



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

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CHEMISTRY

0620/11

Paper 1 Multiple Choice

October/November 2009

45 Minutes

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

* 2 5 4 8 6 2 0 2 5 5 *

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.

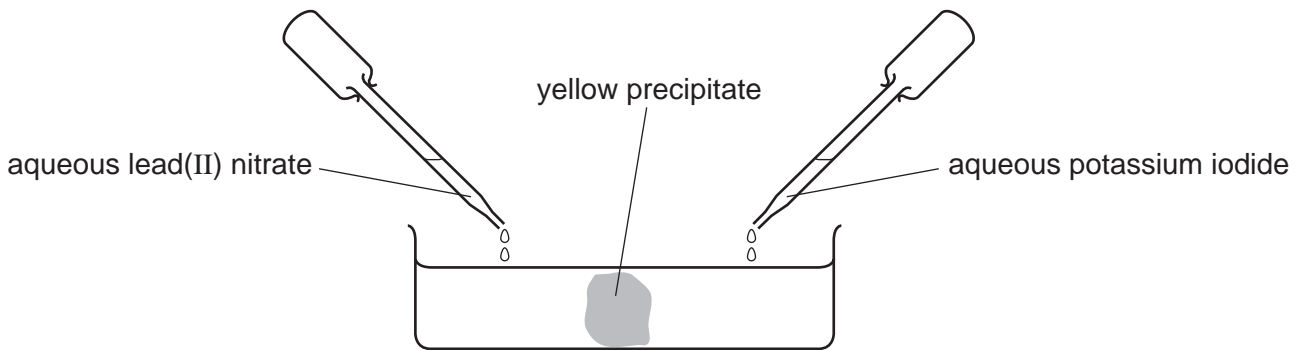
A copy of the Periodic Table is printed on page 16.

You may use a calculator.

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



- 1 Aqueous lead(II) nitrate and aqueous potassium iodide are added to a dish containing water, as shown.

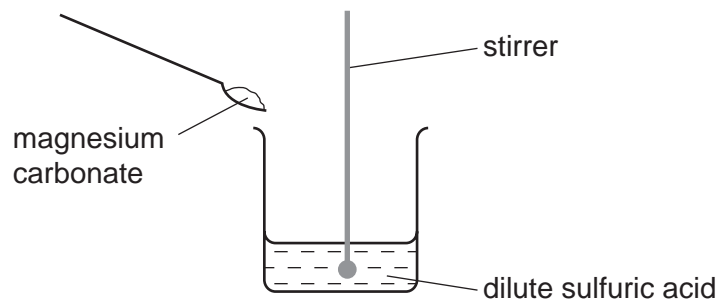


A yellow precipitate forms after a few minutes.

Which process occurs before the precipitate forms?

- A diffusion
 - B distillation
 - C fermentation
 - D filtration
- 2 A student carries out an experiment to prepare pure magnesium sulfate crystals.

The diagram shows the first stage of the preparation.



He adds magnesium carbonate until no more reacts.

Which process should he use for the next stage?

- A crystallisation
- B evaporation
- C filtration
- D neutralisation

- 3 A student separates salt from a mixture of salt and sand.

What is the correct order of steps for the student to take?

- A filter → evaporate → shake with water
- B filter → shake with water → evaporate
- C shake with water → evaporate → filter
- D shake with water → filter → evaporate

- 4 Atom X has 8 more electrons than atom Y.

Student 1 says they are in the same group.

Student 2 says they are unreactive.

Which students can be correct?

	student 1	student 2
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 5 Which number is different for isotopes of the same element?

- A number of electrons
- B number of full shells
- C number of nucleons
- D number of protons

- 6 Which atom has two more electrons than an atom of a noble gas?

- A aluminium
- B bromine
- C calcium
- D rubidium

7 Statements 1, 2 and 3 are about diamond and graphite.

- 1 They are different solid forms of the same element.
- 2 They each conduct electricity.
- 3 They have atoms that form four equally strong bonds.

Which statements are correct?

