UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

**CHEMISTRY** **0620/01**

Paper 1 Multiple Choice

May/June 2005

**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 16.
You may use a calculator.



IB05 06_0620_01/2RP


UNIVERSITY of CAMBRIDGE International Examinations

**[Turn over**

**1** In which of the following are the particles arranged in a regular pattern?

**A** a gas

**B** a liquid

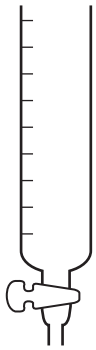
**C** a metal

**D** a solution

**2** A student mixes 25 $cm^3$ samples of dilute hydrochloric acid with different volumes of aqueous sodium hydroxide. Each time, the student measures the change in temperature to test if the reaction is exothermic.

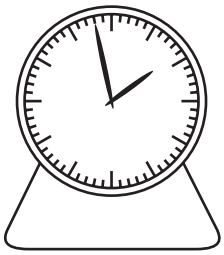
Which piece of apparatus is **not** needed?

**A**



burette

**B**

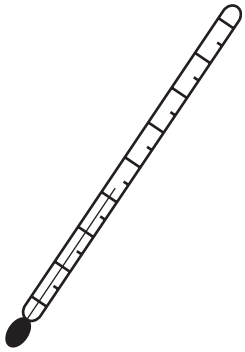


clock

**C**

pipette

**D**



thermometer

**3** In an experiment, a student needs to measure out 36.50 $cm^3$ of a solution.

Which piece of apparatus would measure this volume most accurately?

