



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY

0620/11

Paper 1 Multiple Choice

October/November 2010

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.

You may use a calculator.

This document consists of **17** printed pages and **3** blank pages.



1 In which changes do the particles move further apart?

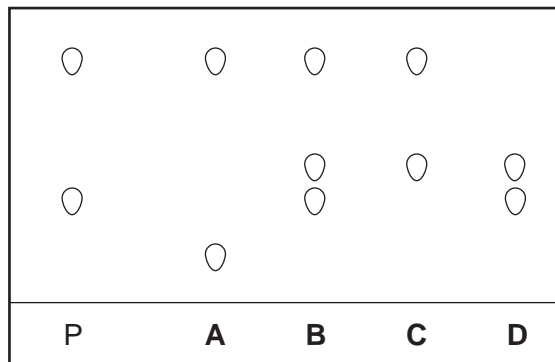


- A** W and X **B** W and Z **C** X and Y **D** Y and Z

2 Chromatography is used to find out if a banned dye, P, is present in foodstuffs.

The results are shown in the diagram.

Which foodstuff contains P?



3 A mixture of ethanol and methanol are separated by fractional distillation.

This method of separation depends on a difference in property X of these two alcohols.

What is property X?

- A** boiling point
B colour
C melting point
D solubility

4 Element X has a nucleon (mass) number of 19 and a proton (atomic) number of 9.

To which group in the Periodic Table does it belong?

- A** I **B** III **C** VII **D** 0

5 The table shows the structure of different atoms and ions.

| particle | proton number | nucleon number | number of protons | number of neutrons | number of electrons |
|------------------|---------------|----------------|-------------------|--------------------|---------------------|
| Mg | 12 | 24 | 12 | W | 12 |
| Mg ²⁺ | X | 24 | 12 | 12 | 10 |
| F | 9 | 19 | 9 | Y | 9 |
| F ⁻ | 9 | 19 | 9 | 10 | Z |

What are the values of W, X, Y and Z?

| | W | X | Y | Z |
|----------|----|----|----|----|
| A | 10 | 10 | 9 | 9 |
| B | 10 | 12 | 10 | 9 |
| C | 12 | 10 | 9 | 10 |
| D | 12 | 12 | 10 | 10 |

6 Two isotopes of hydrogen are ${}^1_1\text{H}$ and ${}^2_1\text{H}$.

Which diagram shows the arrangement of particles in the two isotopes?

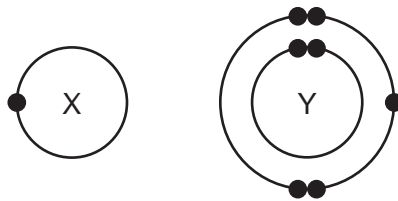
| | ${}^1_1\text{H}$ | ${}^2_1\text{H}$ | key |
|----------|------------------|------------------|---|
| A | | | ⊖ = an electron ⊕ = a proton ⊘ = a neutron ○ = a nucleus |
| B | | | |
| C | | | |
| D | | | |

7 Element X is shiny and can be formed into a sheet by hammering.

Which row correctly describes the properties of element X?

| | conducts electricity | melts below 25 °C |
|----------|----------------------|-------------------|
| A | ✓ | ✓ |
| B | ✓ | x |
| C | x | ✓ |
| D | x | x |

8 The electronic structures of atoms X and Y are shown.

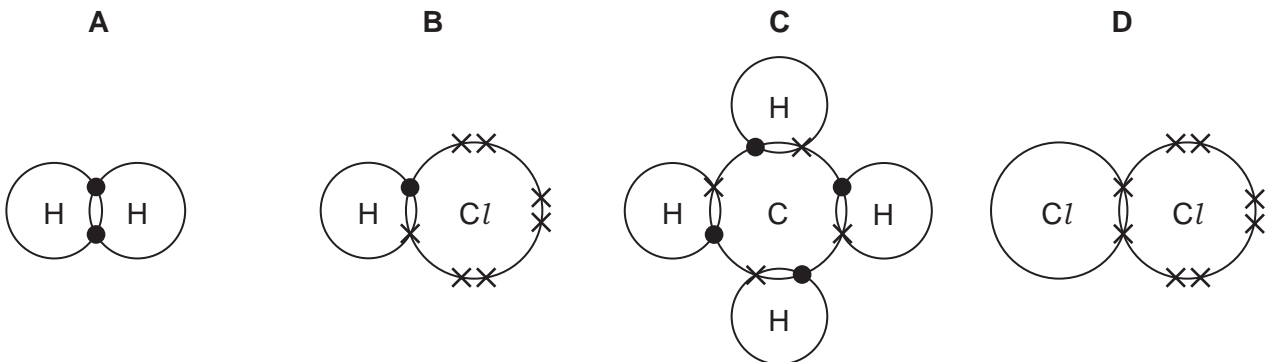


X and Y form a covalent compound.

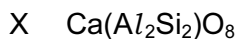
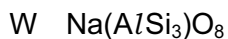
What is its formula?

- A** XY₅ **B** XY₃ **C** XY **D** X₃Y

9 Which diagram does **not** show the outer shell electrons in the molecule correctly?



10 The chemical compositions of two substances, W and X, are given.

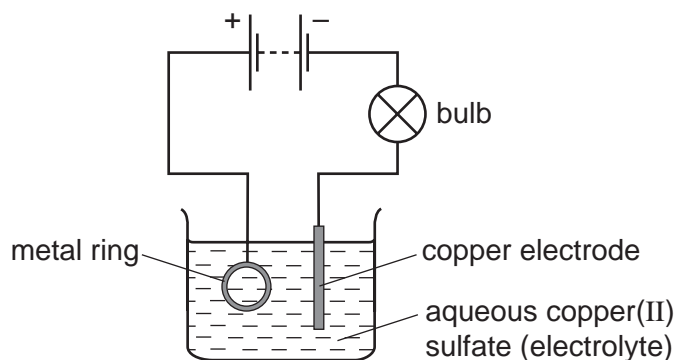


Which statements are correct?

- 1 W and X contain the same amount of oxygen.
- 2 W contains three times as much silicon as X.
- 3 X contains twice as much aluminium as W.

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

11 The diagram shows apparatus used in an attempt to electroplate a metal ring with copper.

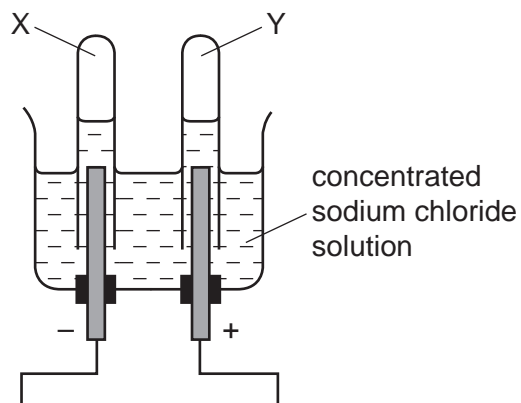


The experiment did not work.

What change is needed in the experiment to make it work?

- A** Add solid copper(II) sulfate to the electrolyte.
- B** Increase the temperature of the electrolyte.
- C** Replace the copper electrode by a carbon electrode.
- D** Reverse the connections to the battery.