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

8 Covalent bonds are formed when electrons are1..... . Covalent compounds have2..... electrical conductivity.

Which words correctly complete gaps 1 and 2?

	1	2
A	shared	high
B	shared	low
C	transferred	high
D	transferred	low

9 Which change to an atom occurs when it forms a positive ion?

- A** It gains electrons.
B It gains protons.
C It loses electrons.
D It loses protons.

10 For each atom of carbon present in a molecule, there is an equal number of atoms of oxygen but twice as many atoms of hydrogen.

What is the formula of the molecule?

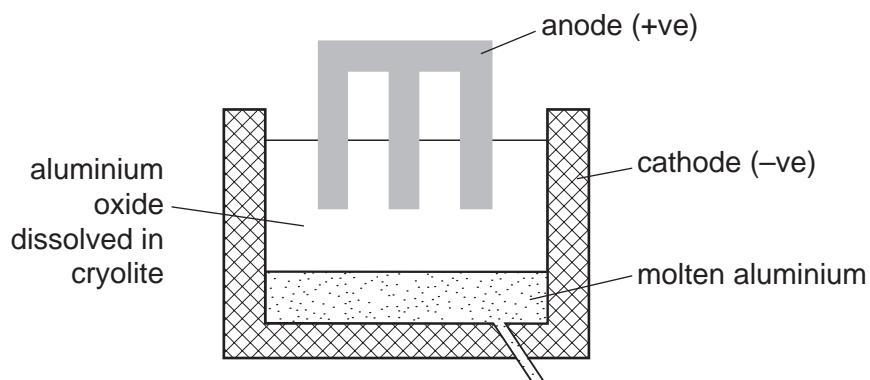
- A** $C_2H_2O_2$ **B** $C_2H_2O_4$ **C** $C_2H_4O_2$ **D** C_2H_6O

11 Water is formed when 48 g of oxygen combine with 6 g of hydrogen.

What mass of oxygen combines with 2 g of hydrogen?

- A** 12 g **B** 16 g **C** 96 g **D** 144 g

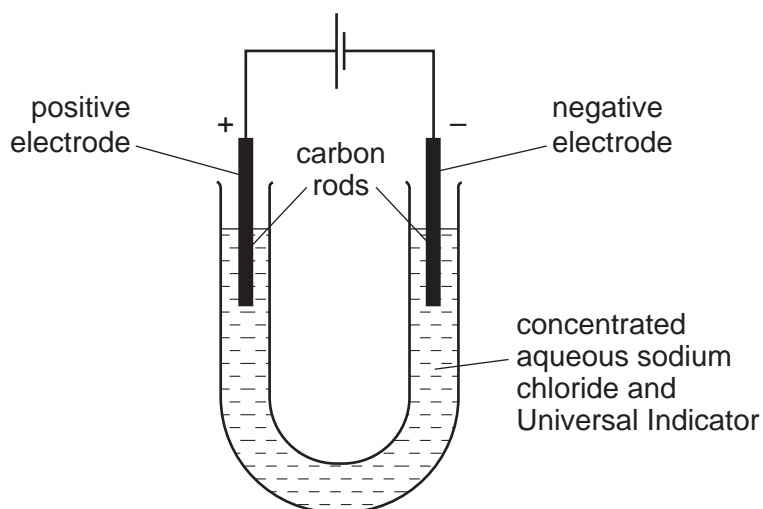
12 The diagram shows how aluminium is manufactured by electrolysis.



What are the anode and cathode made of?

	anode	cathode
A	aluminium	aluminium
B	aluminium	graphite
C	graphite	aluminium
D	graphite	graphite

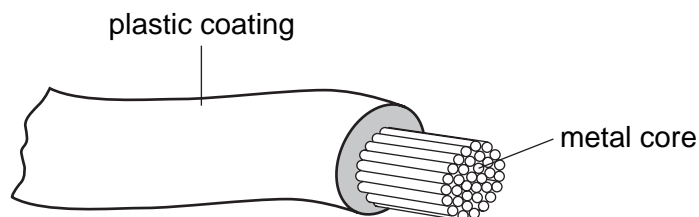
13 The diagram shows the electrolysis of concentrated aqueous sodium chloride.



