Cambridge Assessment International Education

# Cambridge IGCSE™

**CHEMISTRY** **0620/11**

Paper 1 Multiple Choice (Core) **May/June 2021**

**45 minutes**

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

**INSTRUCTIONS**

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

**INFORMATION**

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.



IB21 06_0620_11/2RP
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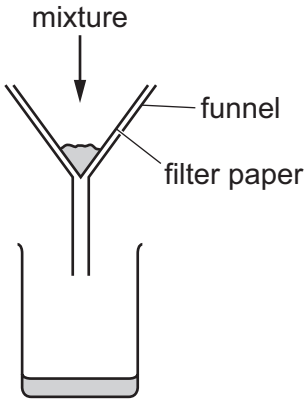
**1** Which row describes the arrangement and movement of particles in a liquid?

View solution

| | arrangement of particles | movement of particles |
|---|---|---|
| **A** | touching and regular | vibrating |
| **B** | touching and random | moving around each other |
| **C** | touching and regular | moving around each other |
| **D** | touching and random | moving very fast |

**2** A mixture is separated using the apparatus shown.

View solution




What is the mixture?

**A** aqueous copper(II) sulfate and aqueous sodium chloride

**B** aqueous copper(II) sulfate and copper

**C** copper and sulfur

**D** ethanol and ethanoic acid

**3** Which statement about paper chromatography is correct?

View solution

**A** A solvent is needed to dissolve the paper.

**B** Paper chromatography separates mixtures of solvents.

**C** The solvent should cover the baseline.

**D** The baseline should be drawn in pencil.

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**4** Element X has 7 protons.

View solution

Element Y has 8 more protons than X.

Which statement about element Y is correct?

**A** Y has more electron shells than X.

**B** Y has more electrons in its outer shell than X.

**C** Y is in a different group of the Periodic Table from X.

**D** Y is in the same period of the Periodic Table as X.

**5** A covalent molecule Q contains only six shared electrons.

View solution

What is Q?

**A** ammonia, $NH_3$

**B** chlorine, $Cl_2$

**C** methane, $CH_4$

**D** water, $H_2O$

**6** Which row describes how an ionic bond forms between a sodium atom and a chlorine atom?

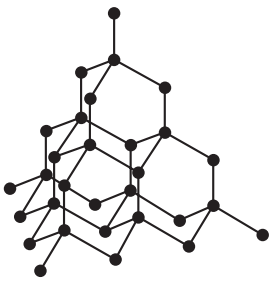
View solution

| | sodium atom | chlorine atom |
|---|---|---|
| **A** | two electrons are lost | two electrons are gained |
| **B** | one electron is gained | one electron is lost |
| **C** | two electrons are gained | two electrons are lost |
| **D** | one electron is lost | one electron is gained |

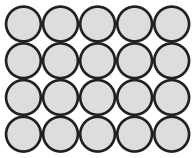
**7** Which diagram shows the structure of an alloy?

View solution

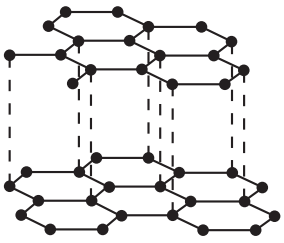
**A**



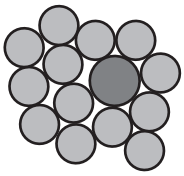
**B**



**C**



**D**



**8** Methane burns in oxygen to produce carbon dioxide and water.

View solution

What is the balanced equation for this reaction?

**A** $CH_4 + 2O_2 \rightarrow 2CO_2 + 2H_2O$

**B** $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

**C** $CH_4 + 2O_2 \rightarrow CO_2 + H_2O$

**D** $CH_4 + O_2 \rightarrow CO_2 + 2H_2O$

**9** What is the relative formula mass of magnesium nitrate, $Mg(NO_3)_2$?

View solution

**A** 74 **B** 86 **C** 134 **D** 148

**10** In separate experiments, electricity was passed through concentrated aqueous sodium chloride and molten lead(II) bromide.

View solution

What would happen in **both** experiments?

