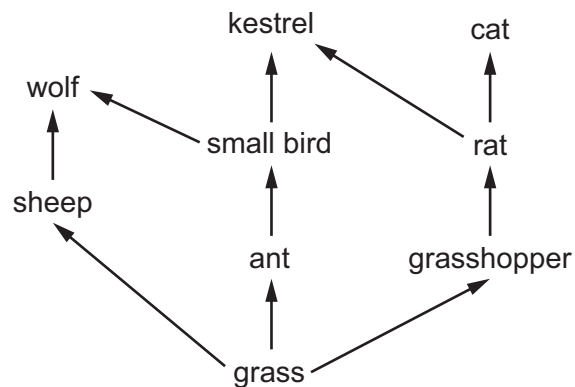
11 The diagram shows the female reproductive system.



What are the functions of the parts labelled X, Y, and Z?

	X	Y	Z
A	development of fetus	release of female gametes	ring of muscle at opening of uterus
B	development of fetus	site of fertilisation	receives penis during intercourse
C	receives penis during intercourse	release of female gametes	ring of muscle at opening of uterus
D	receives penis during intercourse	site of fertilisation	development of fetus

12 The diagram represents several food chains in a food web.

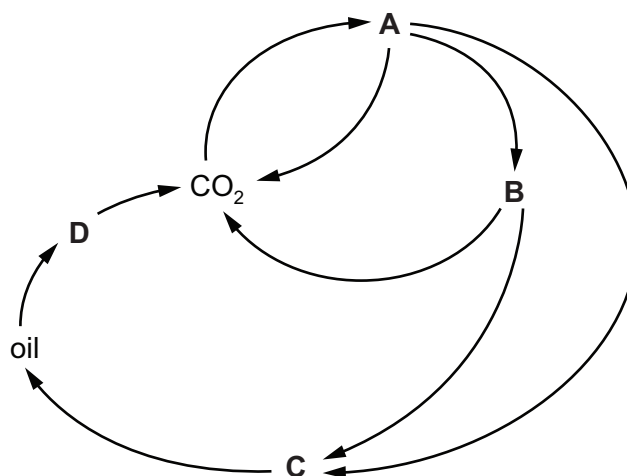


How many different food chains are there in the food web shown?

- A** 3 **B** 4 **C** 5 **D** 9

13 The diagram represents the carbon cycle.

Which letter represents combustion?



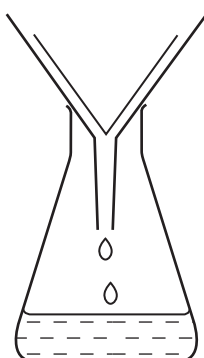
14 A molecule of hydrogen has the formula H_2 .

A molecule of a protein contains several different elements.

Which statement about these molecules is correct?

- A They both contain cations and anions bonded together.
- B They both contain different types of atom.
- C They both contain more than one atom bonded together.
- D They both contain only one type of atom.

15 The diagram shows apparatus used for filtration.



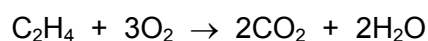
Why can sugar and salt **not** be separated by using this apparatus?

- A They are both compounds.
- B They are both white.
- C They both dissolve in water.
- D They both have the same size particles.

16 Which row about each substance is correct?

	substance	type of bonding	description of bonds	other information
A	ammonia	covalent	three shared pairs of electrons	all atoms have full outer electron shells
B	lithium fluoride	covalent	one shared pair of electrons	both atoms have noble gas electronic structure
C	potassium iodide	ionic	electron transfer from potassium to iodine	volatile compound
D	water	ionic	electron transfer from hydrogen to oxygen	non-volatile compound

17 The equation for the combustion of ethene is shown.



Which statement about this reaction is **not** correct?

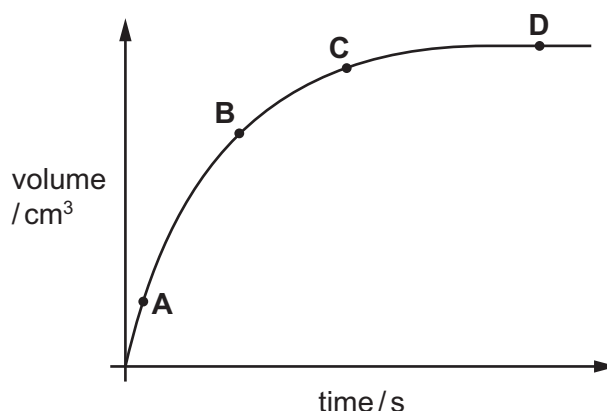
- A** More oxygen molecules than ethene molecules are used.
- B** The number of carbon dioxide molecules formed is equal to the number of water molecules formed.
- C** The number of carbon dioxide molecules formed is the same as the number of ethene molecules used.
- D** The total number of molecules formed is the same as the total number of molecules used.

