



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY

0620/11

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)

* 4 3 1 9 0 4 1 5 7 5 *

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.

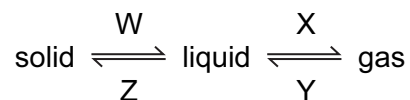
Read the instructions on the Answer Sheet very carefully.

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.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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

- 1 The changes that occur when a substance changes state are shown below.

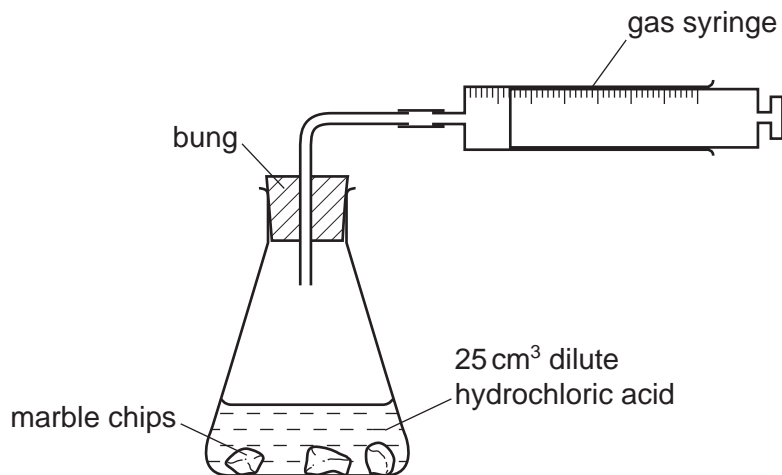


Which process, W, X, Y or Z, is occurring in the following four situations?

- 1 Butter melts on a warm day.
- 2 Water condenses on a cold surface.
- 3 The volume of liquid ethanol in an open beaker reduces.
- 4 Ice forms inside a freezer.

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| A | W | X | Y | Z |
| B | W | Y | X | Z |
| C | X | Y | Z | W |
| D | X | Z | Y | W |

- 2 A student uses the apparatus shown in the diagram below to measure the volume of carbon dioxide gas made when different masses of marble chips are added to 25 cm³ of dilute hydrochloric acid.



Which other items of apparatus are needed?

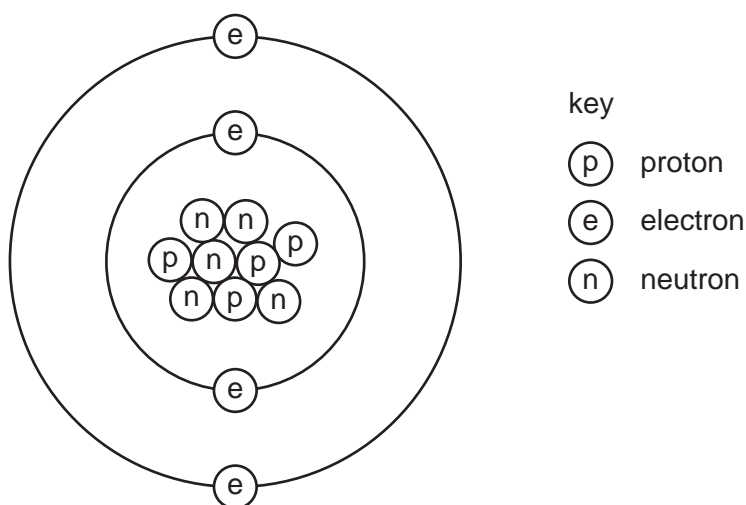
- A funnel and balance
- B funnel and stopwatch
- C measuring cylinder and balance
- D measuring cylinder and stopwatch

- 3 Atoms contain electrons, neutrons and protons.

What is the definition of nucleon number?

- A the number of neutrons in the nucleus of an atom
- B the number of protons in the nucleus of an atom
- C the total number of neutrons and protons in the nucleus of an atom
- D the total number of particles in an atom

- 4 The diagram shows the atomic structure of an element X.



What is X?