**A** beaker

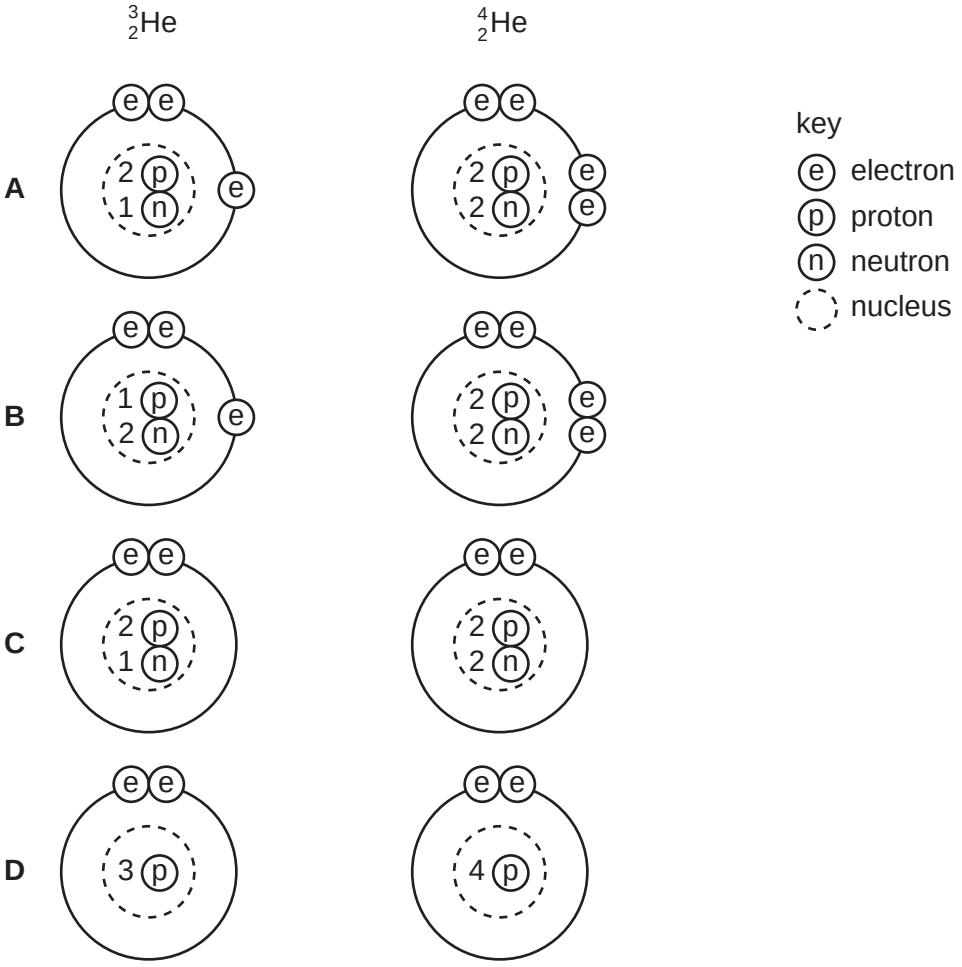
**B** burette

**C** measuring cylinder

**D** pipette

**4** Two isotopes of helium are $^{3}_{2}He$ and $^{4}_{2}He$.

Which two diagrams show the arrangement of particles in these two isotopes?




**5** Which row gives the outer electronic shell of fluorine and of neon?

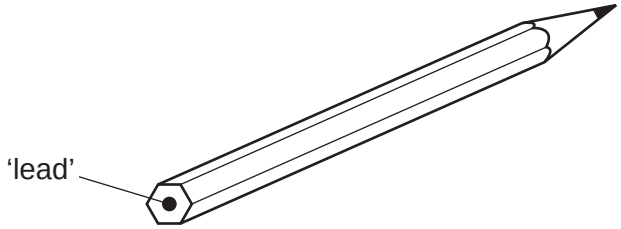
| | $_{9}F$ | $_{10}Ne$ |
|---|---|---|
| **A** | 7 | 8 |
| **B** | 7 | 10 |
| **C** | 9 | 8 |
| **D** | 9 | 10 |

**6** The electronic configuration of an ion is 2.8.8.

What could this ion be?

| | $S^{2-}$ | $Ca^{2+}$ |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

**7** The 'lead' in a pencil is made of a mixture of graphite and clay.




If the percentage of graphite is increased, the pencil slides across the paper more easily.

Why is this?

**A** Graphite conducts electricity.

**B** Graphite is a form of carbon.

**C** Graphite is a lubricant.

**D** Graphite is a non-metal.

**8** Which statement about gaseous hydrogen chloride and solid potassium chloride is correct?

**A** Hydrogen chloride is covalent but potassium chloride is ionic.

**B** Hydrogen chloride is ionic but potassium chloride is covalent.

**C** They are both covalent compounds.

**D** They are both ionic compounds.

**9** Which two elements form an alloy when they are heated together?

**A** chlorine and hydrogen

**B** chlorine and zinc

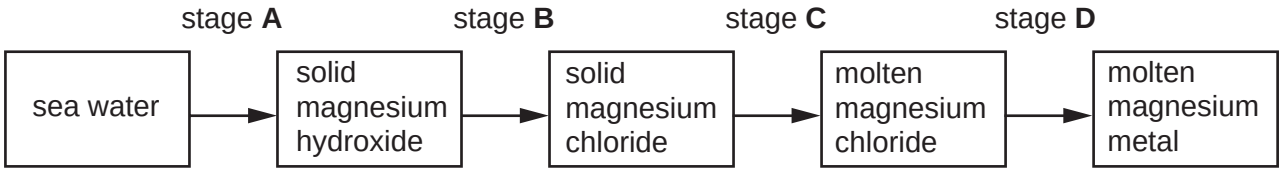
**C** copper and hydrogen

**D** copper and zinc

**10** For which compound is the formula correct?

| | compound | formula |
|---|---|---|
| **A** | ammonia | $NH_4$ |
| **B** | carbon monoxide | $CO_2$ |
| **C** | iron(III) oxide | $Fe_3O_2$ |
| **D** | zinc hydroxide | $Zn(OH)_2$ |

**11** At which stage in the manufacture of magnesium from sea-water can electrolysis be used?




**12** Metallic and non-metallic elements can both be extracted by electrolysis.

Which element is produced at the negative electrode (cathode)?