**A** A halogen would be formed at the anode.

**B** A metal would be formed at the cathode.

**C** Hydrogen would be formed at the anode.

**D** Hydrogen would be formed at the cathode.

**11** Steel core aluminium cables are used for overhead electricity cables.

View solution

Which statement explains why these cables are used?

**A** Aluminium conducts electricity only when it surrounds a steel core.

**B** Aluminium conducts electricity and the steel core makes the cable stronger.

**C** Steel conducts electricity and is surrounded by aluminium because aluminium is an insulator.

**D** Steel conducts electricity and is surrounded by aluminium to stop the steel from corroding.

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**12** The complete combustion of propane is exothermic.

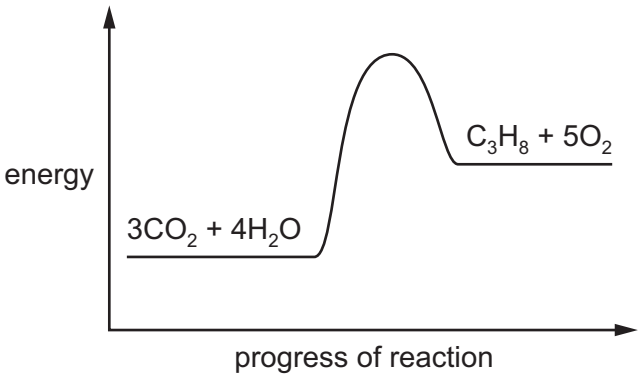
View solution

The equation for this reaction is shown.

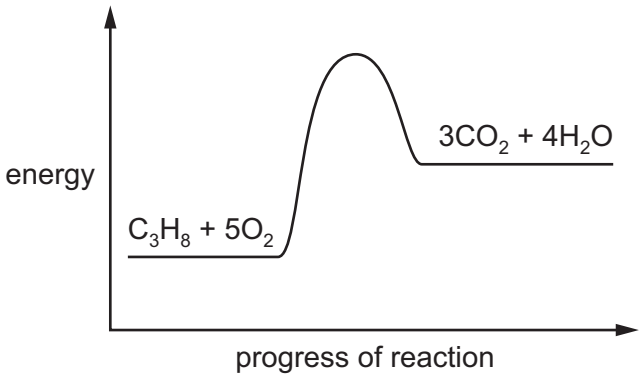
$$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$$

Which energy level diagram represents the complete combustion of propane?

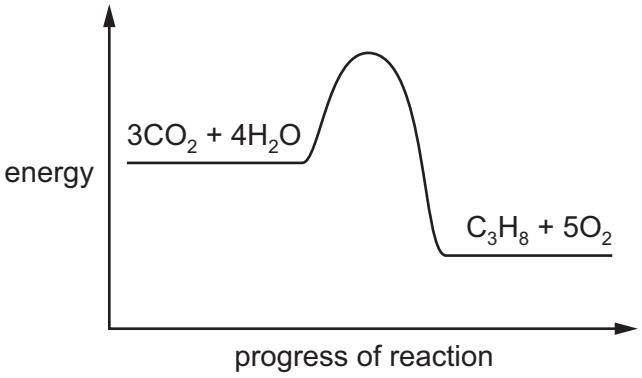
**A**



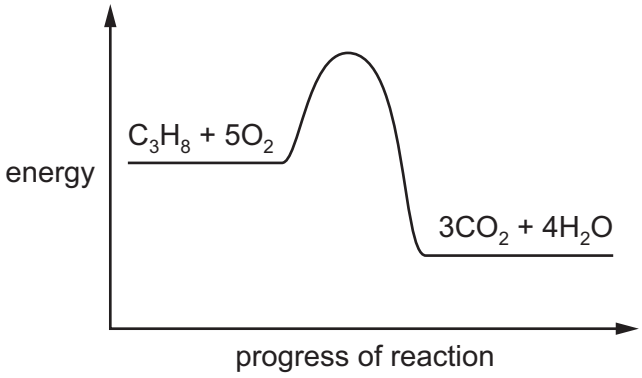

**B**




**C**




**D**




**13** Which changes occur when hydrogen is burned in oxygen?

View solution

| | energy change | product |
|---|---|---|
| **A** | endothermic | $H_2O$ only |
| **B** | endothermic | $H_2O$ and $CO_2$ |
| **C** | exothermic | $H_2O$ only |
| **D** | exothermic | $H_2O$ and $CO_2$ |

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**14** When sulfur is heated it undergoes a .....1..... change as it melts.