18 Which row identifies the products of electrolysis for the named electrolyte?

	electrolyte	product at anode	product at cathode
A	concentrated aqueous sodium chloride	chlorine	sodium
B	dilute sulfuric acid	hydrogen	oxygen
C	dilute sulfuric acid	sulfur dioxide	hydrogen
D	molten lead(II) bromide	bromine	lead

- 19 The graph shows the volume of hydrogen gas produced when dilute hydrochloric acid reacts with zinc.

At which point is the rate of reaction greatest?



- 20 The equations for two redox reactions are shown.



Which row is correct?

	substance being reduced in reaction 1	substance being oxidised in reaction 2
A	CuO	C
B	CO	CO ₂
C	CO	C
D	CuO	CO ₂

- 21 Which aqueous ion gives a white precipitate with aqueous sodium hydroxide and with aqueous ammonia?

A Cu²⁺ **B** Fe²⁺ **C** Fe³⁺ **D** Zn²⁺

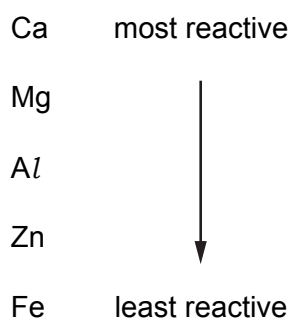
- 22 Which row describes the physical state of the Group VII elements at room temperature?

	chlorine	bromine	iodine
A	gas	gas	liquid
B	gas	liquid	solid
C	liquid	liquid	gas
D	liquid	solid	solid

23 Which two elements do **not** form an alloy?

- A carbon and sulfur
- B carbon and iron
- C copper and zinc
- D silver and gold

24 Part of the reactivity series is shown.



Which metals can be produced by reduction of their oxide using carbon?

- A calcium and magnesium
- B magnesium and aluminium
- C aluminium and zinc
- D zinc and iron

25 Which gas is a greenhouse gas?

- A argon
- B carbon monoxide
- C methane
- D nitrogen

26 Which statement shows that petroleum is a mixture?

- A Petroleum can be burned as a fuel.
- B Petroleum can be separated into fractions by distillation.
- C Petroleum is a fossil fuel formed over millions of years.
- D Petroleum is a thick, black liquid.

27 Which statement about alkanes is correct?

- A Alkanes are compounds containing carbon, hydrogen and oxygen.
- B Alkanes are saturated hydrocarbons.
- C Ethane is used to make poly(ethene).
- D Methane is the only alkane that does not contain a double bond.

28 A vehicle is taken from the Earth to the Moon where the gravitational field strength is weaker.

How do the mass and the weight of the vehicle on the Moon compare with their values on the Earth?

- A smaller mass and smaller weight
- B smaller mass and the same weight
- C the same mass and smaller weight
- D the same mass and the same weight

29 Two properties of a gas are its mass and its volume.

Which properties can be changed by a force?

	mass	volume
A	✓	✓
B	✓	x
C	x	✓
D	x	x

key

✓ = can be changed

x = cannot be changed

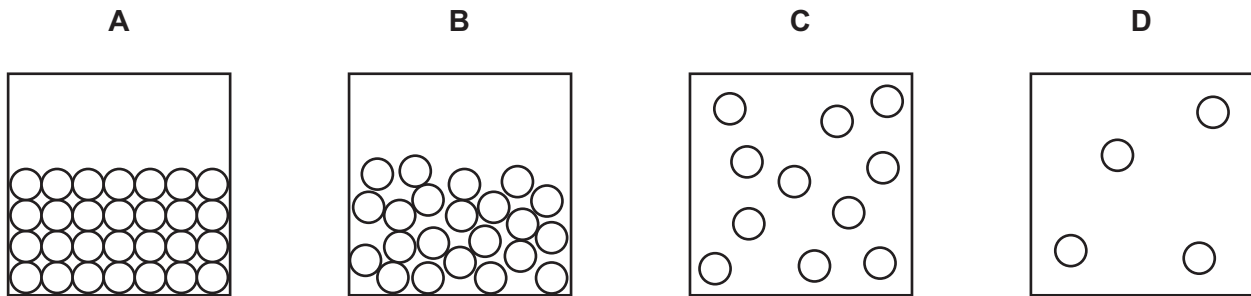
30 What energy does an object have because of its position above the surface of the Earth?