**A** bromine

**B** chlorine

**C** hydrogen

**D** oxygen

**13** Which product is manufactured by electrolysis?

**A** aluminium

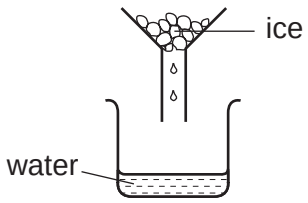
**B** copper(II) sulphate

**C** sodium chloride

**D** steel

**14** Which diagrams show a process in which an exothermic change is taking place?

1

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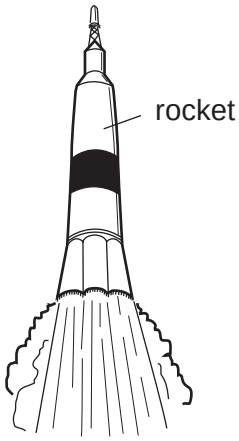


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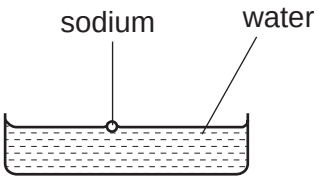



**A** 1 and 2 only

**B** 1 and 3 only

**C** 2 and 3 only

**D** 1, 2 and 3

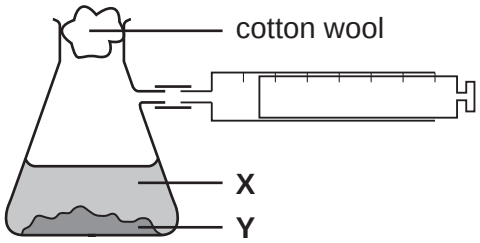
**15** Are hydrogen and uranium oxidised when used as a source of energy?

| | hydrogen | uranium |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

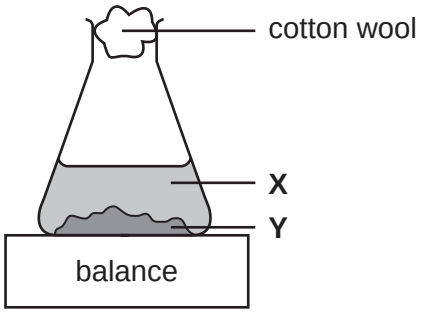
**16** A liquid **X** reacts with solid **Y** to form a gas.

Which **two** diagrams show suitable methods for investigating the speed of the reaction?

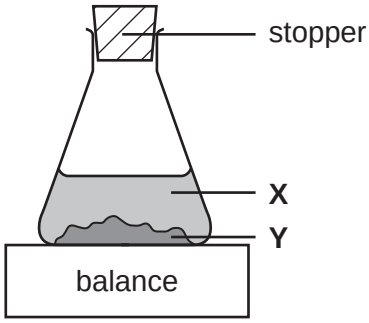
1




2




3

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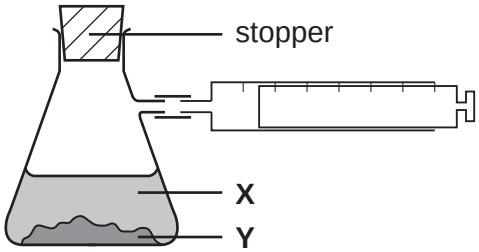
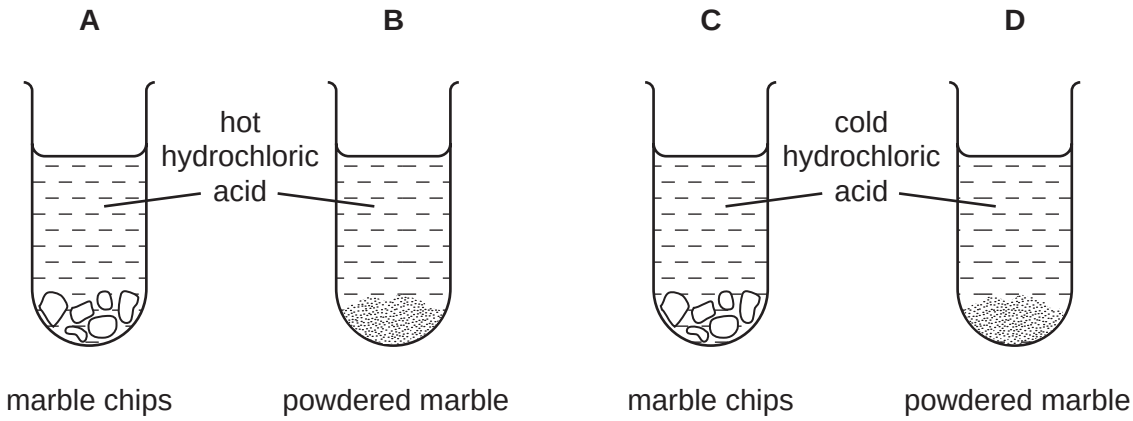