What is the colour of the Universal Indicator at each electrode after five minutes?

	colour at anode (+ electrode)	colour at cathode (- electrode)
A	blue/purple	red
B	red	blue/purple
C	red	colourless
D	colourless	blue/purple

14 The diagram shows an electrical cable.



Which statement about the substances used is correct?

- A The coating is plastic because it conducts electricity well.
- B The core is copper because it conducts electricity well.
- C The core is copper because it is cheap and strong.
- D The core is iron because it is cheap and strong.

15 Substance X requires oxygen in order to produce energy.

It does **not** form carbon dioxide as a result of this energy production.

What is substance X?

- A hydrogen
- B natural gas
- C petrol
- D ^{235}U

16 When an acid is added to an alkali the temperature rises.

Which words describe this reaction?

- A decomposition and endothermic
- B decomposition and exothermic
- C neutralisation and endothermic
- D neutralisation and exothermic

17 When blue copper(II) sulfate is heated, a white solid and water are formed.

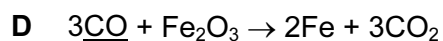
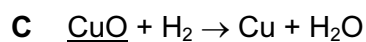
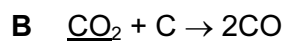
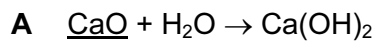
The white solid turns blue and gives out heat when water is added to it.

Which terms describe the blue copper(II) sulfate and the reactions?

	the blue copper(II) sulfate is	reaction
A	a mixture	can be reversed
B	a mixture	cannot be reversed
C	hydrated	can be reversed
D	hydrated	cannot be reversed

18 The equations represent redox reactions.

In which equation is the underlined substance acting as a reducing agent?



19 Which change does **not** increase the speed of reaction between zinc and hydrochloric acid?

A adding a catalyst

B decreasing the temperature

C decreasing the particle size of the zinc

D using more concentrated acid

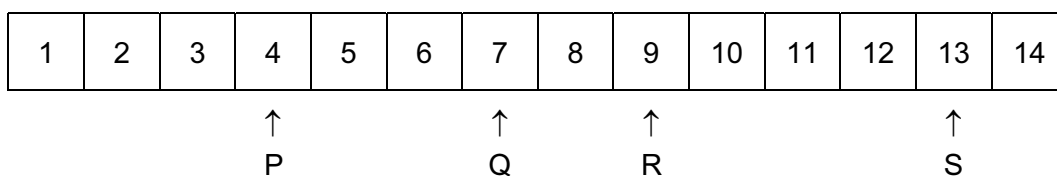
20 An aqueous solution Y contains both barium ions and silver ions.

In separate experiments, dilute sulfuric acid and dilute hydrochloric acid are added to solution Y.

Which of these acids causes a precipitate to form in solution Y?

	dilute sulfuric acid	dilute hydrochloric acid
A	✓	✓
B	✓	x
C	x	✓
D	x	x

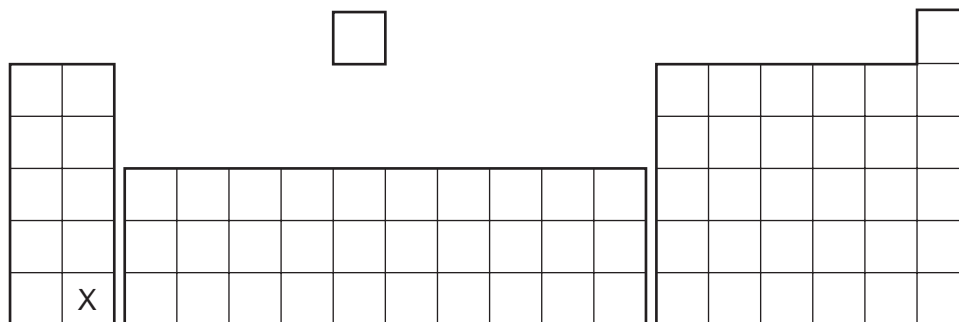
21 The diagram shows the pH values of four solutions.



