

Centre Number	Candidate Number	Name
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CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**PHYSICAL SCIENCE**

**0652/01**

Paper 1 Multiple Choice

October/November 2003

**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, highlighters, 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.

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.

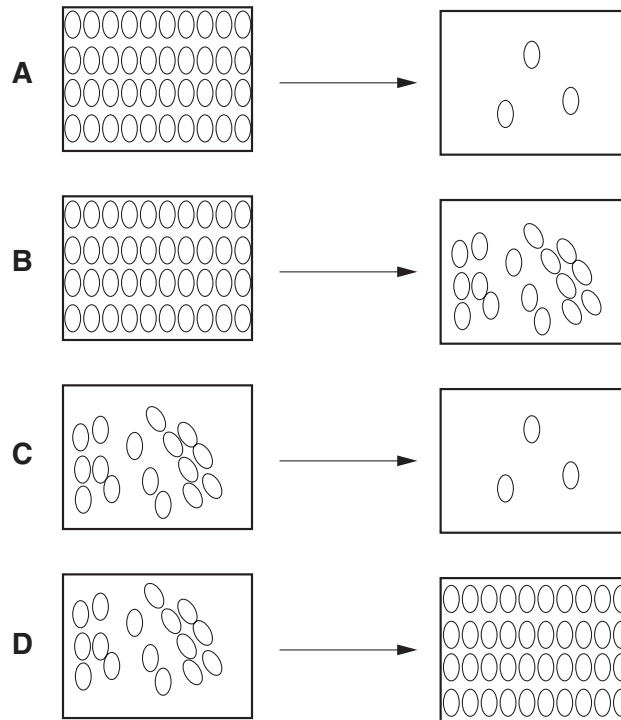
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 20.

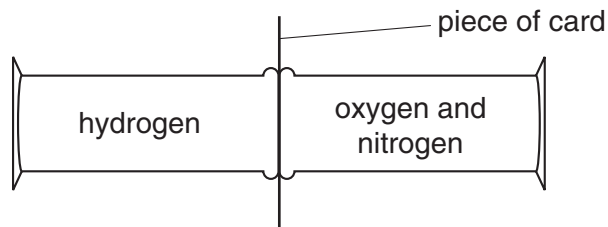
This document consists of **19** printed pages and **1** blank page.

1 Petrol spilled on to the ground on a hot day evaporates quickly.

Which diagrams show the change in arrangement of the particles in the petrol?



2 Hydrogen, nitrogen and oxygen are placed in the gas jars as shown.



The pressure in each jar is the same.

The piece of card is removed.

In which directions does diffusion occur?

	hydrogen into nitrogen and oxygen	nitrogen into hydrogen	oxygen into hydrogen
<b>A</b>	✓	✓	✓
<b>B</b>	✓	✓	✗
<b>C</b>	✓	✗	✓
<b>D</b>	✗	✓	✓

- 3 Two solids, **X** and **Y**, are mixed together.

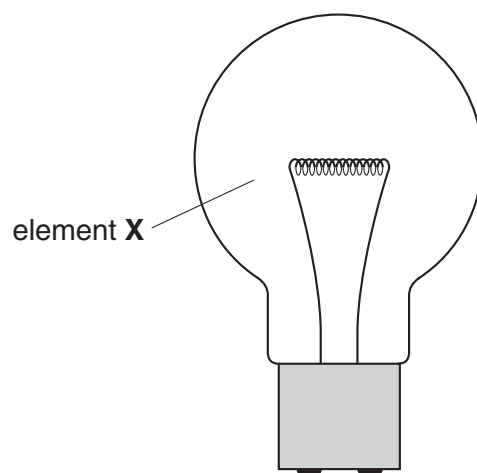
The table gives information about each solid.

property	<b>X</b>	<b>Y</b>
coloured	✓	✓
soluble in ethanol	✓	✓

Which methods separate **X** and **Y**?

	add ethanol then use chromatography	add ethanol then filter
<b>A</b>	✓	✓
<b>B</b>	✓	✗
<b>C</b>	✗	✓
<b>D</b>	✗	✗

