



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

**CO-ORDINATED SCIENCES**

**0654/11**

Paper 1 Multiple Choice

**May/June 2015**

**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, 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 20.

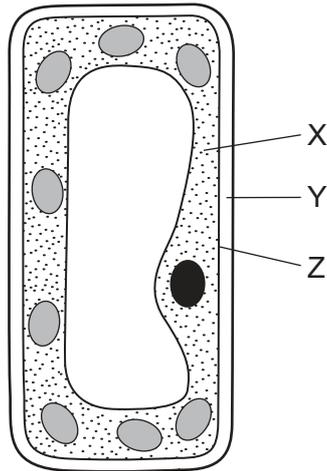
Electronic calculators may be used.

This document consists of **19** printed pages and **1** blank page.

1 Which is a characteristic of all living things?

- A a heart
- B breathing
- C excretion
- D sexual reproduction

2 The diagram shows a typical plant cell.



Which row is correct?

	cell membrane	cell wall	cytoplasm
<b>A</b>	X	Y	Z
<b>B</b>	X	Z	Y
<b>C</b>	Z	X	Y
<b>D</b>	Z	Y	X

3 What is diffusion?

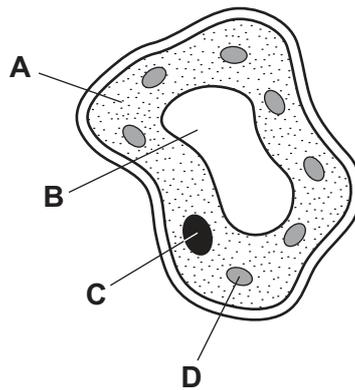
- A the net movement of molecules from a region of their higher concentration to a region of their lower concentration down a concentration gradient
- B the net movement of molecules from a region of their higher concentration to a region of their lower concentration up a concentration gradient
- C the net movement of molecules from a region of their lower concentration to a region of their higher concentration down a concentration gradient
- D the net movement of molecules from a region of their lower concentration to a region of their higher concentration up a concentration gradient

4 What is an enzyme?

- A a carbohydrate that assists in the digestion of the contents of the stomach
- B a chemical that absorbs light for photosynthesis
- C a chemical that alters the activity of a target organ
- D a protein that alters the rate of a chemical reaction

5 The diagram shows a section through a cell from a leaf.

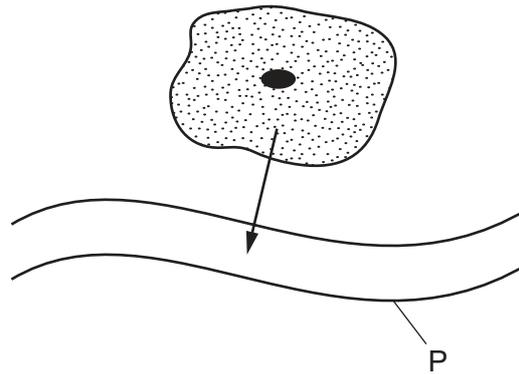
Which part makes simple sugars using light?



6 In a balanced diet, which constituents provide most energy?

- A carbohydrate and protein
- B fat and carbohydrate
- C fat and fibre
- D vitamins and protein

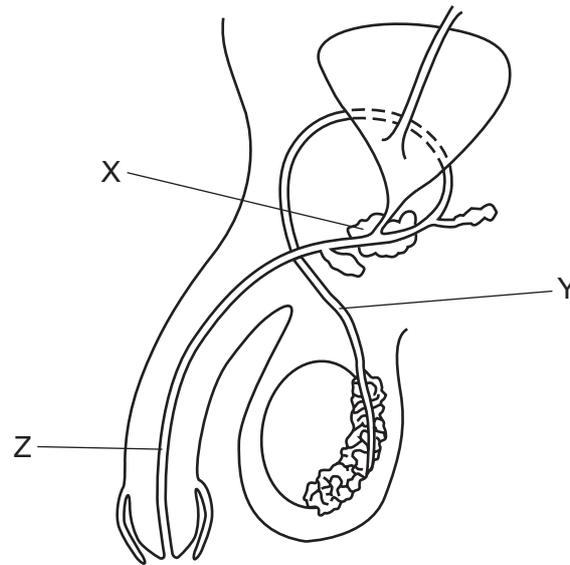
- 7 The arrow shows urea leaving a cell and passing into structure P.