Which of these solutions are alkaline?

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

22 The diagram shows the position of an element X in the Periodic Table.



What is the correct classification of element X and its oxide?

	X	oxide of X
A	metal	acidic
B	metal	basic
C	non-metal	acidic
D	non-metal	basic

23 Salts can be prepared by reacting a dilute acid

- 1 with a metal;
- 2 with a base;
- 3 with a carbonate.

Which methods could be used to prepare copper(II) chloride?

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

- 24 Astatine is an element in Group VII of the Periodic Table. It has only ever been produced in very small amounts.

What is the best description of its likely properties?

	colour	state	reaction with aqueous potassium iodide
A	black	solid	no reaction
B	dark brown	gas	brown colour
C	green	solid	no reaction
D	yellow	liquid	brown colour

- 25 Elements in Group 0 of the Periodic Table have uses.

These noble gases are1..... and this explains why argon2..... be used in lamps.

Which words correctly complete gaps 1 and 2?

	1	2
A	reactive	can
B	reactive	cannot
C	unreactive	can
D	unreactive	cannot

- 26 The table gives information about four elements.

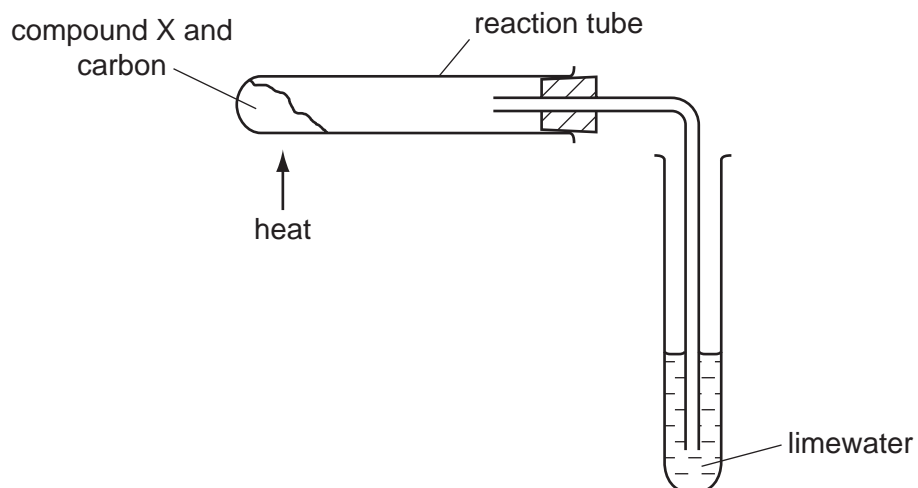
Which element is a transition metal?

	colour of element	electrical conductivity of element	colour of oxide
A	black	high	colourless
B	colourless	low	white
C	grey	high	red
D	yellow	low	colourless

- 27 Which statement about alloys is **not** correct?

- A** Alloys are more expensive than the metals they are made from.
- B** Alloys are mixtures of different metals.
- C** Alloys are not as strong as the metals they are made from.
- D** Alloys conduct electricity well.

28 Compound X is heated with carbon using the apparatus shown.



A brown solid is formed in the reaction tube and the limewater turns cloudy.

What is compound X?

- A calcium oxide
- B copper(II) oxide
- C magnesium oxide
- D sodium oxide

29 Some reactions of three metals are listed in the table.

metal	reacts with dilute hydrochloric acid	metal oxide is reduced by carbon
P	yes	yes
Q	no	yes
R	yes	no

What is the order of reactivity of the metals?

	most reactive	→	least reactive
A	P	R	Q
B	R	P	Q
C	R	Q	P
D	Q	P	R

30 Which property do **all** metals have?

- A They are soluble in water.
- B They conduct electricity.
- C They have high melting points.
- D They react with dilute sulfuric acid.