- A aluminium
 - B beryllium
 - C boron
 - D fluorine
- 5 Which statements comparing the properties of electrons, neutrons and protons are correct?

| | neutrons and protons are both heavier than electrons | only electrons and neutrons are charged |
|----------|--|---|
| A | ✓ | ✓ |
| B | ✓ | ✗ |
| C | ✗ | ✓ |
| D | ✗ | ✗ |

- 6 Rescuers are drilling through fallen rock in order to rescue some men trapped in a cave. The drill needs lubricating from time to time.

The following statements were made about the materials used for the drill tip and the lubricant and the reasons for their use.

- 1 Diamond was used for the drill tip as it does not conduct electricity.
- 2 Diamond was used for the drill tip as it is very hard.
- 3 Graphite was used as the lubricant as it conducts electricity.
- 4 Graphite was used as the lubricant as it is soft and flaky.

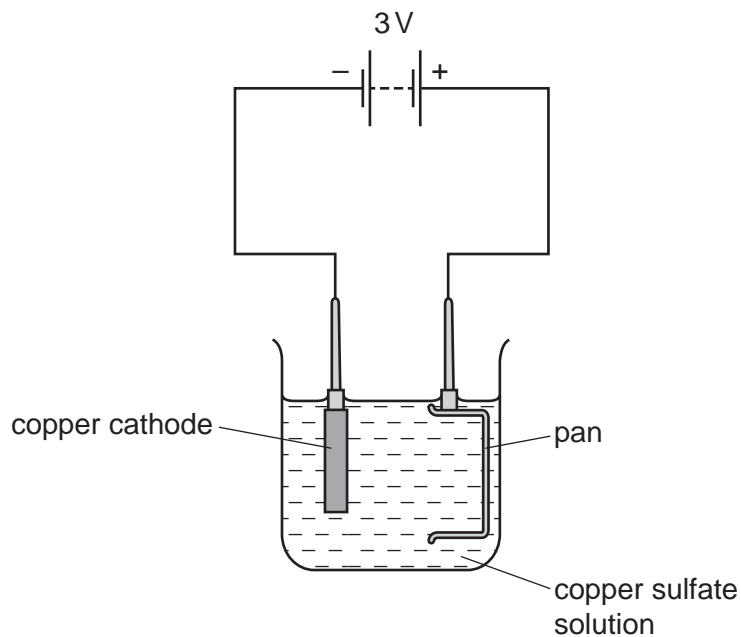
Which statements are correct?

- A** 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4
- 7 In which compounds are pairs of electrons shared between atoms?
- 1 methane
 - 2 lead bromide
 - 3 sodium chloride
- A** 1 only **B** 2 only **C** 1 and 3 **D** 1, 2 and 3
- 8 What is the relative formula mass, M_r , of CaCO_3 ?
- A** 50 **B** 68 **C** 100 **D** 204
- 9 Copper and hydrogen can each be formed by electrolysis.

At which electrodes are these elements formed?

| | copper | hydrogen |
|----------|---------|----------|
| A | anode | anode |
| B | anode | cathode |
| C | cathode | anode |
| D | cathode | cathode |

10 The diagram shows a failed attempt to copper-plate a pan.

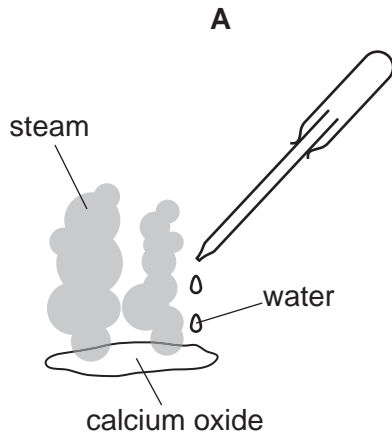


Which action will plate the pan with copper?

