International Education

Cambridge O Level

CHEMISTRY **5070/11**

Paper 1 Multiple Choice **October/November 2025**

1 hour

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.

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[Turn over

1 The pressure of a sample of air is reduced and its temperature remains constant.

Which row describes the changes in the volume of the air and the distance between the particles in the air?

	volume of air	distance between the particles in the air
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

2 Which substance would diffuse most quickly?

A carbon dioxide at 0 °C

B carbon dioxide at 25 °C

C neon at 0 °C

D neon at 25 °C

3 The main component of mineral X is calcium carbonate, $CaCO_3$.

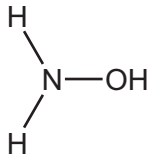
X also contains tiny grains of silicon(IV) oxide, SiO_2.

There are no other substances in X.

Which row shows two correct statements about X?

	statement 1	statement 2
A	X is a compound	X contains exactly four different elements
B	X is a compound	X contains exactly five different elements
C	X is a mixture	X contains exactly four different elements
D	X is a mixture	X contains exactly five different elements

4 The structure of hydroxylamine, NH_2OH, is shown.



Which row about hydroxylamine is correct?

	total number of electrons in the molecule	number of electrons in the bonds of the molecule
A	14	8
B	14	6
C	18	8
D	18	6

5 Metals lose electrons when they combine with a non-metal to form an ionic compound.

Calcium combines with hydrogen to form the ionic compound calcium hydride, CaH_2.

How many electrons are there in the outer shell of each of the two hydride ions in CaH_2?

A 0 **B** 1 **C** 2 **D** 4

6 What is a property of diamond?

A It can be used as a lubricant.

B It has a melting point below 200 °C.

C It has good electrical conductivity.

D It is extremely hard.

7 Which statement about the bonding in copper is correct?

A Copper atoms are attracted to a ‘sea’ of delocalised electrons.

B Copper atoms are attracted to a shared pair of electrons.

C Copper ions are attracted to a ‘sea’ of delocalised electrons.

D Copper ions are attracted to a shared pair of electrons.

8 Aluminium ions, Al^{3+}, react with sulfate ions, SO_4^{2-}, to form aluminium sulfate.

Which row shows the correct empirical formula and ionic formula of aluminium sulfate?

	empirical formula	ionic formula
A	$AlSO_4$	$Al^{3+}SO_4^{2-}$
B	$Al_2S_2O_8$	$Al^{3+}(SO_4^{2-})_2$
C	$Al_2S_3O_{12}$	$Al^{3+}{}_2(SO_4)^{2-}{}_3$
D	$Al_3S_2O_8$	$Al^{2+}{}_3(SO_4^{3-})_2$

9 Which statement is correct?

A The concentration of a solution is expressed in dm^3 / mol.

B The empirical formula of a compound always gives the actual numbers of each type of atom in one molecule.

C The molecular formula of a compound always contains more atoms than the empirical formula.

D The relative atomic mass of an element is $\dfrac{\text{the average mass of one atom of the element}}{\frac{1}{12}\text{ the mass of one atom of carbon-12}}$.

10 How many atoms are there in 27.0 g of water, H_2O?

A 9.030×10^{23} **B** 1.806×10^{24} **C** 2.709×10^{24} **D** 3.612×10^{24}

11 A mixture of sodium hydrogencarbonate and sodium chloride is heated.

The equation for the reaction that takes place when sodium hydrogencarbonate is heated is shown.

$$2NaHCO_3(s) \rightarrow Na_2CO_3(s) + CO_2(g) + H_2O(g)$$

Sodium chloride is unchanged on heating.

When 6.0 g of the mixture is heated, the loss in mass is 1.5 g.

What is the percentage by mass of sodium hydrogencarbonate in the mixture?

[relative molecular mass, M_r: $NaHCO_3$, 84; Na_2CO_3, 106; CO_2, 44; H_2O, 18]

A 34% **B** 48% **C** 68% **D** 95%

12 Electrolysis is used to plate a metal statue with silver.

The statue is an electrode in a suitable electrolyte.

Which row is correct?

	statue	electrolyte
A	cathode	AgCl(aq)
B	cathode	$AgNO_3$(aq)
C	anode	AgCl(aq)
D	anode	$AgNO_3$(aq)

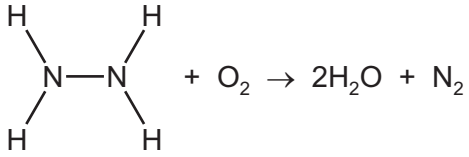
13 Which row is correct?

	purpose of hydrogen–oxygen fuel cell	chemical product of hydrogen–oxygen fuel cell
A	to recycle waste	hydrogen
B	to recycle waste	water
C	to produce electrical energy	hydrogen
D	to produce electrical energy	water

14 Some bond energy data are given in the table.

bond	bond energy kJ / mol
O–O	150
O=O	496
O–H	460
N–H	390
N–N	160
N=N	410
N≡N	944
H–H	436

Hydrazine, N_2H_4, reacts with oxygen, as shown.

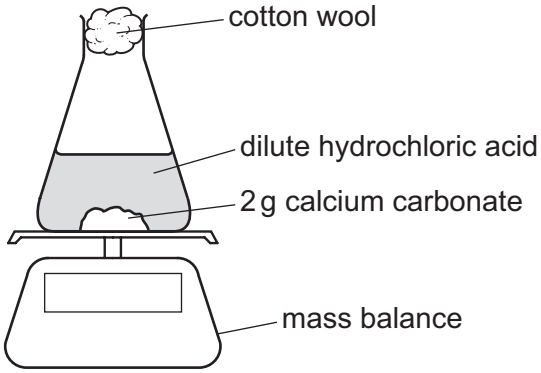


A value for the enthalpy change, ΔH, of this reaction is calculated by selecting and using data from the table.

What is the value of ΔH?

A –728 kJ / mol **B** –568 kJ / mol **C** –34 kJ / mol **D** +352 kJ / mol

15 The rate of reaction between calcium carbonate and dilute hydrochloric acid is measured in three separate experiments.

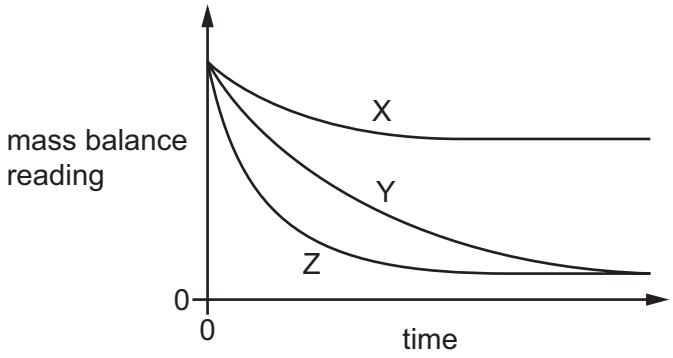


In experiment 1, the calcium carbonate is powdered, and an excess of hydrochloric acid is used.

In experiment 2, the calcium carbonate is in lumps, and an excess of hydrochloric acid is used.

In experiment 3, the calcium carbonate is in lumps, less hydrochloric acid is used, and the calcium carbonate is in excess.

The results of these experiments are shown.



Which statement is correct?

A Experiment 1 is shown by curve X.

B Experiment 1 is shown by curve Y.

C Experiment 2 is shown by curve Y.

D Experiment 3 is shown by curve Z.

16 The equation shows the reversible reaction between nitrogen and hydrogen to form ammonia.

$$N_2 + 3H_2 \rightleftharpoons 2NH_3$$

The forward reaction is exothermic.

Which statement is correct when the temperature is increased?

A The activation energy increases.

B The equilibrium shifts to form more ammonia.

C The rate of the forward reaction decreases.

D The rate at which ammonia decomposes increases.

17 Which statement is correct?

A Ethanoic acid is a weak acid because when it is added to excess alkali not all of the ethanoic acid reacts.

B Ethanoic acid is a weaker acid than sulfuric acid because a smaller proportion of its molecules dissociate in aqueous solution.

C Hydrochloric acid is a stronger acid than ethanoic acid because hydrochloric acid always has a higher pH than ethanoic acid.

D Sulfuric acid is a strong acid because it produces two hydrogen ions for every molecule that dissociates.

18 Some properties of a solid oxide are listed.

- It reacts with dilute sulfuric acid giving a salt and water.
- It is insoluble in water.
- It reacts with aqueous sodium hydroxide.

Which oxide is being described?

A aluminium oxide

B magnesium oxide

C phosphorus(V) oxide

D sodium oxide

19 Two compounds are dissolved separately in water.

When the two solutions are mixed, there is no observable change.

What are the two compounds?

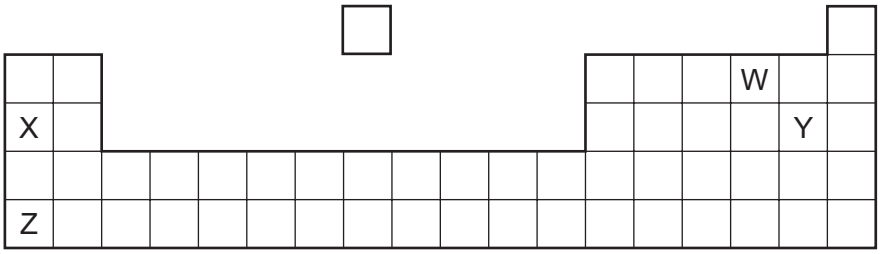
A sodium chloride and barium nitrate

B sodium chloride and lead nitrate

C sodium sulfate and barium chloride

D sodium sulfate and lead chloride

20 Part of the Periodic Table is shown.



W, X, Y and Z are **not** the correct symbols of the elements.

Which statement is correct?

A The compound formed between X and W has covalent bonds.

B W and Y are both gases at r.t.p. that contain covalent bonds.

C X and Y react together more vigorously than Z and Y at r.t.p.

D X and Z both have two outer-shell electrons.

21 The Group I metals lithium, sodium and potassium show trends in their melting points and in their reactions with water.

Which statement is correct going down the group from lithium to potassium?

A Their melting points decrease and their reaction with water becomes less vigorous.

B Their melting points decrease and their reaction with water becomes more vigorous.

C Their melting points increase and their reaction with water becomes less vigorous.

D Their melting points increase and their reaction with water becomes more vigorous.

22 Chlorine gas is bubbled into separate samples of aqueous potassium iodide and aqueous potassium bromide.

In which solutions is there a colour change?

	aqueous potassium iodide	aqueous potassium bromide
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = yes

✗ = no

23 Which statement about the elements in Group VIII of the Periodic Table is correct?

A Going down the group, the number of electrons in the atom increases by eight for each noble gas.

B Going down the group, the number of electrons in the outer shell increases by eight for each noble gas.

C The number of electrons in the outer shell is the same for each noble gas.

D The outer shell of each noble gas is fully occupied by electrons.

24 Which statement is correct?

A Aluminium is used in food containers because of its resistance to corrosion.

B Aluminium is used in the manufacture of aircraft because of its low ductility.

C Copper is used in electrical wiring because of its high density.

D Copper is used in the manufacture of overhead electrical cables because it forms an unreactive oxide layer.

25 Which elements are the major constituents of brass?

A Br and As **B** Cu and Sn **C** Cu and Zn **D** