

COMBINED SCIENCE

5129/12

Paper 1 Multiple Choice

May/June 2014

1 hour

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 16.
Electronic calculators may be used.

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

- 1 Which feature allows root hair cells to carry out their function?
- A absence of nucleus
 - B large surface area
 - C presence of chloroplasts
 - D presence of stomata
- 2 A student placed equal-sized pieces of potato in solutions of different sugar concentrations. She measured the change in length of each piece after 30 minutes. Her results are shown in the table.

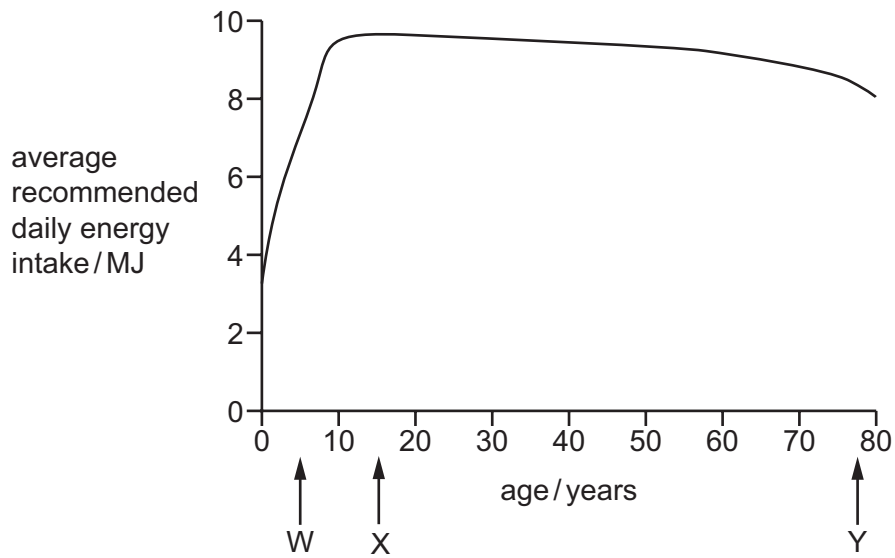
sugar concentration (%)	change in length (mm)
0	+4.0
5	+2.2
10	+0.5
15	-1.2
20	-3.0

The student used the results to predict which concentration of sugar would not change the length of a potato strip.

At which concentration would the change in length be 0 mm?

- A 9% B 10% C 11% D 25%
- 3 Amylase is an enzyme important in seed germination.
- What is the function of amylase in seed germination?
- A breaks the testa so the plumule can emerge
 - B causes the radical to elongate
 - C changes the stored starch into sugars for respiration
 - D helps the seed absorb water to rehydrate the cells
- 4 Which element is contained in fertilisers and used by plants to synthesise protein?
- A helium
 - B nitrogen
 - C silicon
 - D sodium

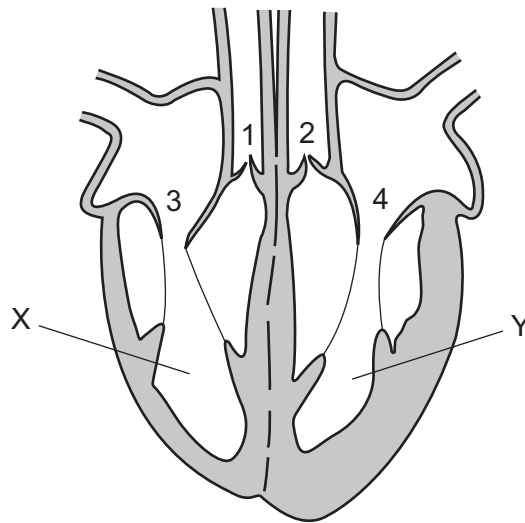
- 5 The graph shows how the average recommended daily energy intake of a woman varies with age.