**A** 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

**17** In different experiments, 2 g of marble are added to 10 $cm^3$ of hydrochloric acid.

In which tube is the reaction fastest?



**18** What is the colour of liquid bromine and of the aqueous bromide ion?

| | bromine | bromide ion |
|---|---|---|
| **A** | red-brown | red-brown |
| **B** | red-brown | colourless |
| **C** | yellow-green | yellow-green |
| **D** | yellow-green | colourless |

**19** Which property does hydrochloric acid have?

**A** It gives a pale blue precipitate with aqueous copper(II) sulphate.

**B** It gives a white precipitate with aqueous barium nitrate.

**C** It releases ammonia from aqueous ammonium sulphate.

**D** It releases hydrogen with zinc powder.

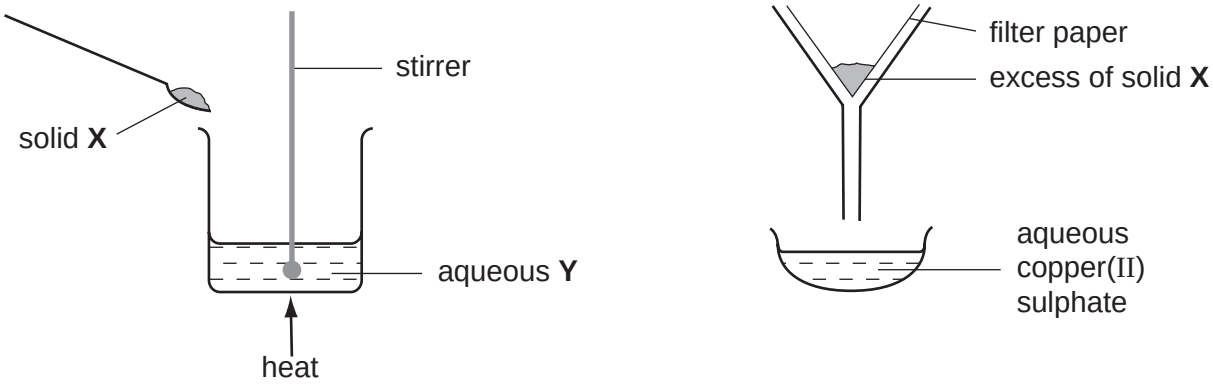
**20** Hydrochloric acid is used to clean a metal surface by removing the oxide layer on the metal.

This is because hydrochloric acid has a …..**X**….. pH and the metal oxide is …..**Y**…..

What are **X** and **Y**?

| | **X** | **Y** |
|---|---|---|
| **A** | high | acidic |
| **B** | high | basic |
| **C** | low | acidic |
| **D** | low | basic |

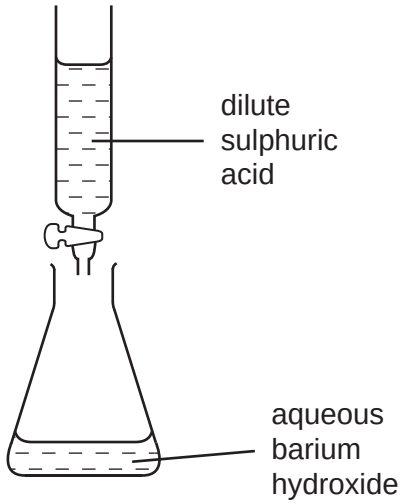
**21** The apparatus shown can be used to prepare aqueous copper(II) sulphate.