What is P?

- A a capillary
  - B an artery
  - C a vein
  - D the small intestine
- 8 A person touches a hot object which triggers a reflex action.
- In which order does the signal travel in the reflex arc?
- A relay neurone → spinal cord → sensory neurone
  - B sensory neurone → spinal cord → motor neurone
  - C spinal cord → sensory neurone → stimulus
  - D stimulus → motor neurone → spinal cord

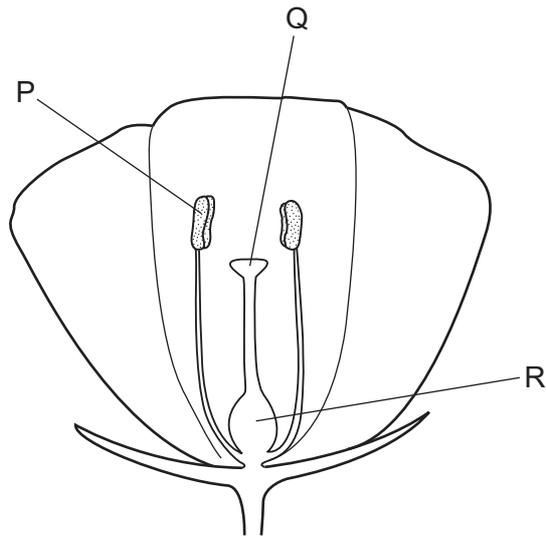
9 The diagram shows the male reproductive system.



Which row identifies structures X, Y and Z?

	urethra	sperm duct	prostate gland
<b>A</b>	X	Y	Z
<b>B</b>	X	Z	Y
<b>C</b>	Z	X	Y
<b>D</b>	Z	Y	X

10 The diagram shows a section through an insect-pollinated flower.



What are the functions of P, Q and R?

	P	Q	R
<b>A</b>	to produce ovules	to produce pollen	to receive pollen
<b>B</b>	to produce pollen	to produce ovules	to receive pollen
<b>C</b>	to produce pollen	to receive pollen	to produce ovules
<b>D</b>	to receive pollen	to produce pollen	to produce ovules

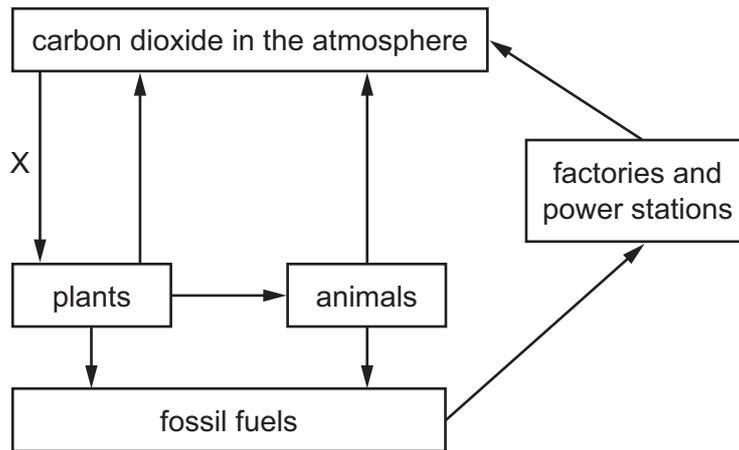
11 Which process is responsible for the flow of energy along a food chain?