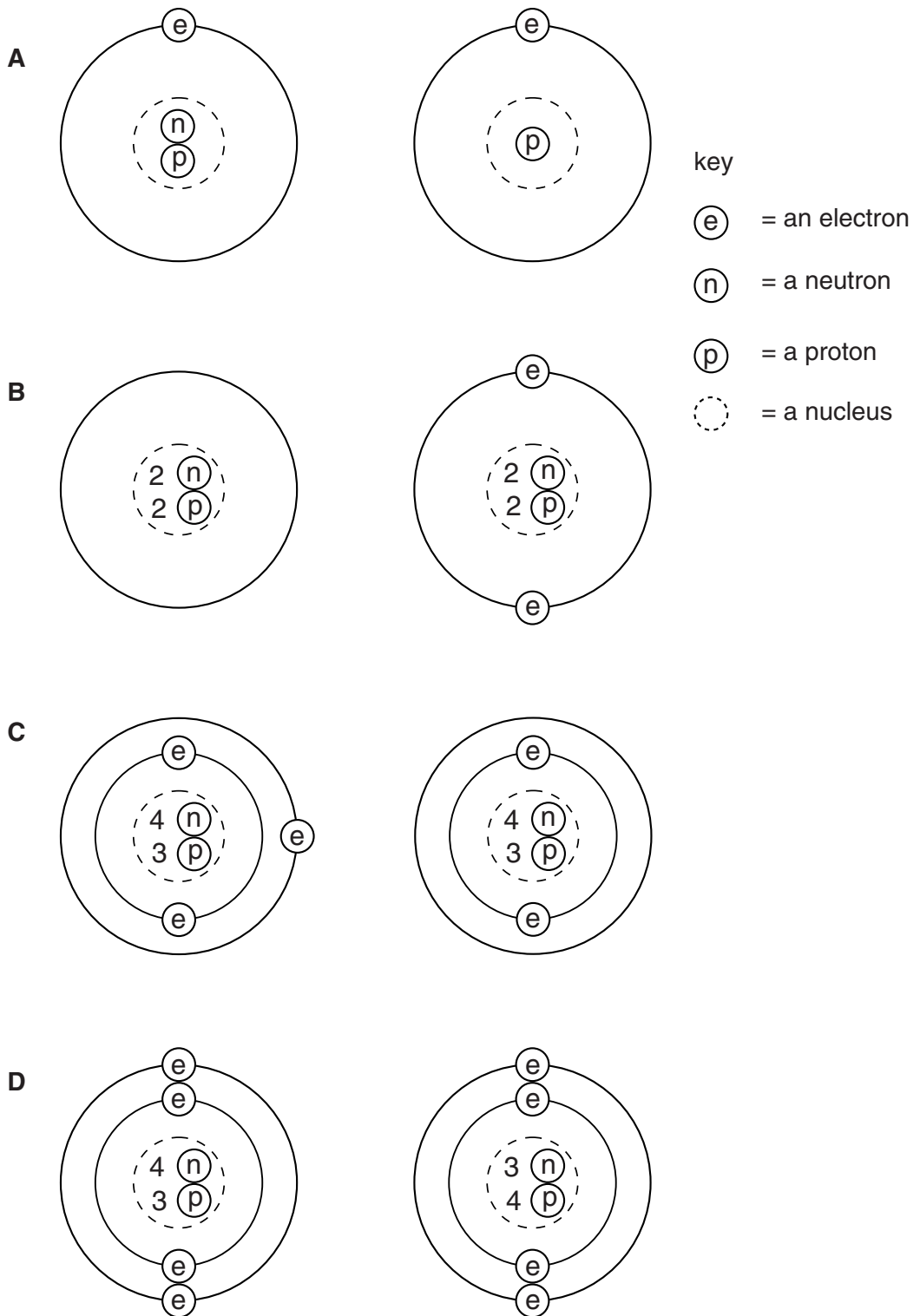
- 4 The diagram shows a use of an unreactive gaseous element **X** in a light bulb.



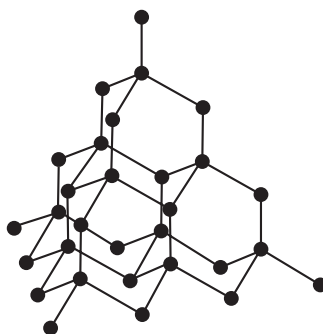
How many electrons are in the outer shell of an atom of **X**?

- A** 1                      **B** 6                      **C** 7                      **D** 8

5 Which two diagrams show two different types of **atom** of the same element?



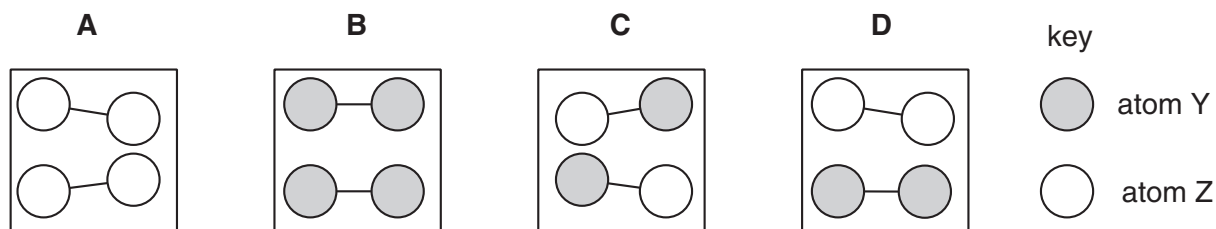
- 6 The diagram shows the structure of a substance.



What is represented?

- A diamond  
 B graphite  
 C methane  
 D poly(ethene)
- 7 The diagrams show models of covalent molecules.

In which diagram is a compound present?



- 8 Benzoic acid has the molecular formula  $C_7H_6O_2$ .

The table shows the relative atomic masses of the elements of benzoic acid.

element	relative atomic mass
hydrogen	1
carbon	12
oxygen	16

What is the relative molecular mass of benzoic acid?

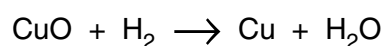
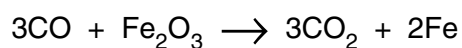
- A 15                      B 29                      C 92                      D 122

- 9 Hydrogen, methane and uranium-235 are energy sources.

Which of these have to be burned to produce energy?