31 Which object is **least** likely to contain aluminium?

- A a bicycle frame
- B a hammer
- C a saucepan
- D an aeroplane body

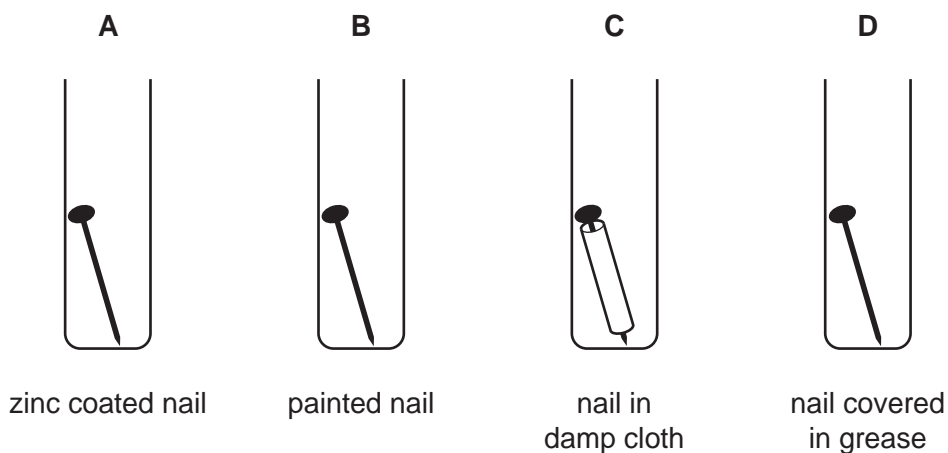
32 A newspaper article claims that carbon dioxide is formed as follows.

- 1 during respiration
- 2 when calcium carbonate reacts with hydrochloric acid
- 3 when methane burns in air

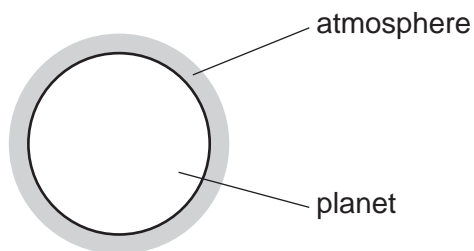
Which statements are correct?

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

33 Which iron nail rusts?



34 A new planet has been discovered and its atmosphere has been analysed.



The table shows the composition of the atmosphere.

gas	percentage by volume
carbon dioxide	4
nitrogen	72
oxygen	24

Which gases are present in the atmosphere of the planet in a higher percentage than they are in the Earth's atmosphere?

- A carbon dioxide and oxygen
- B carbon dioxide only
- C nitrogen and oxygen
- D nitrogen only

35 Water must be purified before it is suitable for use in the home.

Which processes are used to remove solid impurities and bacteria?

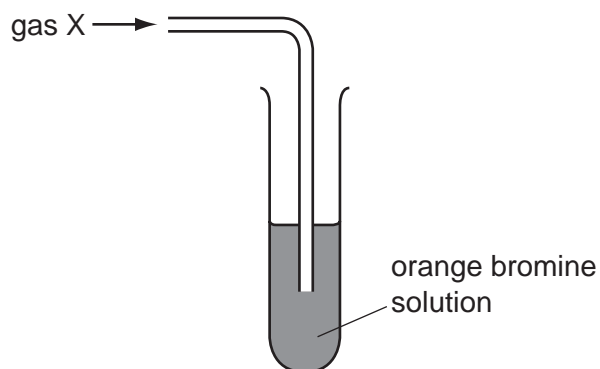
	to remove solid impurities	to remove bacteria
A	chlorination	chlorination
B	chlorination	filtration
C	filtration	chlorination
D	filtration	filtration

36 Fertilisers are used to provide three of the elements needed for plant growth.

Which two compounds would give a fertiliser containing all three of these elements?