What are substances **X** and **Y**?

| | substance **X** | substance **Y** |
|---|---|---|
| **A** | copper | iron(II) sulphate |
| **B** | copper(II) chloride | sulphuric acid |
| **C** | copper(II) oxide | sulphuric acid |
| **D** | sulphur | copper(II) chloride |

**22** In the experiment shown, the dilute sulphuric acid is run into the flask of aqueous barium hydroxide until the reaction is complete.




Which processes occur in this reaction?

| | neutralisation | precipitation |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

**23** The chemical properties of an element depend mainly on the number of

**A** electrons in the innermost shell.

**B** electrons in the outermost shell.

**C** fully occupied shells of electrons.

**D** partly occupied shells of electrons.

**24** An element **X** is in Group III of the Periodic Table.

Which property of **X** can be predicted from this fact?

**A** the charge on an ion of **X**

**B** the colour of the ion of **X**

**C** the melting point of **X**

**D** the relative atomic mass, $A_r$, of **X**

**25** 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 |

**26** Caesium is near the bottom of Group I of the Periodic Table.

What is the correct description of caesium?

| | state at room temperature | reaction with cold water |
|---|---|---|
| **A** | liquid | reacts quickly |
| **B** | liquid | reacts slowly |
| **C** | solid | reacts quickly |
| **D** | solid | reacts slowly |

**27** Mild steel is an alloy of iron and carbon.

How does the carbon affect the properties of mild steel?

**A** The carbon makes the alloy a better conductor of electricity than iron.

**B** The carbon makes the alloy harder than the iron.

**C** The carbon makes the alloy softer than the iron.

**D** The carbon stops the iron rusting.

**28** Which metal reacts quickly with cold water only when it is finely powdered?

**A** calcium

**B** copper

**C** sodium

**D** magnesium

**29** Which of the oxides CaO, CuO and $Na_2O$ can be reduced by heating with carbon?

**A** CaO only

**B** CuO only

**C** $Na_2O$ only

**D** CaO, CuO and $Na_2O$

**30** Three stages in making steel from iron ore are listed.

X carbon dioxide reacts with carbon

Y basic oxides and oxygen are added

Z hematite is reduced

In which order do these stages occur?

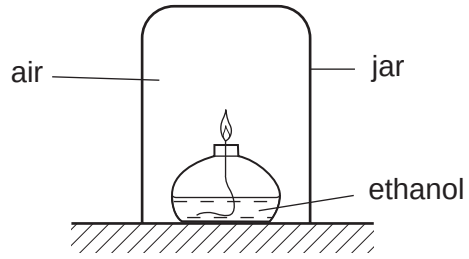
**A** $X \rightarrow Y \rightarrow Z$

**B** $X \rightarrow Z \rightarrow Y$

**C** $Y \rightarrow X \rightarrow Z$

**D** $Z \rightarrow Y \rightarrow X$

**31** The diagram shows ethanol burning inside a sealed jar.




The mass of one gas in the jar does not change.

Which gas is this?

**A** carbon dioxide

**B** nitrogen

**C** oxygen

**D** water vapour

**32** Which methods prevent rusting of iron?

| | coating with zinc | painting | washing with distilled water |
|---|---|---|---|
| **A** | ✓ | ✓ | ✓ |
| **B** | ✗ | ✓ | ✓ |
| **C** | ✓ | ✓ | ✗ |
| **D** | ✓ | ✗ | ✗ |

**33** Which processes do **not** use oxygen?

1 burning natural gas

2 heating a room with an electric fire

3 welding apparatus

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

**34** The presence of nitrates in soil can be shown by warming the soil with aqueous sodium hydroxide and aluminium foil.