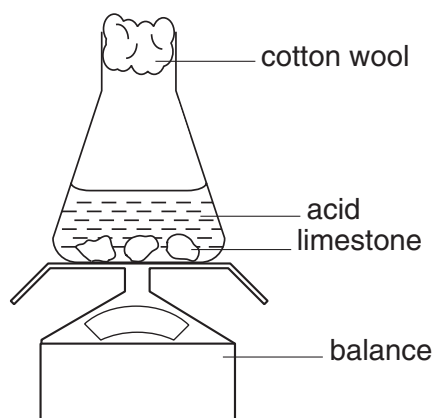
	hydrogen	methane	uranium-235
<b>A</b>	✓	✓	✓
<b>B</b>	✓	✓	✗
<b>C</b>	✓	✗	✓
<b>D</b>	✗	✓	✓

- 10 The equations shown describe chemical reactions involving oxidation and reduction.



Which substances are the reducing agents?

- A** CO, CuO  
**B** CO, H<sub>2</sub>  
**C** CO<sub>2</sub>, H<sub>2</sub>O  
**D** Cu, Fe
- 11 Dilute hydrochloric acid is added to limestone chips as shown in the diagram.



Why does the balance reading **decrease** as the reaction takes place?

- A** The cotton wool acts as a filter.  
**B** The marble dissolves in the acid.  
**C** The reaction is exothermic.  
**D** The reaction produces a gas.

12 The chart shows colours of Universal Indicator at different pH values.

colour	red	yellow	green	blue	violet
pH	1, 2, 3	4, 5, 6	7, 8, 9	10, 11, 12	13, 14

Lemon juice contains citric acid which is only slightly acidic.

What colour would lemon juice give with Universal Indicator?

- A blue
- B green
- C yellow
- D red

13 What are the properties of magnesium and its oxide?

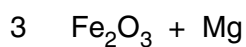
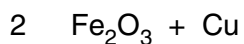
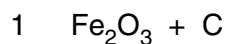
	magnesium is a metal	magnesium burns readily in oxygen	magnesium oxide is
A	✓	✓	basic
B	✓	✓	acidic
C	✓	X	acidic
D	X	✓	basic

14 Element X forms diatomic molecules.

In which group of the Periodic Table is X placed?

- A Group 0
- B Group I
- C Group II
- D Group VII

15 Three mixtures are made.



The mixtures are heated strongly.

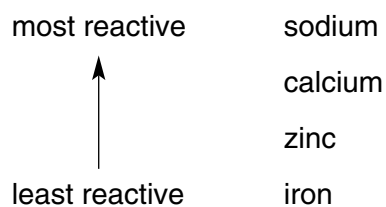
In which mixtures is iron formed?

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

16 Which metal reacts most quickly with water?

- A calcium
- B copper
- C iron
- D potassium

17 Four metals are shown in order of their reactivity.



Which metal is extracted from its ore by electrolysis and which by heating its ore with carbon?

	electrolysis	heating with carbon
<b>A</b>	calcium	sodium
<b>B</b>	iron	zinc
<b>C</b>	sodium	iron
<b>D</b>	zinc	calcium



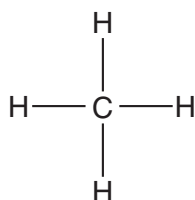
18 What is zinc used for?

	galvanising iron	making brass
<b>A</b>	✓	✓
<b>B</b>	✓	✗
<b>C</b>	✗	✓
<b>D</b>	✗	✗

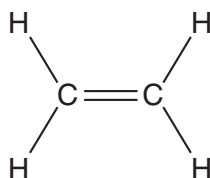
19 Which of hydrogen and steam can react with ethene?

	hydrogen	steam
<b>A</b>	✓	✓
<b>B</b>	✓	✗
<b>C</b>	✗	✓
<b>D</b>	✗	✗

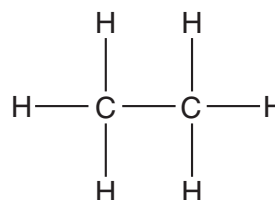
20 The diagrams show the structures of three compounds.



**P**



**Q**

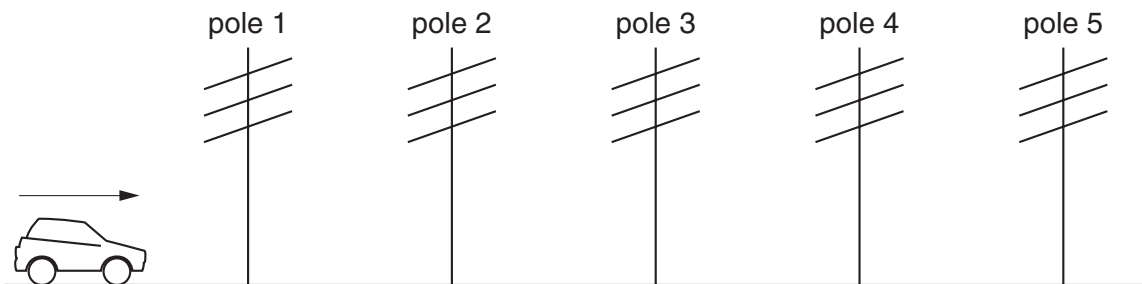


**R**

Which compounds belong to the same homologous series?