What is the reason for the differences in the recommended energy intakes between W and X, and between X and Y?

	reason for difference between W and X	reason for difference between X and Y
A	difference in body size	difference in body size
B	difference in body size	difference in level of activity
C	difference in level of activity	difference in body size
D	difference in level of activity	difference in level of activity

6 The diagram shows a section through the heart.



What is the position of valves 1-4 while chambers X and Y are emptying?

	valves 1 and 2	valves 3 and 4
A	closed	closed
B	closed	open
C	open	closed
D	open	open

7 How does the composition of expired air differ from inspired air?

	carbon dioxide	nitrogen	oxygen	water vapour
A	decreases	increases	decreases	decreases
B	increases	decreases	increases	does not change
C	increases	does not change	decreases	decreases
D	increases	does not change	decreases	increases

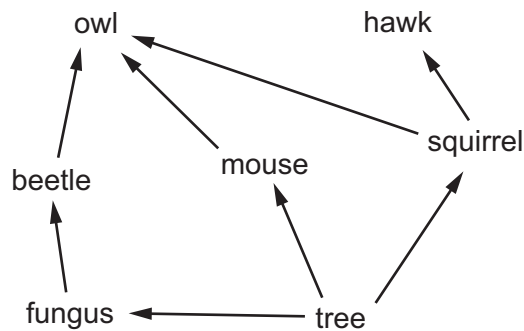
8 Which row describes where hormones are produced and destroyed?

	produced by	destroyed by
A	gland	liver
B	gland	stomach
C	muscle	liver
D	muscle	stomach

9 Why is heroin described as a powerful depressant?

- A** It causes severe symptoms of withdrawal.
- B** It is highly addictive.
- C** It slows down the activity of the nervous system.
- D** It speeds up reaction times.

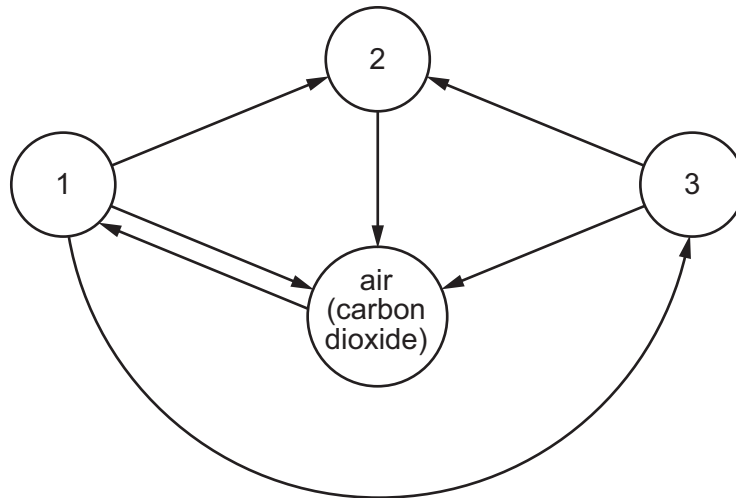
10 The diagram shows a food web.



Which of the organisms shown in the food web can only survive by taking in simple inorganic materials?

- A** beetle
- B** fungus
- C** owl
- D** tree

- 11 In the diagram, arrows represent the movement of carbon compounds in the carbon cycle. The circles represent carbon compounds in animals, decomposers, plants and in the air.



What is represented by each circle?

	1	2	3
A	animals	plants	decomposers
B	plants	animals	decomposers
C	plants	decomposers	animals
D	decomposers	animals	plants

- 12 Which statement about sexual reproduction is correct?

- A** All plants reproduce by this process.
- B** Nuclei of two specialised cells fuse together.
- C** The offspring are genetically identical.
- D** Two cells of one type fuse with a single cell of another type.

- 13 What causes syphilis and how is it treated?

	caused by	treated
A	a bacterium	antibiotics
B	a bacterium	spermicide
C	a virus	antibiotics
D	a virus	spermicide

14 Which substance may be condensed using a water-cooled condenser?

	substance	melting point/°C	boiling point/°C
A	butane	-135	-1
B	pentane	-130	+36
C	bromomethane	-94	+4
D	ammonia	-78	-33

15 An isotope of element X is represented by ${}^{19}_9\text{X}$.

What is the electronic structure of X?

- A** 2,8,8,1 **B** 2,7 **C** 2,8 **D** 2,8,18

16 Calcium reacts with chlorine to form the ionic compound calcium chloride.

An atom of calcium has 20 electrons.

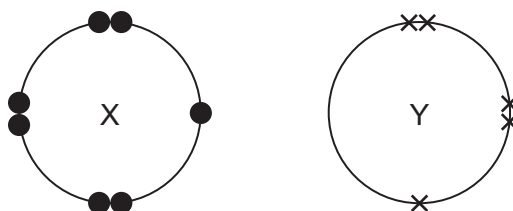
An atom of chlorine has 17 electrons.