Further heating causes the sulfur to undergo a .....2..... change and form sulfur dioxide.

View solution

Which words complete gaps 1 and 2?

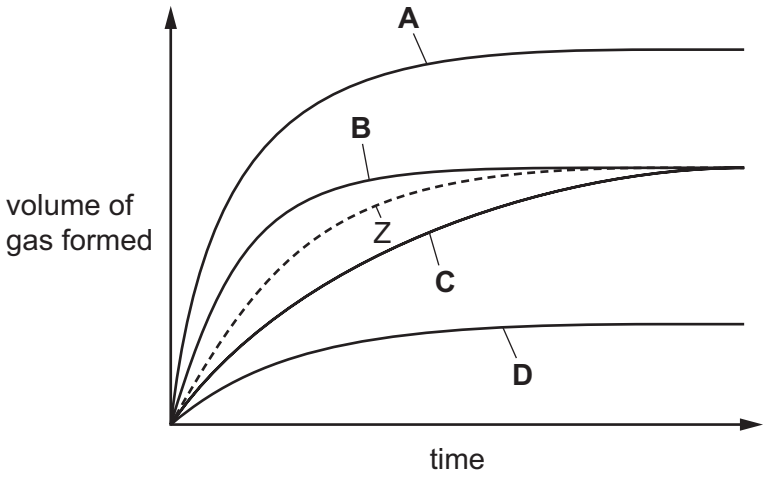
| | 1 | 2 |
|---|---|---|
| **A** | chemical | chemical |
| **B** | chemical | physical |
| **C** | physical | chemical |
| **D** | physical | physical |

**15** Zinc reacts with an acid to form a gas. The volume of gas produced is measured at intervals. The results are shown as curve Z.

View solution

The reaction is repeated in the presence of a catalyst.

Which curve shows the results for the catalysed reaction?




**16** Which statement is correct?

View solution

**A** When anhydrous copper(II) sulfate is heated its colour changes to a deeper blue.

**B** When hydrated copper(II) sulfate is heated its colour changes to a deeper blue.

**C** When water is added to blue cobalt(II) chloride paper it turns pink.

**D** When water is added to pink cobalt(II) chloride paper it turns blue.

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**17** Three separate experiments are carried out on an aqueous solution of S.

View solution

The results are shown.

1 Magnesium does not react with the solution.

2 A gas is given off when ammonium sulfate is heated with the solution.

3 Methyl orange turns yellow when added to the solution.

What is S?

**A** hydrochloric acid

**B** sodium hydroxide

**C** sodium chloride

**D** sulfur dioxide

**18** Element X forms an oxide, XO, that neutralises sulfuric acid.

View solution

Which row describes X and XO?

| | element X | nature of oxide, XO |
|---|---|---|
| **A** | metal | acidic |
| **B** | metal | basic |
| **C** | non-metal | acidic |
| **D** | non-metal | basic |

**19** Copper(II) sulfate is prepared by adding excess copper(II) oxide to warm dilute sulfuric acid.

View solution

Which purification methods are used to obtain pure solid copper(II) sulfate from the reaction mixture?

1 crystallisation

2 filtration

3 chromatography

4 distillation

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

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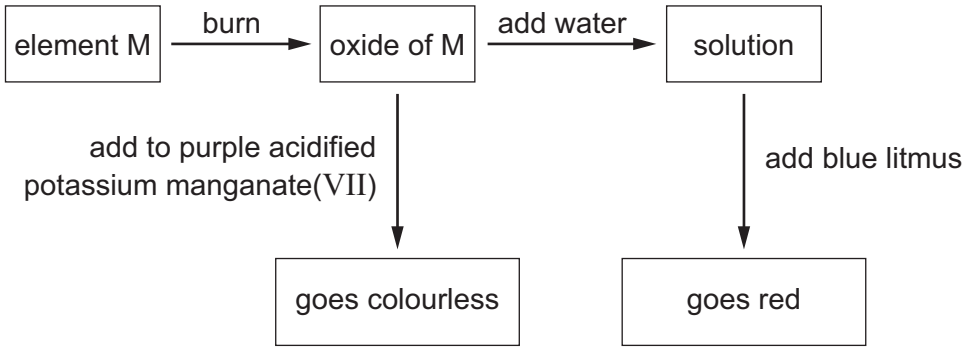
**20** Some reactions of element M are shown.