12 When concentrated sodium chloride solution is electrolysed, elements X and Y are formed.

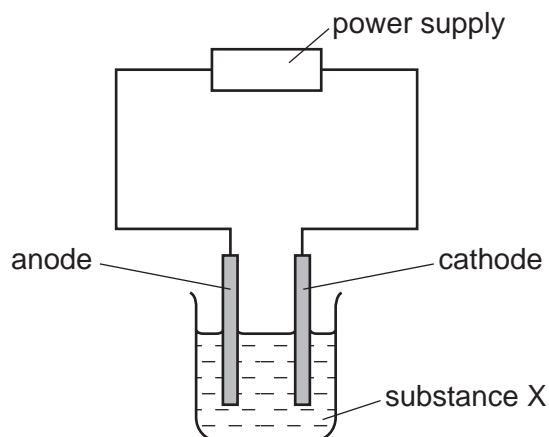


What are X and Y?

| | X | Y |
|----------|----------|----------|
| A | chlorine | hydrogen |
| B | hydrogen | chlorine |
| C | hydrogen | oxygen |
| D | oxygen | hydrogen |

13 Substance X was electrolysed in an electrolytic cell.

A coloured gas was formed at the anode and a metal was formed at the cathode.



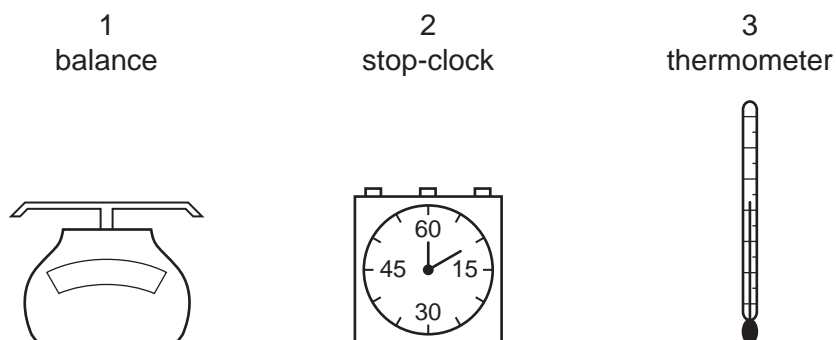
What is substance X?

- A** aqueous sodium chloride
- B** molten lead bromide
- C** molten zinc oxide
- D** solid sodium chloride

14 Which is an endothermic process?

- A burning hydrogen
- B distilling petroleum
- C reacting potassium with water
- D using petrol in a motor car engine

15 The diagrams show some pieces of laboratory equipment.



Which equipment is needed to find out whether dissolving salt in water is an endothermic process?

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

16 Calcium carbonate was reacted with hydrochloric acid in a conical flask. The flask was placed on a balance and the mass of the flask and contents was recorded as the reaction proceeded.

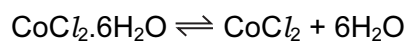
During the reaction, carbon dioxide gas was given off.

The reaction was carried out at two different temperatures.

Which row is correct?

| | change in mass | temperature at which mass changed more quickly |
|---|----------------|--|
| A | decrease | higher temperature |
| B | decrease | lower temperature |
| C | increase | higher temperature |
| D | increase | lower temperature |

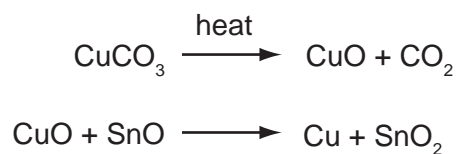
- 17 When pink crystals of cobalt(II) chloride are heated, steam is given off and the colour of the solid changes to blue.



What happens when water is added to the blue solid?

| | colour | temperature |
|----------|-----------------|-------------|
| A | changes to pink | decreases |
| B | changes to pink | increases |
| C | remains blue | decreases |
| D | remains blue | increases |

- 18 The red colour in some pottery glazes may be formed as a result of the reactions shown.



These equations show that1..... is oxidised and2..... is reduced.

Which substances correctly complete gaps 1 and 2 in the above sentence?

| | 1 | 2 |
|----------|-------------------|------------------|
| A | CO ₂ | SnO ₂ |
| B | CuCO ₃ | CuO |
| C | CuO | SnO |
| D | SnO | CuO |

19 Some barium iodide is dissolved in water.

Aqueous lead(II) nitrate is added to the solution until no more precipitate forms.