What is the electronic configuration of the calcium ion and of the chloride ion?

	calcium ion	chloride ion
A	2,8,8	2,8,8
B	2,8,8,1	2,8,8
C	2,8,8,2	2,8,7
D	2,8,8,8	2,8

17 Atoms of element X have seven outer shell electrons.

Atoms of element Y have five outer shell electrons.



X and Y form a compound with covalent bonds.

What is the formula for the compound of X and Y?

- A** XY_2 **B** XY_3 **C** X_2Y **D** X_3Y

18 'Meta-fuel', $C_8H_{16}O_4$, is a fuel used in stoves.

What is the equation for its complete combustion?

- A $C_8H_{16}O_4 + 2O_2 \rightarrow 8C + 8H_2O$
- B $C_8H_{16}O_4 + 6O_2 \rightarrow 8CO + 8H_2O$
- C $C_8H_{16}O_4 + 10O_2 \rightarrow 8CO_2 + 8H_2O$
- D $C_8H_{16}O_4 + 8O_2 \rightarrow 4CO_2 + 4CO + 8H_2O$

19 Which statement describes a base?

- A a substance that produces H^+ ions when dissolved in water
- B a substance that reacts with ammonium chloride to produce ammonia gas
- C a substance that reacts with sodium hydroxide to form a salt
- D a substance that turns Universal Indicator paper red

20 Astatine (At) is in Group VII of the Periodic Table.

Which is a property of astatine?

- A It forms a basic oxide.
- B It is a good conductor of electricity.
- C It is displaced by chlorine from aqueous potassium astatide.
- D It displaces iodine from aqueous potassium iodide.

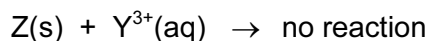
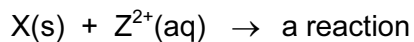
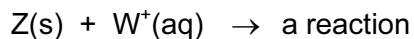
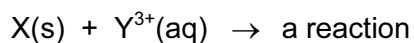
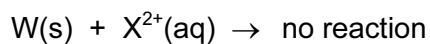
21 Platinum is a metal.

Which statements about platinum are correct?

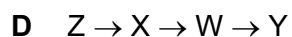
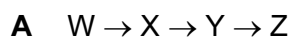
- 1 It can be drawn into wires.
 - 2 It conducts heat.
 - 3 It has a low boiling point.
 - 4 It is shiny.
 - 5 It is strong.
- A 1, 2, 3 and 4
 - B 1, 2, 3 and 5
 - C 1, 2, 4 and 5
 - D 2, 3, 4 and 5

22 A more reactive metal displaces a less reactive from an aqueous solution of its ions.

Four unknown metals are given the labels W, X, Y and Z and found to react as shown.



What is the correct order of reactivity, putting the most reactive first?



23 Which gas dissolves in water to form acid rain?

A ammonia

B carbon monoxide

C nitrogen

D sulfur dioxide

24 Which compound contains nitrogen and is used as a fertiliser?

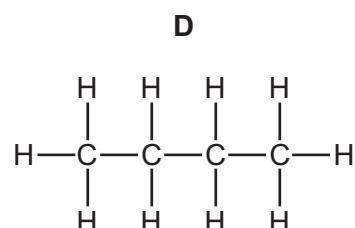
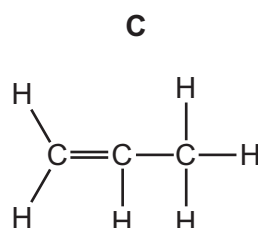
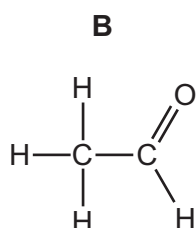
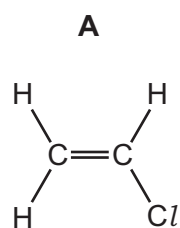
A ammonium sulfate

B calcium phosphate

C nitric acid

D potassium sulfate

25 Which structural formula represents an unsaturated hydrocarbon?



26 When ethene reacts with hydrogen, ethane is produced.

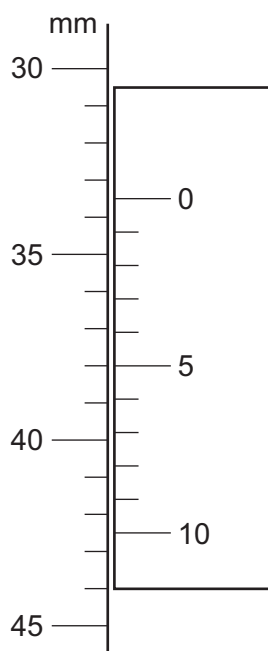
What type of reaction is this?