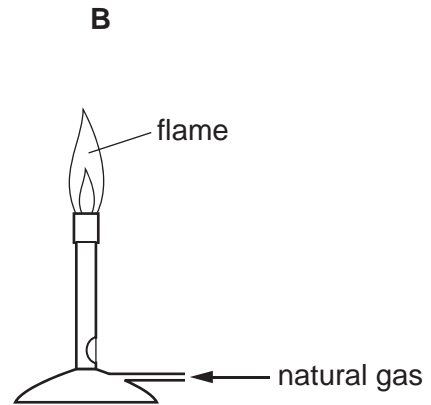
- A cooling the copper sulfate solution in an ice bath
- B heating the copper sulfate solution to boiling point
- C increasing the voltage from 3V to 6V
- D making the pan the cathode and the copper the anode

11 The diagrams show four chemical reactions.

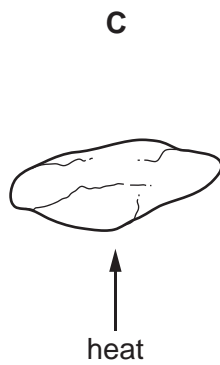
Which reaction is endothermic?



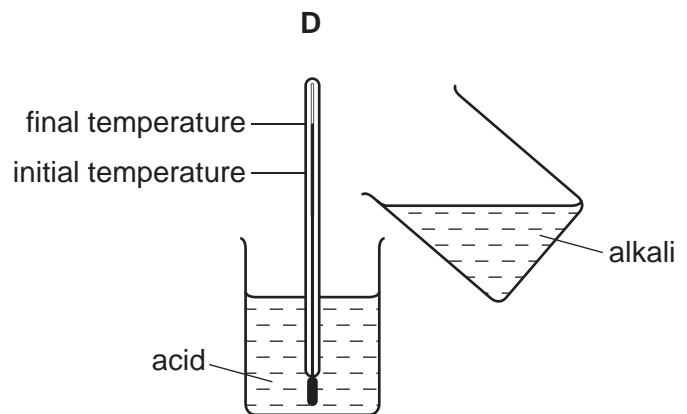
addition of water to calcium oxide



combustion of natural gas



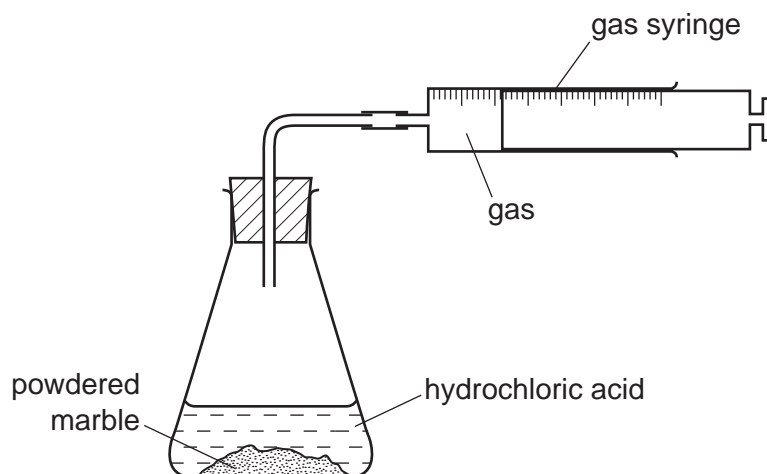
thermal decomposition of limestone



reaction of acid with alkali

- 12 Powdered marble reacts with hydrochloric acid using the apparatus shown.

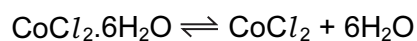
The gas syringe fills in 36 seconds.



The experiment is repeated using marble chips in place of powdered marble.

How long does it take to fill the gas syringe in this experiment?

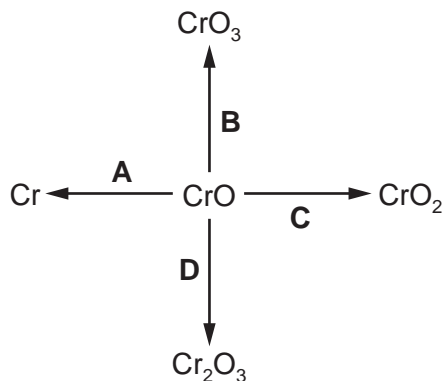
- A 9 seconds
 B 18 seconds
 C 36 seconds
 D 72 seconds
- 13 When pink crystals of cobalt(II) chloride are heated, steam is given off and the colour of the solid changes to blue.