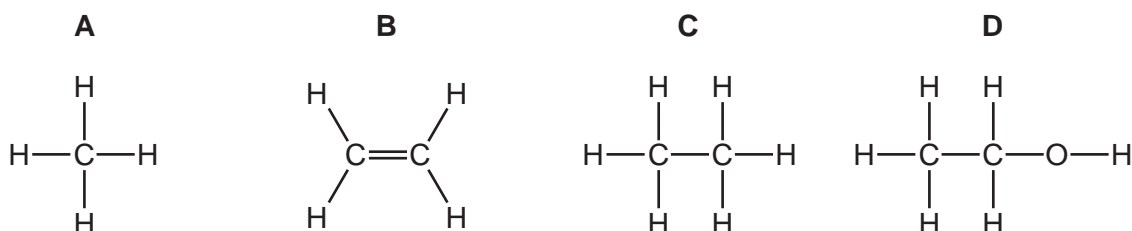
- A $\text{Ca}(\text{NO}_3)_2$ and $(\text{NH}_4)_2\text{SO}_4$
- B $\text{Ca}(\text{NO}_3)_2$ and $(\text{NH}_4)_3\text{PO}_4$
- C KNO_3 and $(\text{NH}_4)_2\text{SO}_4$
- D KNO_3 and $(\text{NH}_4)_3\text{PO}_4$

37 The apparatus shows an experiment used to test gas X.



The bromine solution quickly becomes colourless.

What is the structure of gas X?



38 Which statement about petroleum is **not** correct?

- A** It can be separated into useful substances by fractional distillation.
- B** It consists mainly of hydrocarbons.
- C** It is found underground in many parts of the world.
- D** Its main use is for making lubricants and polishes.

39 Butene and hexene belong to the same homologous series.

What is the same for butene and hexene?

- A** boiling point
- B** functional group
- C** number of hydrogen atoms per molecule
- D** relative molecular mass

40 The table shows the formulae of members of the alkane series.

name of compound	formula
methane	CH_4
ethane	C_2H_6
propane	?
butane	C_4H_{10}
pentane	C_5H_{12}

What is the formula of propane?