View solution




What is element M?

**A** carbon

**B** iron

**C** magnesium

**D** sulfur

**21** Element X is in Group II of the Periodic Table.

View solution

Which statements about X are correct?

1 X is a metal.

2 X has two electrons in its outer shell.

3 X is a liquid at room temperature.

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

**22** Why is helium used to fill balloons?

View solution

**A** Helium is monoatomic.

**B** Helium is in Group VIII of the Periodic Table.

**C** Helium has a full outer electron shell.

**D** Helium is less dense than air.

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**23** Which row describes the trend in properties of the elements in Group I as the group is descended?

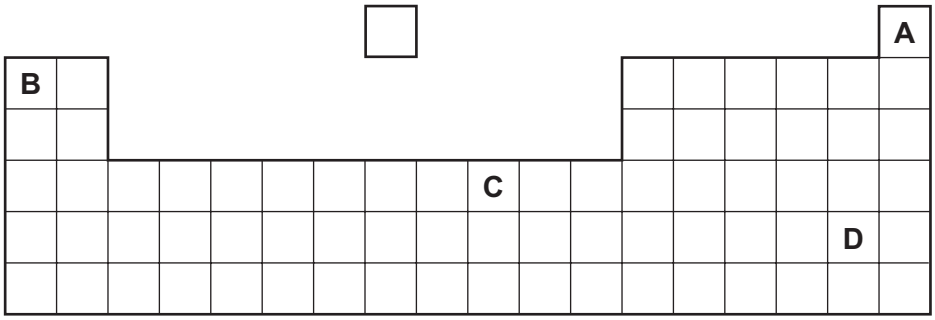
View solution

| | melting point | reactivity with water |
|---|---|---|
| **A** | decreases | decreases |
| **B** | decreases | increases |
| **C** | increases | decreases |
| **D** | increases | increases |

**24** An element melts at 1455 °C, has a density of 8.90 g / $cm^3$ and forms a green chloride.

View solution

Where in the Periodic Table is this element found?




**25** Some properties of metal J are listed.

View solution

- J does not react with cold water.
- J reacts with dilute hydrochloric acid.
- No reaction occurs when the oxide of J is heated with carbon.

What is J?

**A** copper

**B** iron

**C** magnesium

**D** sodium

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**26** Iron from a blast furnace is treated with oxygen and with calcium oxide to make steel.

View solution

Which substances in the iron are removed?

| | oxygen removes | calcium oxide removes |
|---|---|---|
| **A** | carbon | acidic oxides |
| **B** | carbon | basic oxides |
| **C** | iron | acidic oxides |
| **D** | iron | basic oxides |

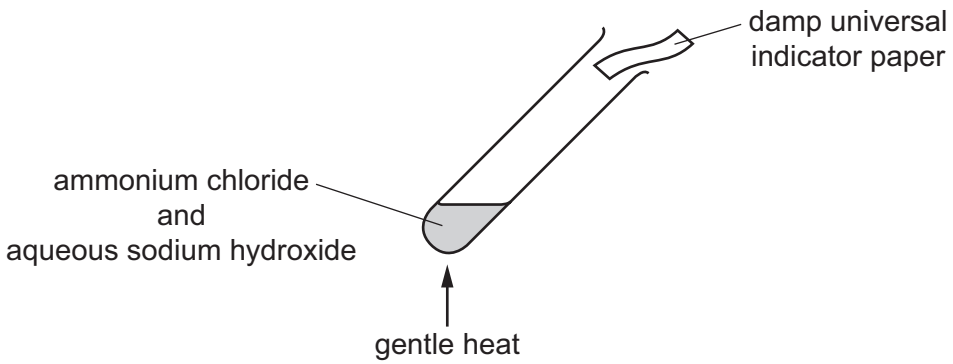
**27** Which row describes a use of the metal and explains why it is used?