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 |

14 In which change is chromium(II) oxide, CrO, reduced?



15 The table shows the pH of four aqueous solutions, W, X, Y and Z.

| substance | pH |
|-----------|----|
| W | 7 |
| X | 9 |
| Y | 2 |
| Z | 5 |

Universal Indicator is added to each solution.

Which row shows the colour of each solution after the indicator is added?

| | W | X | Y | Z |
|---|--------|--------|--------|--------|
| A | blue | green | orange | red |
| B | green | blue | red | orange |
| C | orange | red | blue | green |
| D | red | orange | green | blue |

16 Hydrochloric acid is used to clean metals.

The acid reacts with the oxide layer on the surface of the metal, forming a salt and water.

Which word describes the metal oxide?

- A alloy
- B base
- C element
- D indicator

17 Four steps to prepare a salt from an excess of a solid base and an acid are listed.

- 1 crystallisation
- 2 evaporation
- 3 filtration
- 4 neutralisation

In which order are the steps carried out?

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

18 Which two compounds give a white precipitate when their aqueous solutions are mixed?

- A** silver nitrate and sodium chloride
B silver nitrate and sodium iodide
C sodium hydroxide and copper(II) sulfate
D sodium hydroxide and iron(II) chloride

19 Which element is in the same group of the Periodic Table as lithium?

| | electrical conductivity | density in g/cm ³ |
|----------|-------------------------|------------------------------|
| A | high | 0.97 |
| B | high | 8.93 |
| C | low | 0.07 |
| D | low | 3.12 |

20 Which properties of the element titanium, Ti, can be predicted from its position in the Periodic Table?

| | can be used as a catalyst | conducts electricity when solid | has low density | forms coloured compounds |
|----------|---------------------------|---------------------------------|-----------------|--------------------------|
| A | ✓ | ✓ | ✓ | ✗ |
| B | ✓ | ✓ | ✗ | ✓ |
| C | ✓ | ✗ | ✓ | ✓ |
| D | ✗ | ✓ | ✓ | ✓ |

21 The following statements are about elements in the Periodic Table.

- 1 Their atoms have a full outer shell of electrons.
- 2 They form basic oxides.
- 3 They are found in Group 0.
- 4 They are present in small quantities in the air.

Which statements are correct for the noble gases?

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

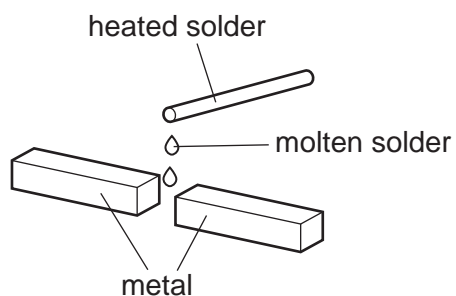
22 In the outline of the Periodic Table below, some elements are shown as numbers.

| | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---|---|--|--|--|
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | 1 | 2 | | | |
| 3 | | | | | | | | | | | | | | | | | | | | 4 | | | |
| 5 | 6 | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | 7 | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |

Which two numbers are **metals** in the same period?

- A** 1 and 2 **B** 1 and 7 **C** 3 and 5 **D** 5 and 6

23 Solder is an alloy of lead and tin. It is used for joining pieces of metal.



Which statement about solder is correct?

- A** It can be represented by a chemical formula.
- B** It contains a mixture of lead and tin.
- C** It contains lead and tin chemically combined.
- D** It has a higher melting point than lead or tin.