- A** C_2H_8 **B** C_3H_7 **C** C_3H_8 **D** C_3H_9

DATA SHEET
The Periodic Table of the Elements

		Group																																																																																																																																																																																																																																						
		I	II	III	IV	V	VI	VII	VIII	IX	X																																																																																																																																																																																																																													
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7 Li Lithium 3	9 Be Beryllium 4	<table style="width: 100%; border-collapse: collapse;"> <tr> <td>11 B Boron 5</td> <td>12 C Carbon 6</td> <td>13 Al Aluminium 13</td> <td>14 Si Silicon 14</td> <td>15 P Phosphorus 15</td> <td>16 S Sulfur 16</td> <td>17 Cl Chlorine 17</td> <td>18 Ar Argon 18</td> <td>19 F Fluorine 9</td> <td>20 Ne Neon 10</td> </tr> <tr> <td>27 Al Aluminium 13</td> <td>28 Si Silicon 14</td> <td>29 K Potassium 19</td> <td>30 Ca Calcium 20</td> <td>31 Sc Scandium 21</td> <td>32 Ti Titanium 22</td> <td>33 V Vanadium 23</td> <td>34 Cr Chromium 24</td> <td>35 Mn Manganese 25</td> <td>36 Fe Iron 26</td> <td>37 Ni Nickel 28</td> <td>38 Cu Copper 29</td> <td>39 Zn Zinc 30</td> <td>40 Ga Gallium 31</td> <td>41 Ge Germanium 32</td> <td>42 As Arsenic 33</td> <td>43 Se Selenium 34</td> <td>44 Br Bromine 35</td> <td>45 Kr Krypton 36</td> </tr> <tr> <td>55 Co Cobalt 27</td> <td>56 Ni Nickel 28</td> <td>57 Cd Cadmium 48</td> <td>58 Pd Palladium 46</td> <td>59 Rh Rhodium 45</td> <td>60 Pt Platinum 78</td> <td>61 Au Gold 79</td> <td>62 Hg Mercury 80</td> <td>63 Tl Thallium 81</td> <td>64 Pb Lead 82</td> <td>65 Bi Bismuth 83</td> <td>66 Po Polonium 84</td> <td>67 At Astatine 85</td> <td>68 Rn Radon 86</td> </tr> <tr> <td>75 Rh Rhodium 45</td> <td>76 Pd Palladium 46</td> <td>77 Ag Silver 47</td> <td>78 Cd Cadmium 48</td> <td>79 In Indium 49</td> <td>80 Sn Tin 50</td> <td>81 Sb Antimony 51</td> <td>82 Te Tellurium 52</td> <td>83 I Iodine 53</td> <td>84 Xe Xenon 54</td> </tr> <tr> <td>85 Rb Rubidium 37</td> <td>86 Sr Strontium 38</td> <td>87 Y Yttrium 39</td> <td>88 Zr Zirconium 40</td> <td>89 Nb Niobium 41</td> <td>90 Mo Molybdenum 42</td> <td>91 Tc Technetium 43</td> <td>92 Ru Ruthenium 44</td> <td>93 Rh Rhodium 45</td> <td>94 Pd Palladium 46</td> <td>95 Ag Silver 47</td> <td>96 Cd Cadmium 48</td> <td>97 Hg Mercury 80</td> <td>98 Tl Thallium 81</td> <td>99 Pb Lead 82</td> <td>100 Bi Bismuth 83</td> <td>101 Po Polonium 84</td> <td>102 At Astatine 85</td> <td>103 Rn Radon 86</td> </tr> <tr> <td>133 Cs Caesium 55</td> <td>137 Ba Barium 56</td> <td>138 La Lanthanum 57</td> <td>139 Ce Cerium 58</td> <td>140 Pr Praseodymium 59</td> <td>141 Nd Neodymium 60</td> <td>142 Pm Promethium 61</td> <td>143 Sm Samarium 62</td> <td>144 Eu Europium 63</td> <td>145 Gd Gadolinium 64</td> <td>146 Tb Terbium 65</td> <td>147 Dy Dysprosium 66</td> <td>148 Ho Holmium 67</td> <td>149 Er Erbium 68</td> <td>150 Tm Thulium 69</td> <td>151 Yb Ytterbium 70</td> <td>152 Lu Lutetium 71</td> <td>153 Fr Francium 87</td> <td>154 Ra Radium 88</td> <td>155 Ac Actinium 89</td> </tr> <tr> <td>103 La Lanthanum 57</td> <td>104 Ce Cerium 58</td> <td>105 Pr Praseodymium 59</td> <td>106 Nd Neodymium 60</td> <td>107 Pm Promethium 61</td> <td>108 Sm Samarium 62</td> <td>109 Eu Europium 63</td> <td>110 Gd Gadolinium 64</td> <td>111 Tb Terbium 65</td> <td>112 Dy Dysprosium 66</td> <td>113 Ho Holmium 