This precipitate, X, is filtered off.

Dilute sulfuric acid is added to the filtrate and another precipitate, Y, forms.

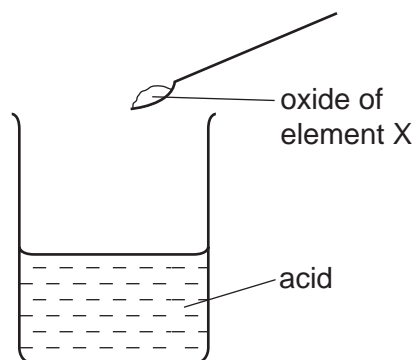
What are the colours of precipitates X and Y?

| | X | Y |
|----------|--------|--------|
| A | white | white |
| B | white | yellow |
| C | yellow | white |
| D | yellow | yellow |

20 Which reaction will result in a decrease in pH?

- A** adding calcium hydroxide to acid soil
- B** adding citric acid to sodium hydrogen carbonate solution
- C** adding sodium chloride to silver nitrate solution
- D** adding sodium hydroxide to hydrochloric acid

21 The oxide of element X was added to an acid. It reacted to form a salt and water.



What is the pH of the acid before the reaction and what type of element is X?

| | pH | type of element X |
|----------|----------------|-------------------|
| A | greater than 7 | metal |
| B | greater than 7 | non-metal |
| C | less than 7 | metal |
| D | less than 7 | non-metal |

22 A salt is made by adding an excess of an insoluble metal oxide to an acid.

How can the excess metal oxide be removed?

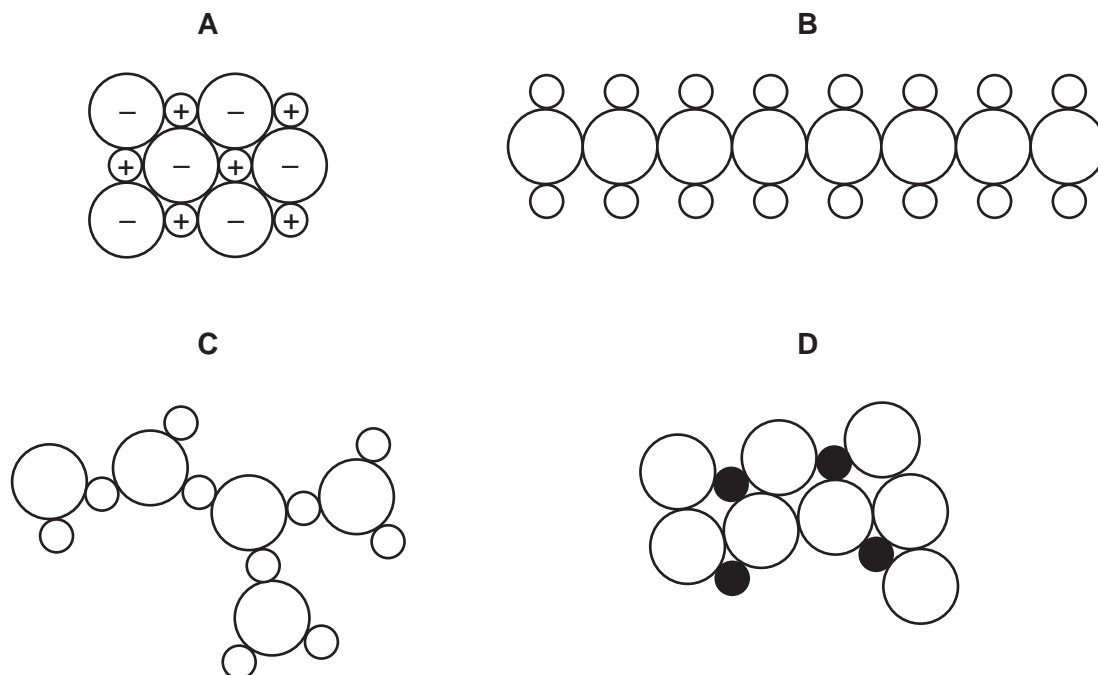
- A** chromatography
- B** crystallisation
- C** distillation
- D** filtration