View solution

| | metal | use | reason |
|---|---|---|---|
| **A** | aluminium | food containers | good conductor of electricity |
| **B** | aluminium | aircraft wings | high density |
| **C** | copper | cooking utensils | good conductor of heat |
| **D** | copper | electricity cables | good electrical insulator |

**28** Ammonium chloride is heated with aqueous sodium hydroxide.

View solution




A gas is produced which turns damp universal indicator paper blue.

Which gas has been produced?

**A** ammonia

**B** hydrogen

**C** oxygen

**D** sulfur dioxide

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**29** Which two gases make up approximately 99% of clean, dry air?

View solution

**A** carbon dioxide and nitrogen

**B** carbon dioxide and oxygen

**C** nitrogen and oxygen

**D** argon and nitrogen

**30** A student writes three statements about potassium nitrate, $KNO_3$.

View solution

1 The relative formula mass of $KNO_3$ is 101.

2 Potassium nitrate contains the three essential elements for plant growth.

3 Potassium nitrate could be used as a fertiliser.

Which statements are correct?

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

**31** Which row describes the uses of sulfur and sulfur dioxide?

View solution

| | sulfur | sulfur dioxide |
|---|---|---|
| **A** | extraction of aluminium | food preservative |
| **B** | extraction of aluminium | manufacture of cement |
| **C** | manufacture of sulfuric acid | food preservative |
| **D** | manufacture of sulfuric acid | manufacture of cement |

**32** A white solid Z reacts with dilute hydrochloric acid to produce a gas.

View solution

The same gas is produced when compound Z is heated strongly.

What is Z?

**A** calcium

**B** calcium carbonate

**C** calcium hydroxide

**D** calcium oxide

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**33** Some information about compound L is listed.

View solution

1 L is an organic compound which contains four hydrogen atoms.

2 L is soluble in water.

3 An aqueous solution of L reacts with copper(II) carbonate to produce a gas.

What is L?

**A** methane

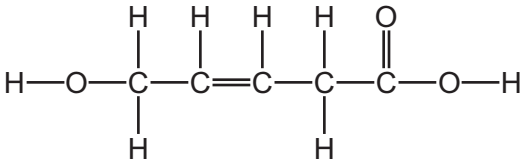
**B** ethene

**C** ethanoic acid

**D** ethanol

**34** The structure of an organic molecule is shown.

View solution



Which functional groups does this molecule contain?

| | alcohol | alkene | carboxylic acid |
|---|---|---|---|
| **A** | no | no | no |
| **B** | no | yes | yes |
| **C** | yes | no | yes |
| **D** | yes | yes | yes |

**35** Which compounds belong to the same homologous series?

View solution

**A** ethane and propane

**B** ethanoic acid and ethanol

**C** methane and ethene

**D** propene and ethanoic acid

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**36** Which statement about alkanes is correct?

View solution

**A** They burn in oxygen.

**B** They contain carbon, hydrogen and oxygen atoms.

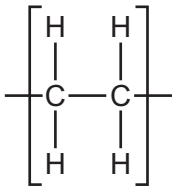
**C** They contain double bonds.

**D** They contain ionic bonds.

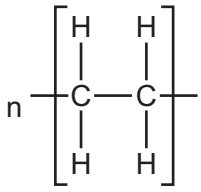
**37** Which structure represents poly(ethene)?

View solution

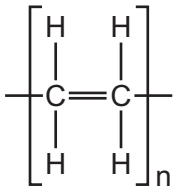
**A**



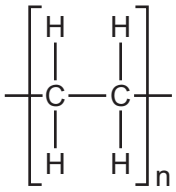
**B**



**C**



**D**



**38** P, Q, R and S are four organic compounds.

View solution

P is an unsaturated hydrocarbon.

Q burns but otherwise is unreactive.

R contains a C–C single bond and a C=C double bond.

S undergoes addition polymerisation.

Which compounds are alkenes?