- A** excretion
- B** feeding
- C** respiration
- D** seed dispersal

12 Which gas has the biggest greenhouse effect?

- A** carbon monoxide
- B** methane
- C** nitrogen
- D** oxygen

13 The diagram shows part of the carbon cycle.

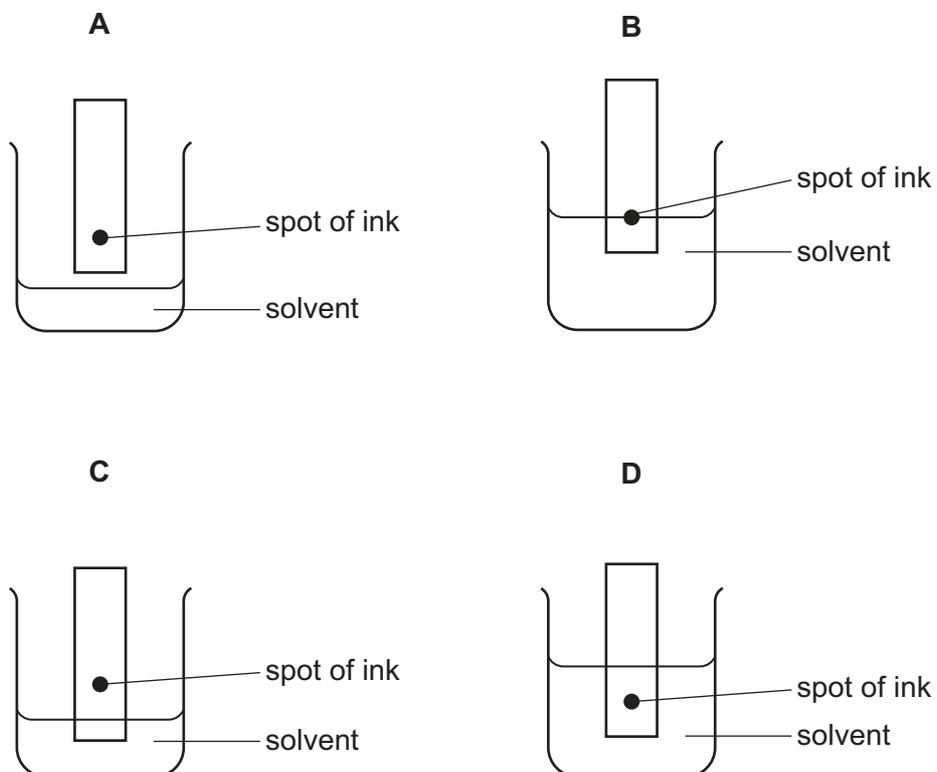


What process does X represent?

- A combustion
- B decay
- C photosynthesis
- D respiration

14 The colours in an ink can be separated by chromatography.

Which diagram shows the correct way to set up the apparatus?





19 Hydrogen and oxygen react explosively to form water.

Which words describe this reaction?

	combustion	oxidation
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

key

✓ = yes

x = no

20 Four substances are added to an acid.

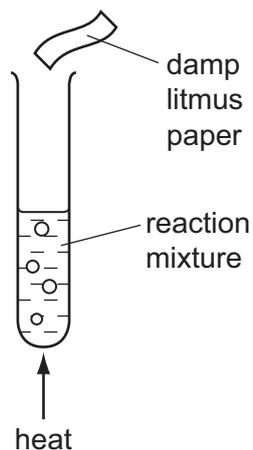
The substances are

- 1 calcium oxide
- 2 magnesium carbonate
- 3 sodium chloride
- 4 sodium hydroxide

Which substances neutralise the acid?

- A** 1 only      **B** 1, 2 and 4      **C** 3 and 4      **D** 4 only

21 The diagram shows a chemical reaction that produces a gas.



The gas bleaches damp litmus paper.

What is the gas?