23 The table compares the properties of Group I elements with those of transition elements.

Which entry in the table is correct?

| | property | Group I elements | transition elements |
|----------|-------------------------|------------------|---------------------|
| A | catalytic activity | low | high |
| B | density | high | low |
| C | electrical conductivity | low | high |
| D | melting point | high | low |

27 Which diagram could represent the structure of an alloy?



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

- A Their boiling points are low.
- B Their densities are low.
- C They conduct electricity.
- D They react with water.

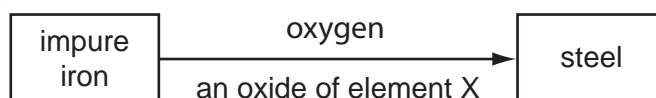
29 Some metals react readily with dilute hydrochloric acid.

Some metals can be extracted by heating their oxides with carbon.

For which metal are **both** statements correct?

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

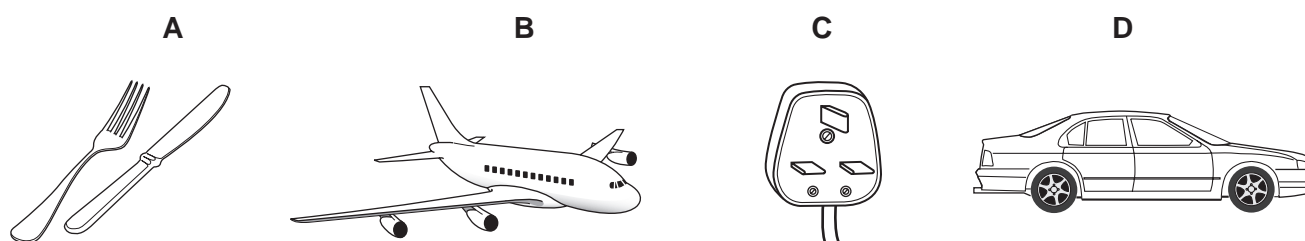
30 The diagram shows the materials used in the production of steel from impure iron.



What could element X be?

- A calcium
- B carbon
- C nitrogen
- D sulfur

31 Which diagram shows a common use of stainless steel?



32 Why is chlorination used in water treatment?

- A to kill bacteria in the water
- B to make the water neutral
- C to make the water taste better
- D to remove any salt in the water

33 Which pollutant, found in car exhaust fumes, does **not** come from the fuel?

- A carbon monoxide
- B hydrocarbons
- C lead compounds
- D nitrogen oxides

34 Which information about carbon dioxide and methane is correct?

| | | carbon dioxide | methane |
|----------|-----------------------------------|----------------|---------|
| A | formed when vegetation decomposes | ✓ | ✗ |
| B | greenhouse gas | ✓ | ✓ |
| C | present in unpolluted air | ✗ | ✗ |
| D | produced during respiration | ✗ | ✓ |

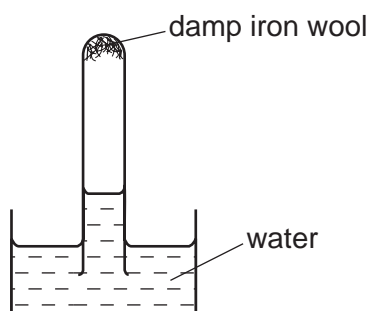
35 A bag of fertiliser 'Watch it grow' contains ammonium sulfate and potassium sulfate.