- A** P and Q only
- B** P and R only
- C** Q and R only
- D** P, Q and R

- 21 Which of the following is **not** necessary when using a measuring cylinder to measure the volume of a quantity of water?
- A making sure that the measuring cylinder is vertical
  - B making sure that your eye is level with the liquid surface
  - C reading the bottom of the meniscus
  - D using the largest measuring cylinder possible
- 22 Five telegraph poles are positioned at equal distances along the side of a road.



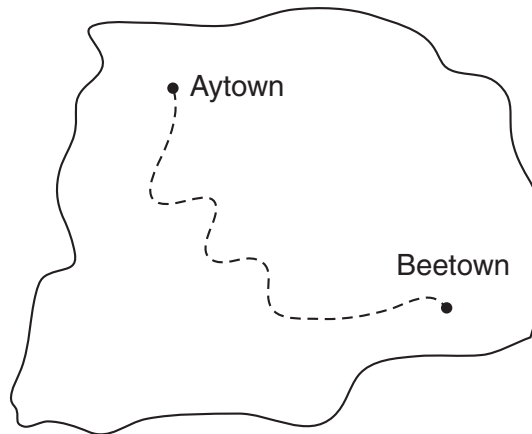
A car accelerates until it is level with pole 4. The car then continues along the road at a steady speed. The times taken to travel between one pole and the next are measured.

Which time is the greatest?

The time between

- A pole 1 and pole 2.
- B pole 2 and pole 3.
- C pole 3 and pole 4.
- D pole 4 and pole 5.

- 23 A train travels along a track from Aytown to Beetown. The map shows the route.



The distance travelled by the train between the towns is 210 km. It moves at an average speed of 70 km/h.

How long does the journey take?

- A less than  $\frac{70}{210}$  hours, because the journey is not in a straight line
- B exactly  $\frac{70}{210}$  hours
- C exactly  $\frac{210}{70}$  hours
- D more than  $\frac{210}{70}$  hours, because the journey is not in a straight line
- 24 A student tries to find the density of a metal block. First he measures the weight with a forcemeter (spring balance). Next he measures the sides of the block using a rule, in order to calculate the volume of the block. Finally he divides the weight by the volume to find the density.

The student has made a mistake.

Why does his method **not** give the density?

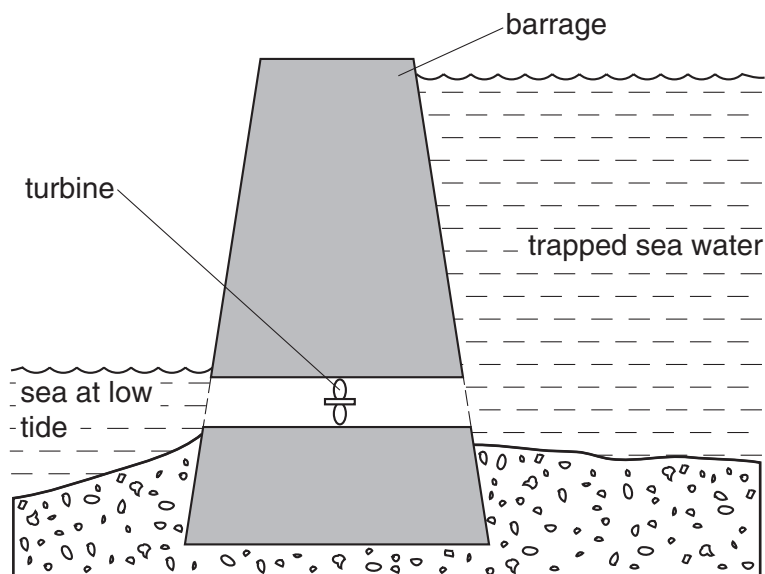
- A Density is volume divided by weight.
- B He should have measured the surface area, not the volume.
- C He should have used the mass in his calculation, not the weight.
- D Weight is not measured with a forcemeter (spring balance).

25 A large electric motor is used to lift a container off a ship.

Which of the following values are enough to allow the power of the motor to be calculated?

- A the mass of the container and the distance moved
- B the force used and the distance moved
- C the current used and the work done
- D the work done and the time taken

26 A tidal power station is made by building a barrage across the mouth of a river. At high tide the sea water is trapped behind the barrage.



At low tide the water is allowed to flow back into the sea through a turbine.

What is the useful energy change in a tidal power station?