- A ammonia
  - B chlorine
  - C hydrogen
  - D oxygen
- 22 Which statement about the elements in Group VII of the Periodic Table is correct?
- A Chlorine displaces bromine from potassium bromide.
  - B The colour of the elements becomes darker up the group.
  - C The melting point of the elements decreases down the group.
  - D The reactivity of the elements increases down the group.

23 The table shows information about some minerals.

mineral	chemical formula
bauxite	$Al_2O_3$
galena	PbS
hematite	$Fe_2O_3$
rutile	$TiO_2$

Which minerals contain a transition element?

- A bauxite and galena
- B bauxite and hematite
- C galena and rutile
- D hematite and rutile

24 Two tests are done on material Y.

The tests show that Y conducts electricity and is soft.

What is Y?

- A copper
- B lithium
- C sodium chloride
- D sulfur

25 Which process does **not** produce carbon dioxide?

- A complete combustion of fossil fuels
- B reaction of an acid with a carbonate
- C respiration in plants
- D rusting iron

26 Lime is manufactured from limestone and is used for treating industrial waste.

Which row describes the type of reaction involved in the manufacture of lime and in the treatment of industrial waste?

	manufacture	waste treatment
<b>A</b>	reduction	neutralisation
<b>B</b>	reduction	oxidation
<b>C</b>	thermal decomposition	neutralisation
<b>D</b>	thermal decomposition	oxidation

27 A fuel used for cooking food is the hydrocarbon ...1... that burns in an ...2... reaction.

Which words correctly complete gaps 1 and 2?

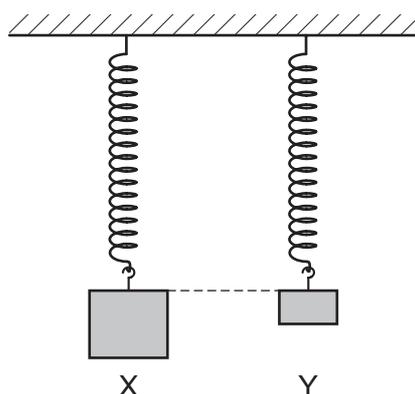
	1	2
<b>A</b>	coke	endothermic
<b>B</b>	coke	exothermic
<b>C</b>	methane	endothermic
<b>D</b>	methane	exothermic

28 The circuit of a motor racing track is 3.0 km in length. In a race, a car goes 25 times round the circuit in 30 minutes.

What is the average speed of the car?

- A** 75 km/hour
- B** 90 km/hour
- C** 150 km/hour
- D** 750 km/hour

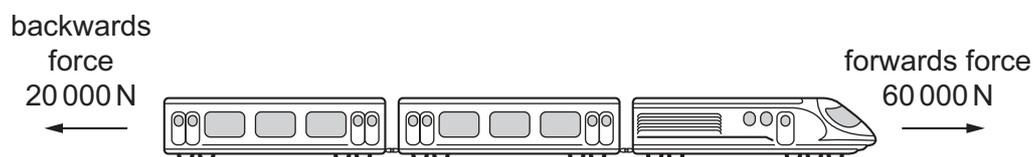
- 29 Two objects X and Y are suspended from identical springs. Both springs extend by the same amount.



What does this show about the masses and about the weights of objects X and Y?

	masses	weights
<b>A</b>	mass X is greater than mass Y	weight X is greater than weight Y
<b>B</b>	mass X is greater than mass Y	weight X is equal to weight Y
<b>C</b>	mass X is equal to mass Y	weight X is equal to weight Y
<b>D</b>	mass X is equal to mass Y	weight X is less than weight Y

- 30 A train travels along a horizontal track at constant speed. Two of the forces acting on the train are shown in the diagram.

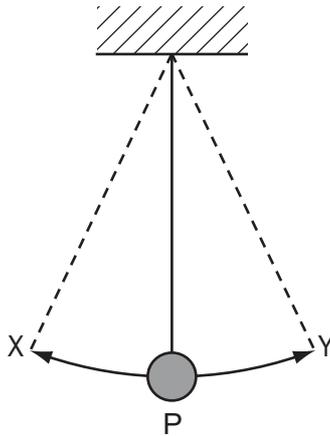


A force of air resistance is also acting on the train to give it a resultant force of zero.