Which of the three elements N, P and K does 'Watch it grow' contain?

| | N | P | K |
|----------|---|---|---|
| A | ✓ | ✓ | ✗ |
| B | ✓ | ✗ | ✓ |
| C | ✗ | ✓ | ✗ |
| D | ✗ | ✗ | ✓ |

36 A test-tube containing damp iron wool is inverted in water.

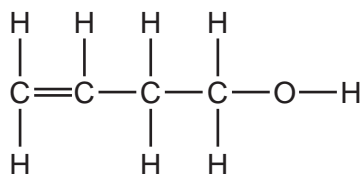
After three days, the water level inside the test-tube has risen.



Which statement explains this rise?

- A** Iron oxide has been formed.
- B** Iron wool has been reduced.
- C** Oxygen has been formed.
- D** The temperature of the water has risen.

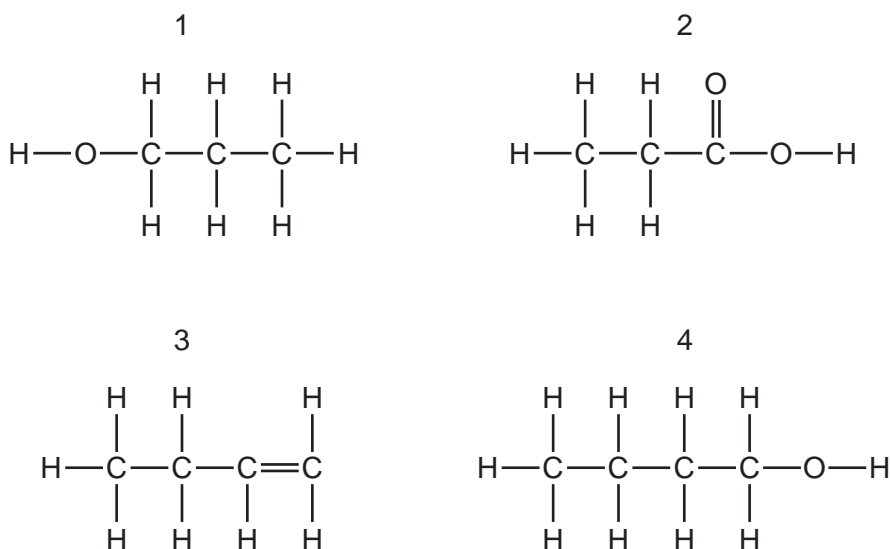
37 The diagram shows the structure of a compound.



To which classes of compound does this molecule belong?

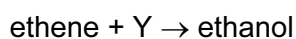
| | alkane | alkene | alcohol |
|----------|--------|--------|---------|
| A | no | no | no |
| B | no | yes | yes |
| C | yes | no | yes |
| D | yes | yes | yes |

38 Which structures show compounds that are members of the same homologous series?



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

39 Ethene reacts with Y to produce ethanol.

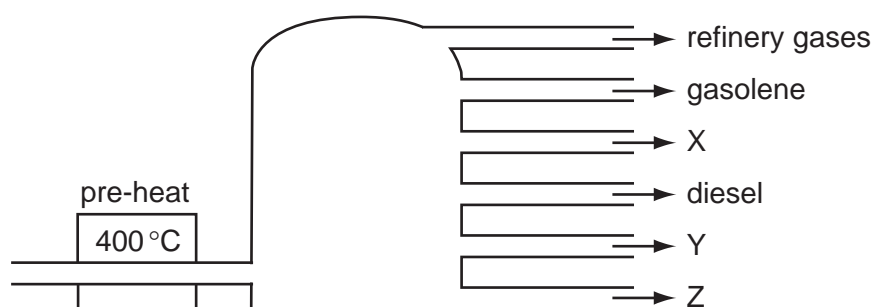


What is Y?

- A** hydrogen
B oxygen
C steam
D yeast

40 In an oil refinery, crude oil is separated into useful fractions.

The diagram shows some of these fractions.