- A electrical energy  $\rightarrow$  energy of position (potential)
- B electrical energy  $\rightarrow$  energy of motion (kinetic)
- C energy of motion (kinetic)  $\rightarrow$  energy of position (potential)
- D energy of position (potential)  $\rightarrow$  electrical energy

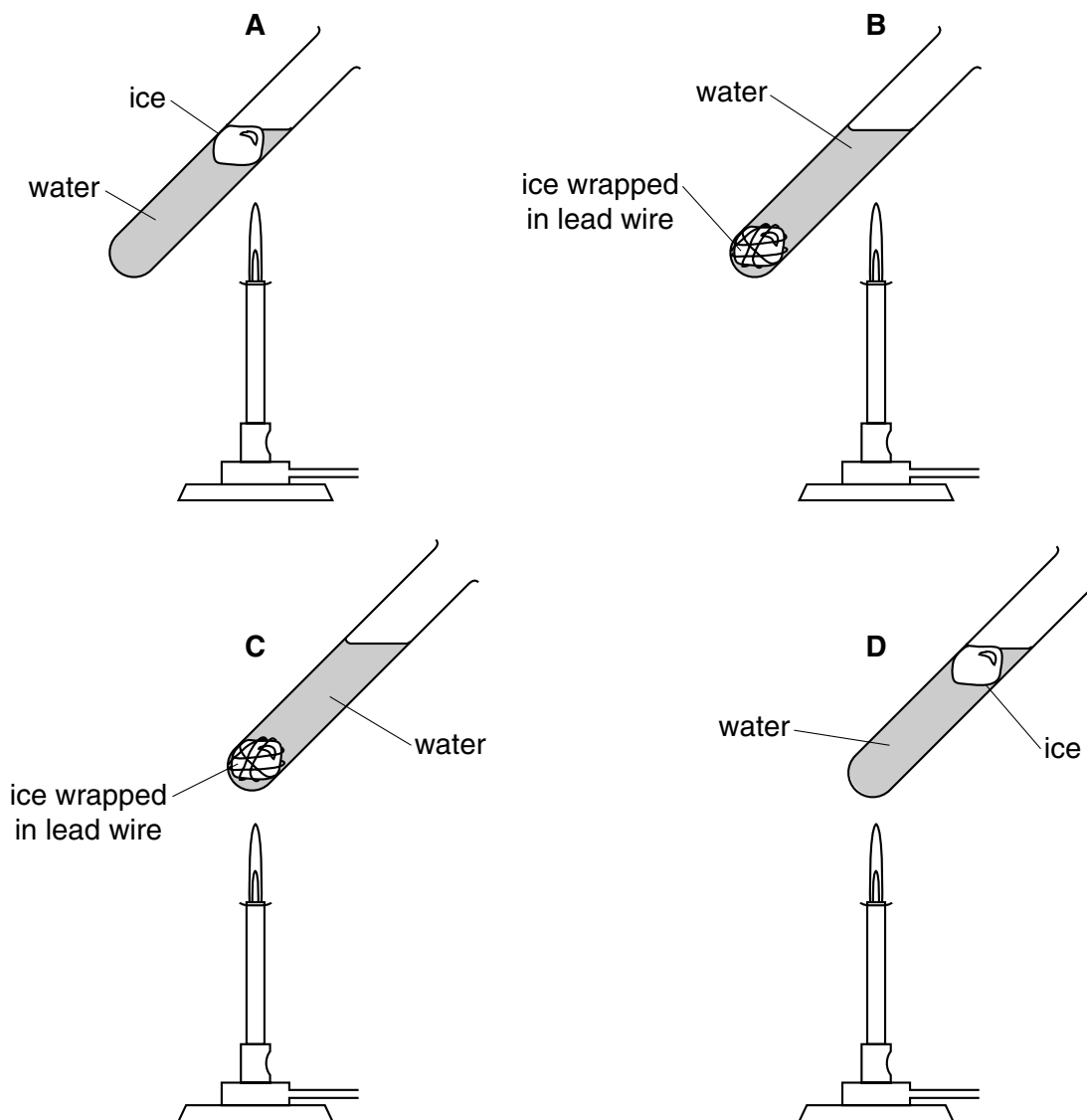
27 There is a vacuum between the double walls of a vacuum flask.

Which types of heat transfer are reduced by the vacuum?

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

28 The diagrams show four identical pieces of ice that are heated in test-tubes of water.

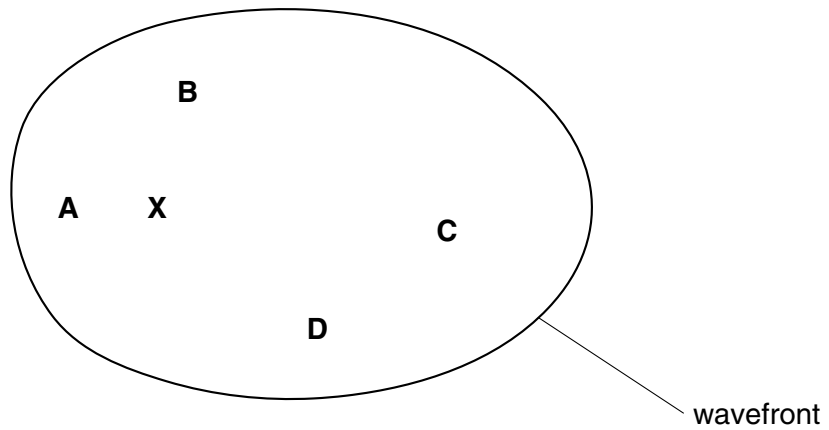
In which test-tube will the ice take the longest time to melt?