What is this air resistance force?

- A** 40 000 N backwards
- B** 80 000 N backwards
- C** 40 000 N forwards
- D** 80 000 N forwards

- 31 The diagram shows an object attached to a thread, swinging between point X and point Y, passing through point P.



Which row best describes the kinetic energy and the gravitational energy of the object when it is passing through point P?

	kinetic energy	gravitational energy
<b>A</b>	maximum	maximum
<b>B</b>	maximum	minimum
<b>C</b>	minimum	maximum
<b>D</b>	minimum	minimum

- 32 To keep a bottle of fruit juice cool on a hot day, it is wrapped in a cloth soaked in water.

Why is this method successful?

- A** Water has a high boiling point.
  - B** Water has a low melting point.
  - C** Water is a poor conductor of heat.
  - D** Water produces a cooling effect as it evaporates.
- 33 There is a vacuum between the double walls of a vacuum flask.

Which types of heat transfer are reduced by the vacuum?

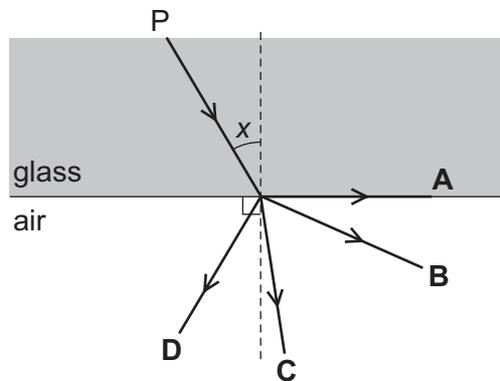
- A** conduction, convection and radiation
- B** conduction and convection only
- C** conduction and radiation only
- D** convection and radiation only

34 Which row gives an example of a longitudinal wave and describes the direction of the vibrations?

	example of a longitudinal wave	vibrations
<b>A</b>	light wave	at right angles to the direction the wave travels
<b>B</b>	light wave	in the same direction as the wave travels
<b>C</b>	sound wave	at right angles to the direction the wave travels
<b>D</b>	sound wave	in the same direction as the wave travels

35 The diagram shows a ray of light travelling from P. Angle  $x$  is less than the critical angle.

In which labelled direction does the ray continue?

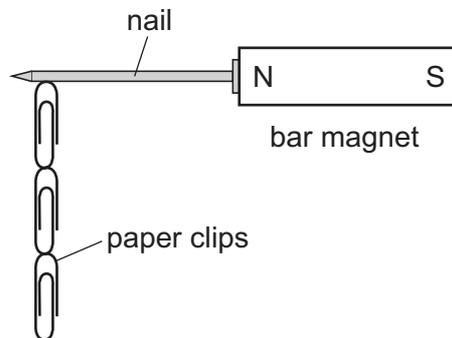


36 Which type of wave **cannot** travel through a vacuum?

- A** infra-red radiation
- B** microwaves
- C** sound waves
- D** X-rays

37 Four nails **A**, **B**, **C** and **D** are tested to find which makes the strongest permanent magnet.

One of the nails is placed against a bar magnet and the number of paper clips which the nail can support is recorded.

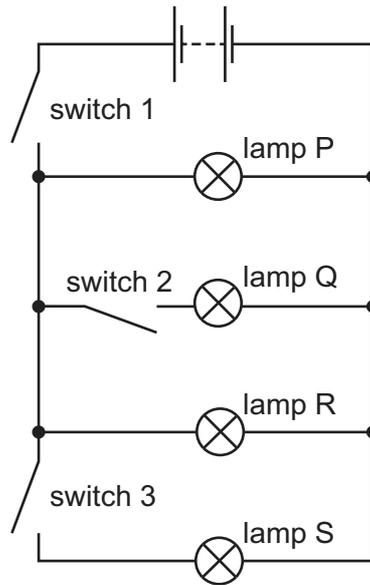


The bar magnet is then removed and the number of paper clips remaining attached to the nail is recorded. Each nail is tested in turn.