What are fractions X, Y and Z?

| | X | Y | Z |
|----------|---------------------|---------------------|---------------------|
| A | fuel oil | bitumen | paraffin (kerosene) |
| B | fuel oil | paraffin (kerosene) | bitumen |
| C | paraffin (kerosene) | bitumen | fuel oil |
| D | paraffin (kerosene) | fuel oil | bitumen |

DATA SHEET
The Periodic Table of the Elements

| | | Group | | | | | | | | | | | | | | | |
|-----------------------------------|------------------------------------|-------------------------------------|------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|----------------------------------|-----------------------------------|------------------------------------|----------------------------------|------------------------------------|------------------------------------|------------------------------------|----------------------------------|----------------------------------|
| | | I | II | III | IV | V | VI | VII | VIII | IX | X | O | | | | | |
| | | 1 H Hydrogen 1 | | | | | | | | | | | | | | | |
| 7 Li Lithium 3 | 9 Be Beryllium 4 | | | | | | | | | | | | | | | | |
| 23 Na Sodium 11 | 24 Mg Magnesium 12 | | | | | | | | | | | | | | | | |
| 39 K Potassium 19 | 40 Ca Calcium 20 | 45 Sc Scandium 21 | 48 Ti Titanium 22 | 51 V Vanadium 23 | 52 Cr Chromium 24 | 55 Mn Manganese 25 | 56 Fe Iron 26 | 59 Co Cobalt 27 | 59 Ni Nickel 28 | 64 Cu Copper 29 | 65 Zn Zinc 30 | 70 Ga Gallium 31 | 73 Ge Germanium 32 | 75 As Arsenic 33 | 79 Se Selenium 34 | 80 Br Bromine 35 | 84 Kr Krypton 36 |
| 85 Rb Rubidium 37 | 88 Sr Strontium 38 | 89 Y Yttrium 39 | 91 Zr Zirconium 40 | 93 Nb Niobium 41 | 96 Mo Molybdenum 42 | 101 Ru Ruthenium 44 | 101 Rh Rhodium 45 | 106 Pd Palladium 46 | 108 Ag Silver 47 | 112 Cd Cadmium 48 | 115 In Indium 49 | 119 Sn Tin 50 | 122 Sb Antimony 51 | 127 I Iodine 53 | 131 Xe Xenon 54 | | |
| 133 Cs Caesium 55 | 137 Ba Barium 56 | 139 La Lanthanum 57 | 178 Hf Hafnium 72 | 181 Ta Tantalum 73 | 184 W Tungsten 74 | 190 Os Osmium 76 | 192 Ir Iridium 77 | 195 Pt Platinum 78 | 197 Au Gold 79 | 201 Hg Mercury 80 | 204 Tl Thallium 81 | 207 Pb Lead 82 | 209 Bi Bismuth 83 | 210 Po Polonium 84 | 210 At Astatine 85 | 222 Rn Radon 86 | |
| 87 Fr Francium | 88 Ra Radium | 226 Ac Actinium | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|-----------------------------------|--|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------------------|-----------------------------------|--------------------------------------|---------------------------------------|---------------------------------------|------------------------------------|--|-------------------------------------|---------------------------------------|
| 140 Ce Cerium 58 | 141 Pr Praseodymium 59 | 144 Nd Neodymium 60 | 150 Sm Samarium 62 | 152 Eu Europium 63 | 157 Gd Gadolinium 64 | 159 Tb Terbium 65 | 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 | 232 Pa Protactinium 91 | 238 U Uranium 92 | 238 Np Neptunium 93 | 238 Pu Plutonium 94 | 238 Am Americium 95 | 238 Cm Curium 96 | 238 Bk Berkelium 97 | 238 Cf Californium 98 | 238 Es Einsteinium 99 | 238 Fm Fermium 100 | 238 Md Mendelevium 101 | 238 No Nobelium 102 | 238 Lr Lawrencium 103 |

| | | |
|---|----------|---|
| a | X | b |
|---|----------|---|

Key

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

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

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

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