24 What is a major use of aluminium?

- A making brass
- B making cutlery
- C making electrical wiring
- D making food containers

25 Which row describes the conditions used to make steel from the iron produced by a blast furnace?

| | calcium oxide (lime) | oxygen | heat |
|----------|----------------------|--------|------|
| A | ✓ | ✓ | ✓ |
| B | ✓ | ✓ | x |
| C | x | ✓ | ✓ |
| D | x | ✓ | x |

26 W, X, Y and Z are four metals.

Some properties of these metals are listed below.

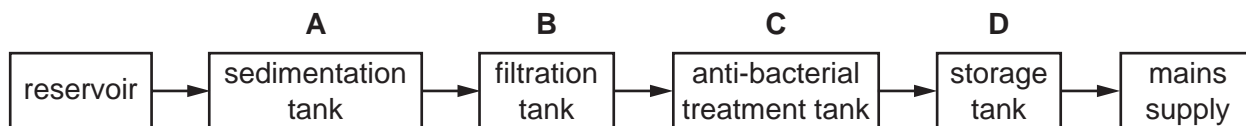
- 1 Only W and Z can be extracted by reduction of their oxides with carbon.
- 2 Only X will react with cold water.
- 3 Only Z can be found 'native' (not combined with any other element).

What is the correct order of these metals in the reactivity series (most reactive first)?

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

27 The diagram shows stages in producing drinking water.

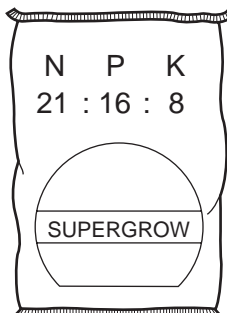
In which tank is chlorine added to the water?



28 Which gas is **not** found in clean air?

- A carbon dioxide
- B carbon monoxide
- C nitrogen
- D oxygen

29 Which combination of chemical compounds could be used to produce the fertiliser shown?



- A $(\text{NH}_4)_3\text{PO}_4$, KCl
- B NH_4NO_3 , $\text{Ca}_3(\text{PO}_4)_2$
- C NH_4NO_3 , $\text{CO}(\text{NH}_2)_2$
- D NH_4NO_3 , K_2SO_4 , $(\text{NH}_4)_2\text{SO}_4$

30 The pollutants released into the air from car exhausts and some power stations include oxides of the type XO and YO_2 .

What are X and Y?

| | X | Y |
|---|---------------------|-----------------------------|
| A | carbon only | nitrogen only |
| B | carbon only | nitrogen and sulfur only |
| C | carbon and nitrogen | carbon and nitrogen only |
| D | carbon and nitrogen | carbon, nitrogen and sulfur |

31 Which statement about rusting is **not** correct?

- A Only oxygen is needed for rusting.
- B Painting can stop iron gates rusting.
- C Rust is hydrated iron(III) oxide.
- D Water and oxygen are both needed for rusting.

32 Carbon dioxide and methane are 'greenhouse gases' which contribute to global warming.

Which process does **not** increase global warming?

- A burning fossil fuels
- B decay of organic waste
- C farming cattle for beef
- D growing crops such as sugar cane

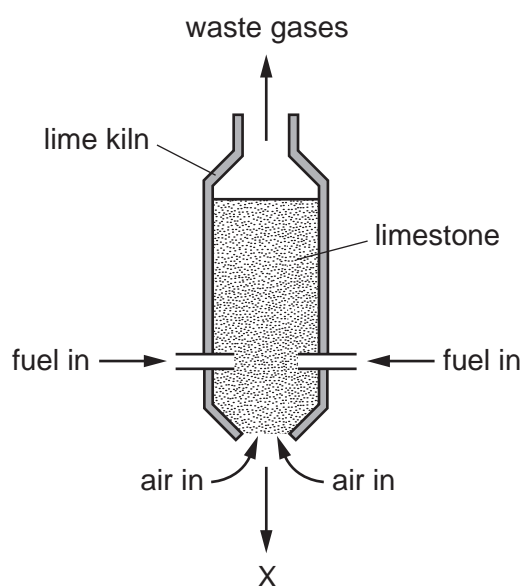
33 These statements are about a gas.