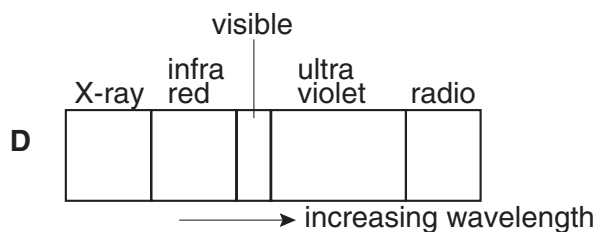
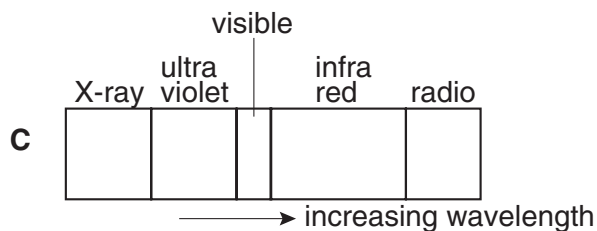
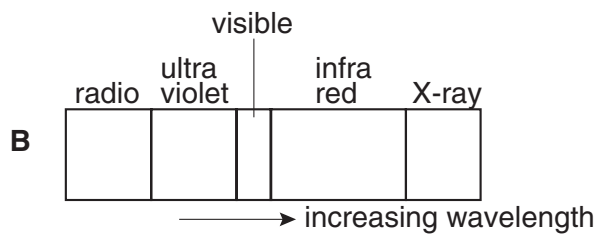
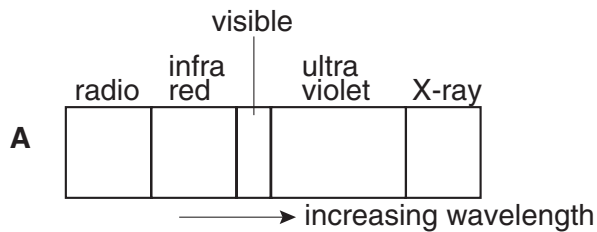
29 Waves travel more slowly on the surface of water when the water is shallow.

A person drops a stone into a pool at **X**. The diagram shows the first wavefront on the surface of the pool.

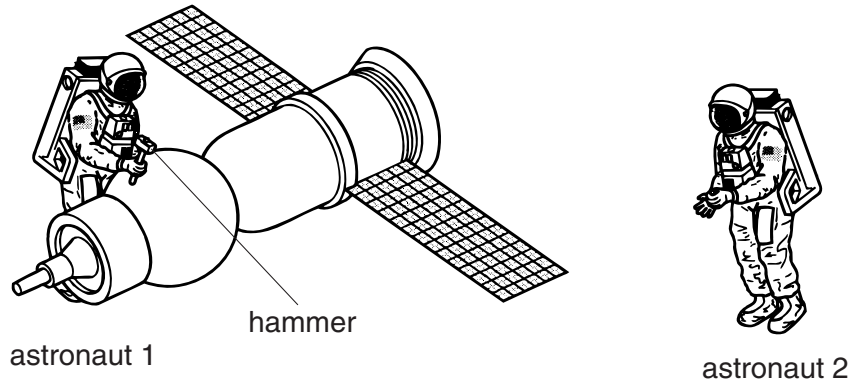
Which region of the pool is likely to be most shallow?



30 Which diagram shows the correct order of the waves in the electromagnetic spectrum?



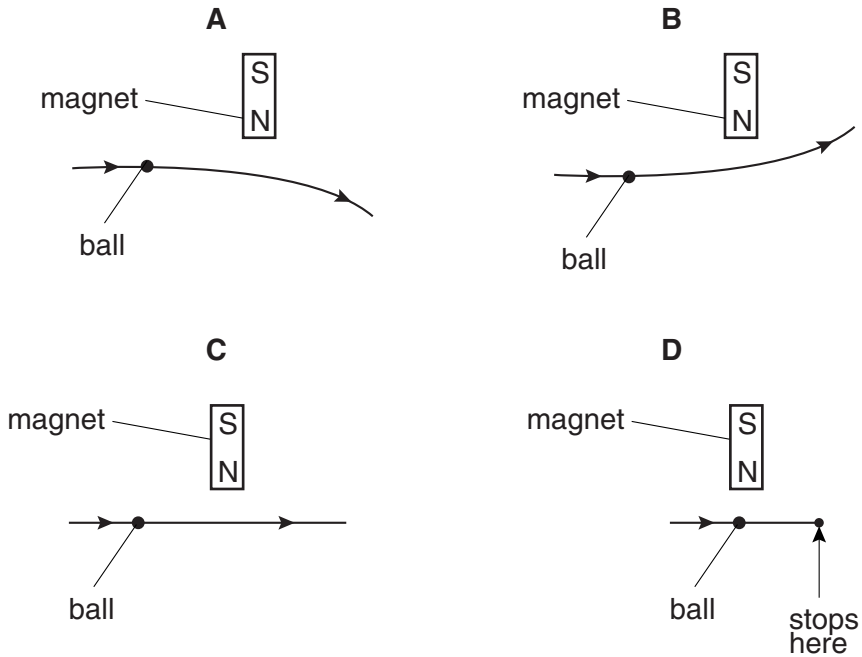
- 31 Astronaut 1 uses a hammer to mend a satellite in space. Astronaut 2 is nearby. There is no atmosphere in space.



Compared with the sound heard if they were working on Earth, what does astronaut 2 hear?