- A addition
- B displacement
- C oxidation
- D polymerisation

27 Which substances are produced by yeast from sugar?

- A ethanoic acid and oxygen
- B ethanol and carbon dioxide
- C ethanol and oxygen
- D starch and carbon dioxide

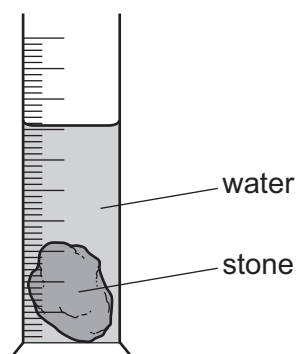
28 The diagram shows part of a vernier scale.



What is the correct reading?

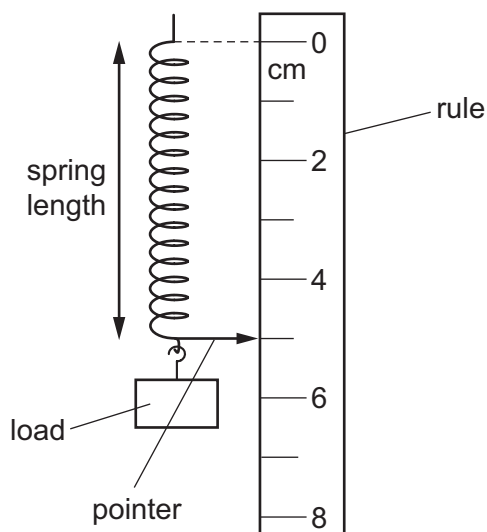
- A 30.5 mm
- B 33.5 mm
- C 38.0 mm
- D 42.5 mm

- 29 To calculate the density of a stone, a student places some water in a measuring cylinder and then places the stone in the water.



What does the student need to measure to be able to calculate the density of the stone?

- A** mass of the stone and combined volume of the water and the stone
B mass of the stone, mass of the water and volume of the water
C mass of the stone, volume of the water and combined volume of the water and the stone
D mass of the water, volume of the water and combined volume of the water and the stone
- 30 The diagram shows the apparatus a student uses to investigate the extension of a spring.



She is asked to plot an extension-load graph for the spring.

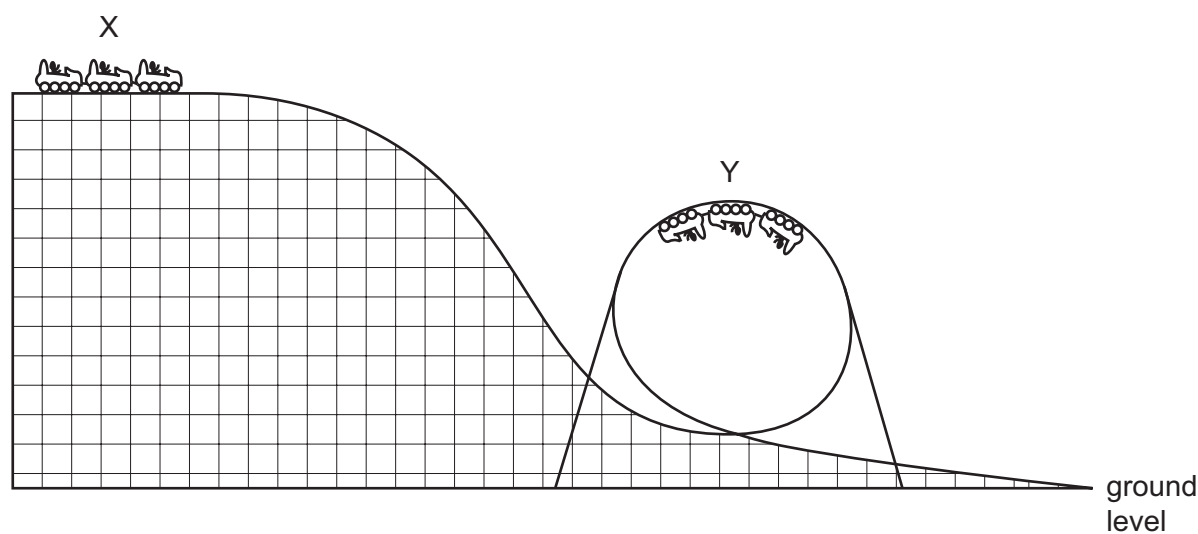
She writes down the steps she will follow.