- A chemical potential
- B gravitational potential
- C kinetic
- D thermal

31 Which mode of transport uses a renewable energy source?

- A a coal-fired steam train
- B a nuclear-powered submarine
- C a petrol-engined car
- D a sailing boat moved by the wind

32 Which diagram shows the molecular structure of a liquid?



33 Benzene and glycerine are two substances.

The table gives the melting point and the boiling point of benzene and of glycerine.

	melting point/ $^{\circ}\text{C}$	boiling point/ $^{\circ}\text{C}$
benzene	5.4	80
glycerine	18	290

At which temperature are both benzene and glycerine liquid?

- A** 0°C **B** 50°C **C** 90°C **D** 300°C

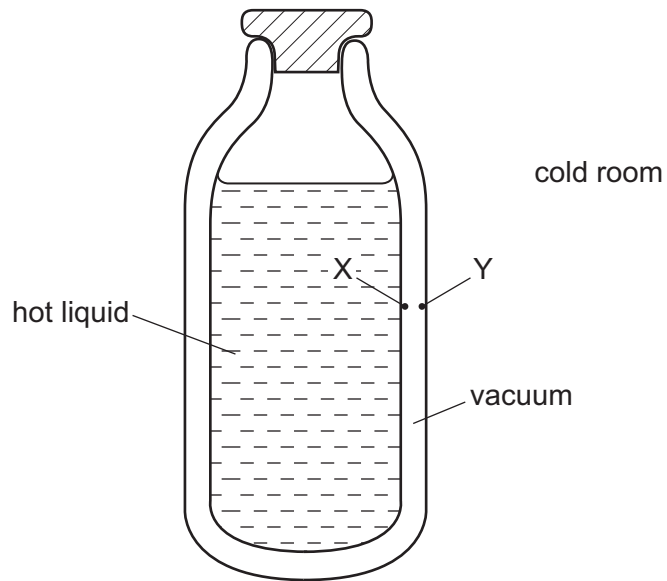
34 A solid is heated.

Which two properties of the solid **both** change as a result?

- A** density and volume
B density and weight
C mass and volume
D mass and weight

35 The diagram shows a vacuum flask containing a hot liquid in a cold room.

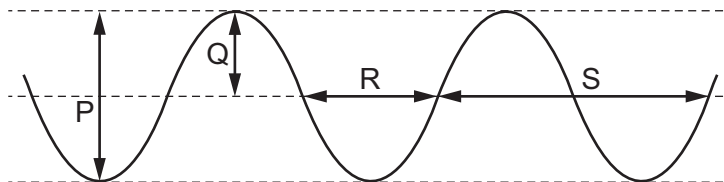
X and Y are points on the inside surfaces of the walls of the flask.



How is thermal energy transferred through the vacuum between X and Y?

- A by conduction and convection
- B by conduction only
- C by radiation and convection
- D by radiation only