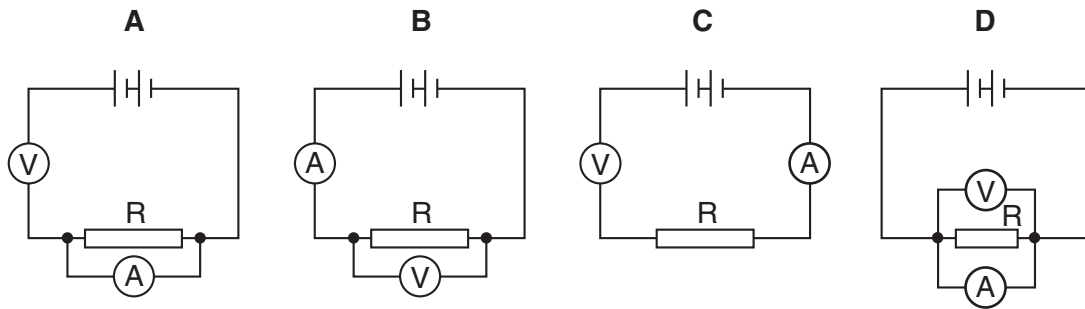
- A no sound at all
  - B a quieter sound
  - C a sound of the same loudness
  - D a louder sound
- 32 A steel ball on a horizontal wooden table rolls near the north pole of a bar magnet that is lying on the table.

Which diagram shows the most likely path of the ball, as seen from above the table?

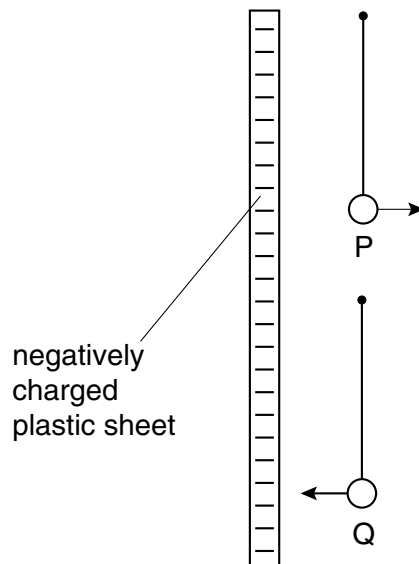


33 A student wants to find the resistance of resistor R using a voltmeter and an ammeter.

Which circuit should the student use?



34 Two very light, charged balls P and Q are hung, one above the other, from nylon threads. When a negatively charged plastic sheet is placed alongside them, P is repelled and Q is attracted.



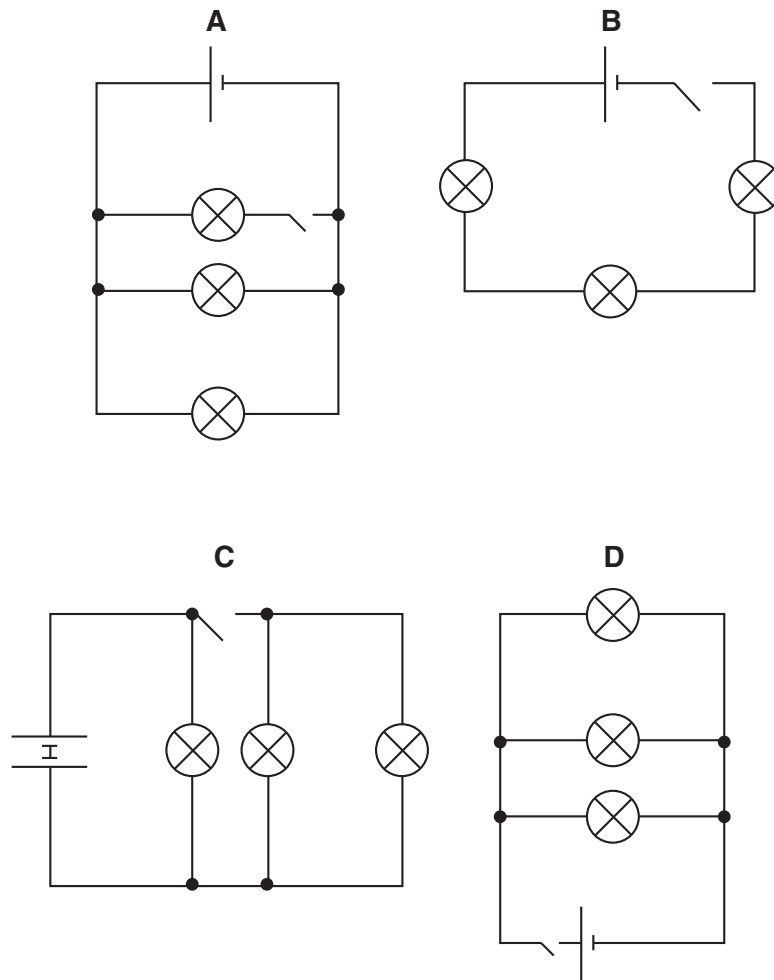
What are the original charges on P and on Q?

	charge on P	charge on Q
<b>A</b>	negative	negative
<b>B</b>	negative	positive
<b>C</b>	positive	negative
<b>D</b>	positive	positive



- 35 Four students are asked to draw a circuit showing three lamps working in parallel, a cell, and a switch that controls all three lamps.