- 1 It is produced by thermal decomposition of a carbonate.
- 2 It is produced by the fermentation of glucose.
- 3 It makes up 1% of unpolluted air.
- 4 It is produced during the production of steel from iron.

Which statements are correct for carbon dioxide?

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

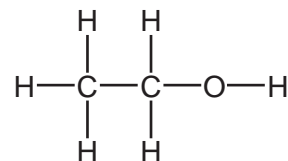
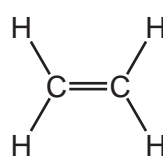
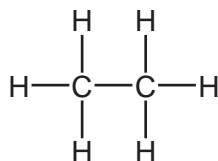
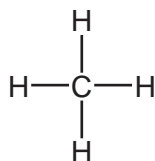
34 The diagram represents a lime kiln.



What leaves the furnace at X?

- A** calcium carbonate
B calcium hydroxide
C calcium oxide
D calcium sulfate

35 The structures of four organic compounds are shown.



Which statement is **not** correct?

- A** Only one of the compounds is an alcohol.
- B** Only one of the compounds is an alkane.
- C** Only one of the compounds is unsaturated.
- D** Only three of the compounds are hydrocarbons.
- 36 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.
- 37 Which statement about alkane molecules is correct?
- A** They burn in oxygen.
- B** They contain carbon, hydrogen and oxygen atoms.
- C** They contain double bonds.
- D** They contain ionic bonds.
- 38 Which statements are correct for ethanoic acid?
- 1 It contains a carbon-oxygen double bond.
 - 2 It contains two carbon atoms.
 - 3 It decolourises bromine water.
 - 4 It contains an –OH group.
- A** 1 and 2 only
- B** 1 and 3
- C** 1, 2 and 4
- D** 2, 3 and 4

39 A hydrocarbon A is cracked to make B and hydrogen.

Compound C is formed by the addition polymerisation of B.

To which homologous series do A, B and C belong?

| | alkene | alkane |
|----------|--------|---------|
| A | A | B and C |
| B | B | A and C |
| C | C | A and B |
| D | – | A and C |

40 By which of the following methods is ethanol formed?

- 1 fractional distillation of petroleum
- 2 fermentation
- 3 catalytic addition of steam to ethene

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

DATA SHEET
The Periodic Table of the Elements

| | | Group | | | | | | | | | | | | |
|-----------------------------------|------------------------------------|--|--|--------------------------------------|-------------------------------------|--------------------------------------|-----------------------------------|--------------------------------------|------------------------------------|----------------------------------|------------------------------------|-------------------------------------|-------------------------------------|--------------------------------|
| I | II | III | IV | V | VI | VII | 0 | | | | | 0 | | |
| 7 Li Lithium 3 | 9 Be Beryllium 4 | 1 H Hydrogen 1 | 11 B Boron 5 | 12 C Carbon 6 | 14 N Nitrogen 7 | 16 O Oxygen 8 | 19 F Fluorine 9 | 20 Ne Neon 10 | 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 |
| 39 K Potassium 19 | 40 Ca Calcium 20 | 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 | 91 Zr Zirconium 40 | 91 Nb Niobium 41 | 93 Nb Niobium 41 | 96 Mo Molybdenum 42 | 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 | 141 Pr Praseodymium 59 | 144 Nd Neodymium 60 | 145 Pm Promethium 61 | 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 | |
| 226 Ra Radium 88 | 227 Ac Actinium 89 | 140 Ce Cerium 58 | 141 Pr Praseodymium 59 | 144 Nd Neodymium 60 | 150 Sm Samarium 62 | 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 | |
| 87 Fr Francium | 88 Ra Radium | 90 Th Thorium | 91 Pa Protactinium | 93 Np Neptunium | 94 Pu Plutonium | 96 Cm Curium | 97 Bk Berkelium | 98 Cf Californium | 99 Es Einsteinium | 100 Fm Fermium | 101 Md Mendelevium | 102 No Nobelium | 103 Lr Lawrencium | |

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

Key

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

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