36 The diagram represents a wave at one moment.

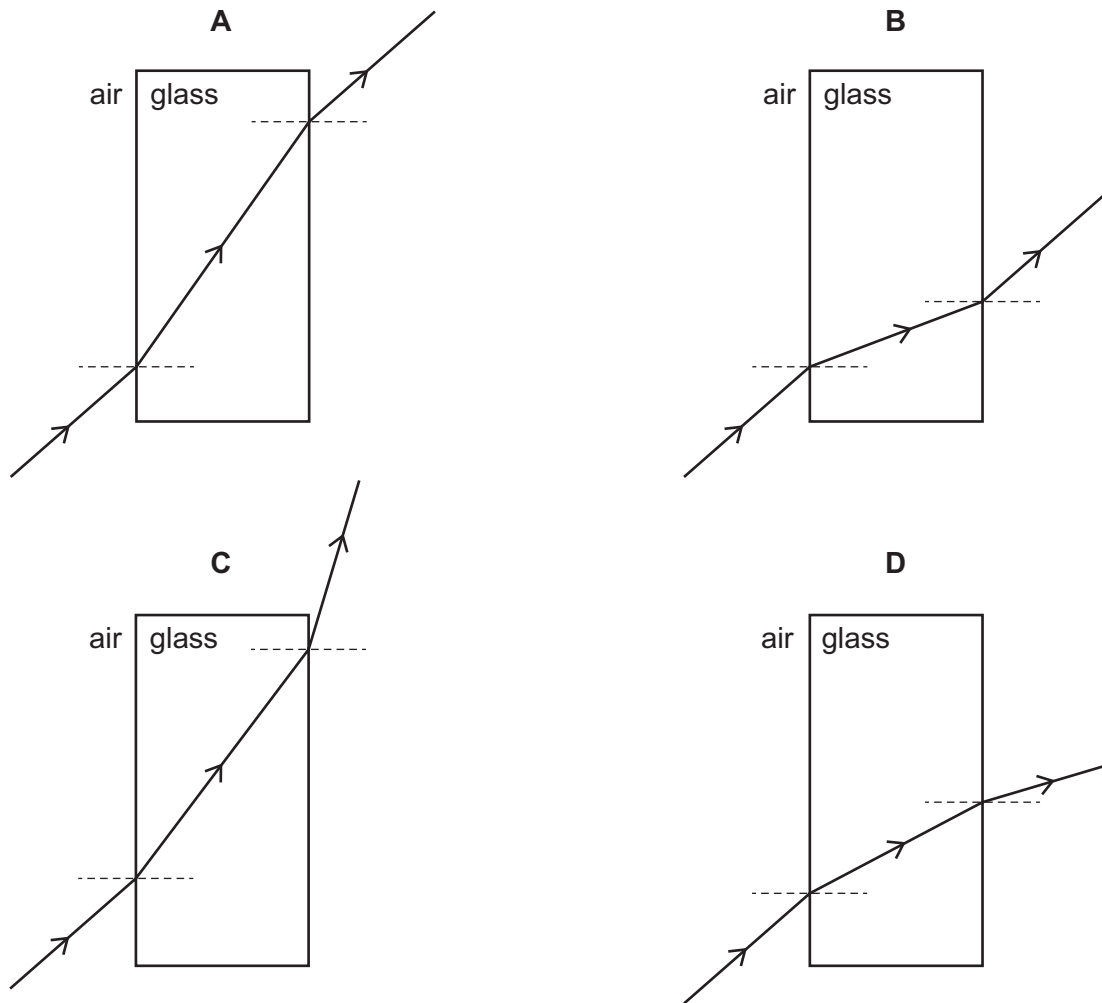


Which labelled arrows represent the amplitude and the wavelength of the wave?

	amplitude	wavelength
A	P	R
B	P	S
C	Q	R
D	Q	S

37 Light passes through a parallel-sided block of glass.

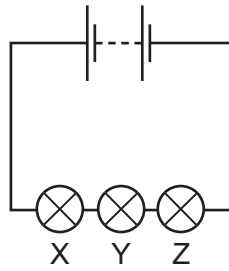
Which diagram shows how the light passes through the block?



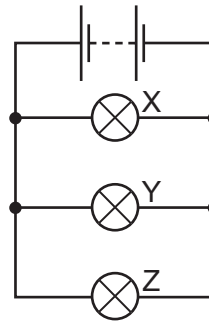
38 What is the unit of electromotive force (e.m.f.) and what is used to measure it?

	unit	measuring instrument
A	newton	newton meter
B	newton	voltmeter
C	volt	newton meter
D	volt	voltmeter

- 39 The diagrams show two ways in which three lamps X, Y and Z may be connected.



circuit 1



circuit 2

Which statement is correct?

- A If lamp Y breaks in circuit 1, both the other lamps go off.
 - B If lamp Y breaks in circuit 2, both the other lamps go off.
 - C If lamp Y breaks in circuit 1, lamp Z goes off, but lamp X remains on.
 - D If lamp Y breaks in circuit 2, lamp Z goes off, but lamp X remains on.
- 40 A mains circuit can safely supply a current of up to 40 A.

The current in a hairdryer is 2 A when it is operating normally. The hairdryer is connected to the mains by a lead which can safely carry up to 5 A.

What is the correct fuse to protect the hairdryer?

- A 1 A fuse
- B 3 A fuse
- C 10 A fuse
- D 50 A fuse

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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	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> Key atomic number atomic symbol name relative atomic mass </div>										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											1 H hydrogen 1	13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5
19 K potassium 39	20 Ca calcium 40	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
37 Rb rubidium 85	38 Sr strontium 88	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
55 Cs caesium 133	56 Ba barium 137	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 —
87 Fr francium —	88 Ra radium —	89–103 actinoids	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 —	114 Fl flerovium —	116 Lv livermorium —	—	—	—	—

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium —	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	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 —	99 Es einsteinium —	100 Fm fermium —	101 Md mendelevium —	102 No nobelium —	103 Lr lawrencium —

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