Which student is correct?



- 36 A  $3.0\ \Omega$  lamp and a  $6.0\ \Omega$  lamp are connected in series.

What is the total resistance of the combination?

- A  $0.5\ \Omega$
- B  $2.0\ \Omega$
- C  $9.0\ \Omega$
- D  $18.0\ \Omega$

37 In a cathode-ray tube, particles are given off from a hot cathode by thermionic emission.

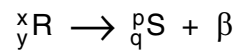
Which particles are given off?

- A atoms
- B electrons
- C ions
- D protons

38 Which line in the table describes the nature of an  $\alpha$ -particle and a  $\gamma$ -ray?

	$\alpha$ -particle	$\gamma$ -ray
A	helium nucleus	electromagnetic radiation
B	helium nucleus	electron
C	proton	electromagnetic radiation
D	proton	electron

39 A radioactive nucleus R decays with the emission of a  $\beta$ -particle as shown.



Which equation is correct?

- A  $x = p$
- B  $y = q$
- C  $p = x - 1$
- D  $q = y - 1$

40 Which line in the table shows the structure of the nucleus of a helium atom  ${}^4_2\text{He}$ ?

	electrons	neutrons	protons
A	2	2	0
B	2	0	2
C	0	2	2
D	2	2	2



# DATA SHEET

## The Periodic Table of the Elements

		Group										
I	II	III	IV	V	VI	VII	O					
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">1 <b>H</b> Hydrogen 1</div> </div>										4 <b>He</b> Helium 2
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12											11 <b>B</b> Boron 5
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulphur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18					
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	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					
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	65 <b>Zn</b> Zinc 30	64 <b>Cu</b> Copper 29	59 <b>Ni</b> Nickel 28	108 <b>Ag</b> Silver 47	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54					
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89	112 <b>Cd</b> Cadmium 48	106 <b>Pd</b> Palladium 46	103 <b>Rh</b> Rhodium 45	197 <b>Au</b> Gold 79	209 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85					
		55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		52 <b>Cr</b> Chromium 24	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		51 <b>V</b> Vanadium 23	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		48 <b>Ti</b> Titanium 22	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		41 <b>Nb</b> Niobium 41	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		91 <b>Zr</b> Zirconium 40	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		178 <b>Hf</b> Hafnium 72	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		181 <b>Ta</b> Tantalum 73	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		184 <b>W</b> Tungsten 74	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		190 <b>Os</b> Osmium 76	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		192 <b>Ir</b> Iridium 77	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		195 <b>Pt</b> Platinum 78	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		201 <b>Hg</b> Mercury 80	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		204 <b>Tl</b> Thallium 81	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		207 <b>Pb</b> Lead 82	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		209 <b>Bi</b> Bismuth 83	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		210 <b>Po</b> Polonium 84	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		210 <b>At</b> Astatine 85	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		210 <b>Rn</b> Radon 86	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	101 <b>Ru</b> Ruthenium 44	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52					
		140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	150 <b>Sm</b> Samarium 62	157 <b>Gd</b> Gadolinium 64	162 <b>Dy</b> Dysprosium 66					
		232 <b>Th</b> Thorium 90	238 <b>Pa</b> Protactinium 91	238 <b>U</b> Uranium 92	238 <b>Np</b> Neptunium 93	238 <b>Pu</b> Plutonium 94	238 <b>Am</b> Americium 95					
		140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	150 <b>Sm</b> Samarium 62	157 <b>Gd</b> Gadolinium 64	162 <b>Dy</b> Dysprosium 66					
		144 <b>Nd</b> Neodymium 60	144 <b>Nd</b> Neodymium 60	150 <b>Sm</b> Samarium 62	157 <b>Gd</b> Gadolinium 64	162 <b>Dy</b> Dysprosium 66	167 <b>Er</b> Erbium 68					
		150 <b>Sm</b> Samarium 62	150 <b>Sm</b> Samarium 62	157 <b>Gd</b> Gadolinium 64	162 <b>Dy</b> Dysprosium 66	167 <b>Er</b> Erbium 68	173 <b>Yb</b> Ytterbium 70					
		157 <b>Gd</b> Gadolinium 64	157 <b>Gd</b> Gadolinium 64	162 <b>Dy</b> Dysprosium 66	167 <b>Er</b> Erbium 68	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71					
		162 <b>Dy</b> Dysprosium 66	162 <b>Dy</b> Dysprosium 66	167 <b>Er</b> Erbium 68	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71					
		167 <b>Er</b> Erbium 68	167 <b>Er</b> Erbium 68	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71					
		169 <b>Tm</b> Thulium 69	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71					
		173 <b>Yb</b> Ytterbium 70	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71					
		175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71					
		101 <b>Md</b> Mendelevium 101	101 <b>Md</b> Mendelevium 101	102 <b>No</b> Nobelium 102	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103					
		102 <b>No</b> Nobelium 102	102 <b>No</b> Nobelium 102	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103					
		103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103					

\*58-71 Lanthanoid series  
†90-103 Actinoid series

**Key**

a	X
b	b

a = relative atomic mass  
X = atomic symbol  
b = proton (atomic) number

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