Which nail becomes the strongest permanent magnet?

nail	number of paper clips attached to the nail	
	bar magnet present	bar magnet removed
<b>A</b>	2	0
<b>B</b>	2	1
<b>C</b>	4	3
<b>D</b>	5	2

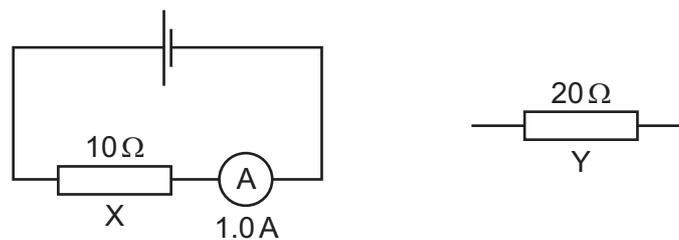
- 38 The circuit shown contains three switches and four lamps P, Q, R and S.



Which switches must be closed to light only lamps P and R?

- A switch 1 only
  - B switch 1 and switch 2 only
  - C switch 1 and switch 3 only
  - D switch 2 and switch 3 only
- 39 The diagram shows a circuit containing a  $10\ \Omega$  resistor X and an ammeter. The ammeter reading is  $1.0\text{ A}$ .

A  $20\ \Omega$  resistor Y is also available.



Which change to the circuit produces a reading on the ammeter that is greater than  $1.0\text{ A}$ ?

- A connecting Y in parallel with X
- B placing X on the other side of the ammeter
- C replacing X with Y
- D reversing the connections to X

40 Which type of radiation has the greatest ionising effect?

- A infra-red rays
- B  $\alpha$ -particles
- C  $\beta$ -particles
- D  $\gamma$ -rays



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

		Group																											
		I	II	III	IV	V	VI	VII	VIII	IX	X	XI																	
		1 <b>H</b> Hydrogen 1										4 <b>He</b> Helium 2																	
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4											19 <b>F</b> Fluorine 9																	
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulfur 16	35.5 <b>Cl</b> Chlorine 17	36 <b>Ar</b> Argon 18						20 <b>Ne</b> Neon 10																
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	52 <b>Cr</b> Chromium 24	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36												
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	96 <b>Mo</b> Molybdenum 42	101 <b>Ru</b> Ruthenium 44	101 <b>Rh</b> Rhodium 45	103 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54												
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	139 <b>La</b> Lanthanum 57	178 <b>Hf</b> Hafnium 72	181 <b>Ta</b> Tantalum 73	184 <b>W</b> Tungsten 74	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86													
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89											169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71															
		*58-71 Lanthanoid series †90-103 Actinoid series										167 <b>Er</b> Erbium 68	168 <b>Fm</b> Fermium 100	101 <b>Md</b> Mendelevium 101															
		<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">             a <b>X</b> b           </div> <div style="text-align: left;">             a = relative atomic mass              X = atomic symbol              b = proton (atomic) number           </div> </div>										162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	166 <b>Es</b> Einsteinium 99	167 <b>Cf</b> Californium 98	159 <b>Tb</b> Terbium 65	157 <b>Gd</b> Gadolinium 64	152 <b>Eu</b> Europium 63	150 <b>Sm</b> Samarium 62	144 <b>Nd</b> Neodymium 60	141 <b>Pr</b> Praseodymium 59	140 <b>Ce</b> Cerium 58	232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92	93 <b>Np</b> Neptunium 93	94 <b>Pu</b> Plutonium 94	95 <b>Am</b> Americium 95	96 <b>Cm</b> Curium 96	97 <b>Bk</b> Berkelium 97

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).