67</td> <td>114 Er Erbium 68</td> <td>115 Tm Thulium 69</td> <td>116 Yb Ytterbium 70</td> <td>117 Lu 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Ho</td> <td>114 Er</td> <td>115 Tm</td> <td>116 Yb</td> <td>117 Lu</td> <td>118 Fr</td> <td>119 Ra</td> <td>120 Ac</td> </tr> </table>										11 B Boron 5	12 C Carbon 6	13 Al Aluminium 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulfur 16	17 Cl Chlorine 17	18 Ar Argon 18	19 F Fluorine 9	20 Ne Neon 10	27 Al Aluminium 13	28 Si Silicon 14	29 K Potassium 19	30 Ca Calcium 20	31 Sc Scandium 21	32 Ti Titanium 22	33 V Vanadium 23	34 Cr Chromium 24	35 Mn Manganese 25	36 Fe Iron 26	37 Ni Nickel 28	38 Cu Copper 29	39 Zn Zinc 30	40 Ga Gallium 31	41 Ge Germanium 32	42 As Arsenic 33	43 Se Selenium 34	44 Br Bromine 35	45 Kr Krypton 36	55 Co Cobalt 27	56 Ni Nickel 28	57 Cd Cadmium 48	58 Pd Palladium 46	59 Rh Rhodium 45	60 Pt Platinum 78	61 Au Gold 79	62 Hg Mercury 80	63 Tl Thallium 81	64 Pb Lead 82	65 Bi Bismuth 83	66 Po Polonium 84	67 At Astatine 85	68 Rn Radon 86	75 Rh Rhodium 45	76 Pd Palladium 46	77 Ag Silver 47	78 Cd Cadmium 48	79 In Indium 49	80 Sn Tin 50	81 Sb Antimony 51	82 Te Tellurium 52	83 I Iodine 53	84 Xe Xenon 54	85 Rb Rubidium 37	86 Sr Strontium 38	87 Y Yttrium 39	88 Zr Zirconium 40	89 Nb Niobium 41	90 Mo Molybdenum 42	91 Tc Technetium 43	92 Ru Ruthenium 44	93 Rh Rhodium 45	94 Pd Palladium 46	95 Ag Silver 47	96 Cd Cadmium 48	97 Hg Mercury 80	98 Tl Thallium 81	99 Pb Lead 82	100 Bi Bismuth 83	101 Po Polonium 84	102 At Astatine 85	103 Rn Radon 86	133 Cs Caesium 55	137 Ba Barium 56	138 La Lanthanum 57	139 Ce Cerium 58	140 Pr Praseodymium 59	141 Nd Neodymium 60	142 Pm Promethium 61	143 Sm Samarium 62	144 Eu Europium 63	145 Gd Gadolinium 64	146 Tb Terbium 65	147 Dy Dysprosium 66	148 Ho Holmium 67	149 Er Erbium 68	150 Tm Thulium 69	151 Yb Ytterbium 70	152 Lu Lutetium 71	153 Fr Francium 87	154 Ra Radium 88	155 Ac Actinium 89	103 La Lanthanum 57	104 Ce Cerium 58	105 Pr Praseodymium 59	106 Nd Neodymium 60	107 Pm Promethium 61	108 Sm Samarium 62	109 Eu Europium 63	110 Gd Gadolinium 64	111 Tb Terbium 65	112 Dy Dysprosium 66	113 Ho Holmium 67	114 Er Erbium 68	115 Tm Thulium 69	116 Yb Ytterbium 70	117 Lu Lutetium 71	118 Fr Francium 87	119 Ra Radium 88	120 Ac Actinium 89	137 Ba Barium 56	138 La Lanthanum 57	139 Ce Cerium 58	140 Pr Praseodymium 59	141 Nd Neodymium 60	142 Pm Promethium 61	143 Sm Samarium 62	144 Eu Europium 63	145 Gd Gadolinium 64	146 Tb Terbium 65	147 Dy Dysprosium 66	148 Ho Holmium 67	149 Er Erbium 68	150 Tm Thulium 69	151 Yb Ytterbium 70	152 Lu Lutetium 71	153 Fr Francium 87	154 Ra Radium 88	155 Ac Actinium 89	103 La Lanthanum 57	104 Ce Cerium 58	105 Pr Praseodymium 59	106 Nd Neodymium 60	107 Pm Promethium 61	108 Sm Samarium 62	109 Eu Europium 63	110 Gd Gadolinium 64	111 Tb Terbium 65	112 Dy Dysprosium 66	113 Ho Holmium 67	114 Er Erbium 68	115 Tm Thulium 69	116 Yb Ytterbium 70	117 Lu Lutetium 71	118 Fr Francium 87	119 Ra Radium 88	120 Ac Actinium 89	137 Ba Barium 56	138 La Lanthanum 57	139 Ce Cerium 58	140 Pr Praseodymium 59	141 Nd Neodymium 60	142 Pm Promethium 61	143 Sm Samarium 62	144 Eu Europium 63	145 Gd Gadolinium 64	146 Tb Terbium 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Er	115 Tm	116 Yb	117 Lu	118 Fr	119 Ra	120 Ac
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a = relative atomic mass
X = atomic symbol
b = proton (atomic) number

Key

	a	X	b
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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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