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

**39** Which statement about petroleum fractions is correct?

View solution

**A** All petroleum fractions are used as fuels.

**B** Gas oil is used to make bottled gas for heating.

**C** Hydrocarbons in diesel have higher boiling points than hydrocarbons in gasoline.

**D** Molecules in kerosene are larger than molecules in fuel oil.

**40** Which substance is a natural polymer?

View solution

**A** ethene

**B** *Terylene*

**C** nylon

**D** protein

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## The Periodic Table of Elements

| Group | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I | II | | | | | | | | | | | III | IV | V | VI | VII | VIII |
| | | | | | | | 1 H hydrogen 1 | | | | | | | | | | 2 He helium 4 |
| 3 Li lithium 7 | 4 Be beryllium 9 | | | | | | | | | | | 5 B boron 11 | 6 C carbon 12 | 7 N nitrogen 14 | 8 O oxygen 16 | 9 F fluorine 19 | 10 Ne neon 20 |
| 11 Na sodium 23 | 12 Mg magnesium 24 | | | | | | | | | | | 13 Al aluminium 27 | 14 Si silicon 28 | 15 P phosphorus 31 | 16 S sulfur 32 | 17 Cl chlorine 35.5 | 18 Ar argon 40 |
| 19 K potassium 39 | 20 Ca calcium 40 | 21 Sc scandium 45 | 22 Ti titanium 48 | 23 V vanadium 51 | 24 Cr chromium 52 | 25 Mn manganese 55 | 26 Fe iron 56 | 27 Co cobalt 59 | 28 Ni nickel 59 | 29 Cu copper 64 | 30 Zn zinc 65 | 31 Ga gallium 70 | 32 Ge germanium 73 | 33 As arsenic 75 | 34 Se selenium 79 | 35 Br bromine 80 | 36 Kr krypton 84 |
| 37 Rb rubidium 85 | 38 Sr strontium 88 | 39 Y yttrium 89 | 40 Zr zirconium 91 | 41 Nb niobium 93 | 42 Mo molybdenum 96 | 43 Tc technetium – | 44 Ru ruthenium 101 | 45 Rh rhodium 103 | 46 Pd palladium 106 | 47 Ag silver 108 | 48 Cd cadmium 112 | 49 In indium 115 | 50 Sn tin 119 | 51 Sb antimony 122 | 52 Te tellurium 128 | 53 I iodine 127 | 54 Xe xenon 131 |
| 55 Cs caesium 133 | 56 Ba barium 137 | 57–71 lanthanoids | 72 Hf hafnium 178 | 73 Ta tantalum 181 | 74 W tungsten 184 | 75 Re rhenium 186 | 76 Os osmium 190 | 77 Ir iridium 192 | 78 Pt platinum 195 | 79 Au gold 197 | 80 Hg mercury 201 | 81 Tl thallium 204 | 82 Pb lead 207 | 83 Bi bismuth 209 | 84 Po polonium – | 85 At astatine – | 86 Rn radon – |
| 87 Fr francium – | 88 Ra radium – | 89–103 actinoids | 104 Rf rutherfordium – | 105 Db dubnium – | 106 Sg seaborgium – | 107 Bh bohrium – | 108 Hs hassium – | 109 Mt meitnerium – | 110 Ds darmstadtium – | 111 Rg roentgenium – | 112 Cn copernicium – | | 114 Fl flerovium – | | 116 Lv livermorium – | | |

**Key**

atomic number
atomic symbol
name
relative atomic mass

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| lanthanoids | 57 La lanthanum 139 | 58 Ce cerium 140 | 59 Pr praseodymium 141 | 60 Nd neodymium 144 | 61 Pm promethium – | 62 Sm samarium 150 | 63 Eu europium 152 | 64 Gd gadolinium 157 | 65 Tb terbium 159 | 66 Dy dysprosium 163 | 67 Ho holmium 165 | 68 Er erbium 167 | 69 Tm thulium 169 | 70 Yb ytterbium 173 | 71 Lu lutetium 175 |
| actinoids | 89 Ac actinium – | 90 Th thorium 232 | 91 Pa protactinium 231 | 92 U uranium 238 | 93 Np neptunium – | 94 Pu plutonium – | 95 Am americium – | 96 Cm curium – | 97 Bk berkelium – | 98 Cf californium – | 99 Es einsteinium – | 100 Fm fermium – | 101 Md mendelevium – | 102 No nobelium – | 103 Lr lawrencium – |

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