Which gas is given off?

**A** ammonia

**B** carbon dioxide

**C** nitrogen

**D** nitrogen dioxide

**35** Dolomite is a rock that contains magnesium carbonate.

A piece of dolomite is heated strongly in air.

Which word equation correctly describes the reaction that takes place?

**A** magnesium carbonate + water → magnesium hydroxide + carbon dioxide

**B** magnesium carbonate + oxygen → magnesium oxide + carbon dioxide + water

**C** magnesium carbonate + oxygen → magnesium oxide + water

**D** magnesium carbonate → magnesium oxide + carbon dioxide

**36** Which two compounds have molecules in which there is a double bond?

**A** ethane and ethanoic acid

**B** ethane and ethanol

**C** ethene and ethanoic acid

**D** ethene and ethanol

**37** Which substance is found in crude oil?

**A** bitumen

**B** ethanol

**C** ethanoic acid

**D** poly(ethene)

**38** Which statement about a family of organic compounds describes an homologous series?

All compounds in the family have the same

**A** functional group.

**B** physical properties.

**C** relative molecular mass.

**D** structural formula.

**39** Which column describes ethane and which column describes ethene?

| | hydrocarbon | | | |
|---|---|---|---|---|
| | **1** | **2** | **3** | **4** |
| state at room temperature | gas | gas | liquid | liquid |
| reaction with oxygen | burns | burns | burns | burns |
| reaction with aqueous bromine | no reaction | decolourises bromine | no reaction | decolourises bromine |

**A** **1** (ethane) and **2** (ethene)

**B** **1** (ethane) and **3** (ethene)

**C** **2** (ethene) and **3** (ethane)

**D** **3** (ethane) and **4** (ethene)

**40** Which of the products $C_{12}H_{24}$ and $H_2$ could be formed by cracking dodecane, $C_{12}H_{26}$?

| | $C_{12}H_{24}$ | $H_2$ |
|---|---|---|
| **A** | ✗ | ✗ |
| **B** | ✗ | ✓ |
| **C** | ✓ | ✗ |
| **D** | ✓ | ✓ |

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# DATA SHEET
## The Periodic Table of the Elements

| Group | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I | II | | | | | | | | | | | III | IV | V | VI | VII | 0 |
| | | | | | | | 1 H Hydrogen 1 | | | | | | | | | | 4 He Helium 2 |
| 7 Li Lithium 3 | 9 Be Beryllium 4 | | | | | | | | | | | 11 B Boron 5 | 12 C Carbon 6 | 14 N Nitrogen 7 | 16 O Oxygen 8 | 19 F Fluorine 9 | 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 Sulphur 16 | 35.5 Cl Chlorine 17 | 40 Ar Argon 18 |
| 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 | Tc Technetium 43 | 101 Ru Ruthenium 44 | 103 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 | 128 Te Tellurium 52 | 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 | 186 Re Rhenium 75 | 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 | Po Polonium 84 | At Astatine 85 | Rn Radon 86 |
| Fr Francium 87 | 226 Ra Radius 88 | 227 Ac Actinium 89 | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 140 Ce Cerium 58 | 141 Pr Praseodymium 59 | 144 Nd Neodymium 60 | Pm Promethium 61 | 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 | Pa Protactinium 91 | 238 U Uranium 92 | Np Neptunium 93 | Pu Plutonium 94 | Am Americium 95 | Cm Curium 96 | Bk Berkelium 97 | Cf Californium 98 | Es Einsteinium 99 | Fm Fermium 100 | Md Mendelevium 101 | No Nobelium 102 | Lr Lawrencium 103 |

*58-71 Lanthanoid series
90-103 Actinoid series

Key: a X b — a = relative atomic mass; X = atomic symbol; b = proton (atomic) number

The volume of one mole of any gas is 24 $dm^3$ at room temperature and pressure (r.t.p.).