Which step is **not** correct?

- A** The load is increased, in stages, on the lower end of the spring.
B The reading of the pointer against the scale is recorded for each load.
C The load is reduced, in stages, and the pointer reading recorded.
D The average pointer reading, at each stage, is plotted against the load.

31 In a theme park ride, passengers in a car are initially at rest at the top of the track.

The car then travels down and round a circular loop in the track.



Which form of energy is possessed by the car and passengers at points X and Y?

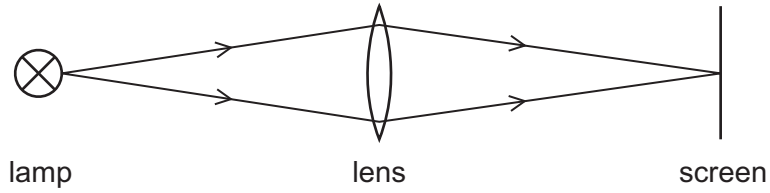
	X	Y	
A	KE only	PE only	key
B	PE only	KE only	KE = kinetic energy
C	KE only	KE and PE	PE = gravitational potential energy
D	PE only	KE and PE	

32 What is **not** a consequence of thermal expansion?

- A** the cracking of a cold plate when put into a very hot oven
- B** the distortion of metal rail tracks in very hot weather
- C** the distortion suffered by a football when kicked
- D** the water circulation in a heated saucepan

33 Which diagram shows an example of a longitudinal wave?

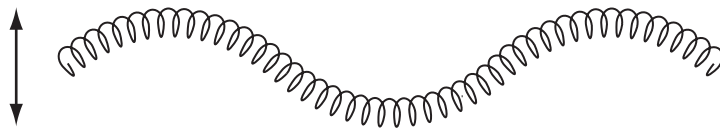
A light travelling from a lamp to a screen



B a spring pushed backwards and forwards



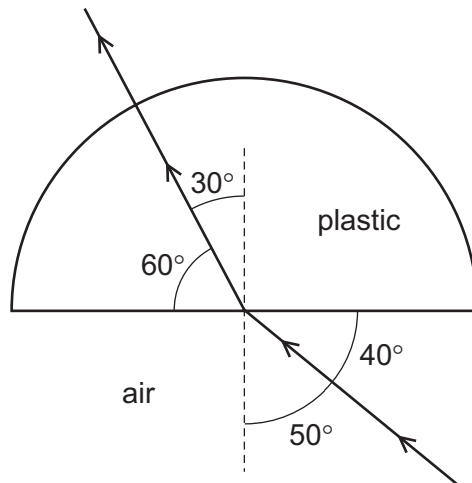
C a spring pushed up and down



D a water ripple caused by a dipper moving up and down



34 A semi-circular block is made from plastic. A ray of light passes through it at the angles shown.



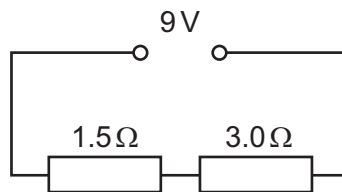
What is the refractive index of the plastic?

- A 0.74 B 0.88 C 1.29 D 1.53

- 35 Which row correctly describes what happens when two electrostatic charges are brought nearer to one another?

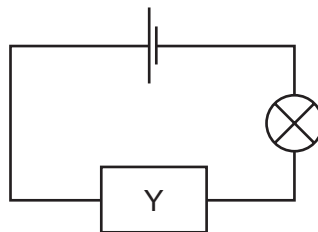
	like charges	unlike charges
A	attract	attract
B	attract	repel
C	repel	attract
D	repel	repel

- 36 Two resistors are connected in series with a 9 V supply.



What is the current in the circuit?

- A** 2.0A **B** 3.0A **C** 4.5A **D** 6.0A
- 37 In the circuit shown, component Y can be used to gradually change the brightness of the lamp.



What is component Y?

- A** a battery
B a resistor
C a switch
D a variable resistor
- 38 A light bulb is marked 120V, 60W.
 How much energy does the bulb dissipate in one minute?
- A** 2J **B** 60J **C** 120J **D** 3600J

39 ${}_{92}^{238}\text{U}$ is a nuclide of uranium.

What does the nucleus contain?

- A 92 protons and 146 neutrons
- B 92 protons and 238 neutrons
- C 92 protons, 146 neutrons and 92 electrons
- D 92 protons, 238 neutrons and 92 electrons

40 After use, a radioactive source still contains material that is radioactive.

How may it be disposed of safely?

- A by burning the source at high temperatures
- B by burying the source deep underground
- C by cooling the source quickly to a very low temperature
- D by washing the source into a fast-flowing river

DATA SHEET
The Periodic Table of the Elements

		Group																																	
I	II	III	IV	V	VI	VII	0					0																							
		1 H Hydrogen 1											4 He Helium 2																						
7 Li Lithium 3	9 Be Beryllium 4											20 Ne Neon 10																							
23 Na Sodium 11	24 Mg Magnesium 12	27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18					84 Kr Krypton 36																							
39 K Potassium 19	40 Ca Calcium 20	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36					131 Xe Xenon 54																							
85 Rb Rubidium 37	88 Sr Strontium 38	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54					86 Rn Radon 86																							
133 Cs Caesium 55	137 Ba Barium 56	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	210 Rn Radon 86					86 Rn Radon 86																							
226 Ra Radium 88	227 Ac Actinium 89											227 Ac Actinium 89																							
*58-71 Lanthanoid series †90-103 Actinoid series																																			
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">a</td> <td style="padding: 2px;">X</td> <td style="padding: 2px;">b</td> </tr> </table> <p style="text-align: center; margin-top: 5px;">Key a = relative atomic mass X = atomic symbol b = proton (atomic) number</p>												a	X	b																					
a	X	b																																	
<table border="1" style="margin: auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">140 Ce Cerium 58</td> <td style="padding: 2px;">141 Pr Praseodymium 59</td> <td style="padding: 2px;">144 Nd Neodymium 60</td> <td style="padding: 2px;">150 Sm Samarium 62</td> <td style="padding: 2px;">152 Eu Europium 63</td> <td style="padding: 2px;">157 Gd Gadolinium 64</td> <td style="padding: 2px;">162 Dy Dysprosium 66</td> <td style="padding: 2px;">165 Ho Holmium 67</td> <td style="padding: 2px;">167 Er Erbium 68</td> <td style="padding: 2px;">169 Tm Thulium 69</td> <td style="padding: 2px;">173 Yb Ytterbium 70</td> <td style="padding: 2px;">175 Lu Lutetium 71</td> </tr> <tr> <td style="padding: 2px;">232 Th Thorium 90</td> <td style="padding: 2px;">238 U Uranium 92</td> <td style="padding: 2px;">238 U Uranium 92</td> <td style="padding: 2px;">94 Pu Plutonium 94</td> <td style="padding: 2px;">95 Am Americium 95</td> <td style="padding: 2px;">96 Cm Curium 96</td> <td style="padding: 2px;">98 Cf Californium 98</td> <td style="padding: 2px;">99 Es Einsteinium 99</td> <td style="padding: 2px;">100 Fm Fermium 100</td> <td style="padding: 2px;">101 Md Mendelevium 101</td> <td style="padding: 2px;">102 No Nobelium 102</td> <td style="padding: 2px;">103 Lr Lawrencium 103</td> </tr> </table>												140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71	232 Th Thorium 90	238 U Uranium 92	238 U Uranium 92	94 Pu Plutonium 94	95 Am Americium 95	96 Cm Curium 96	98 Cf Californium 98	99 Es Einsteinium 99	100 Fm Fermium 100	101 Md Mendelevium 101	102 No Nobelium 102	103 Lr Lawrencium 103
140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71																								
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The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

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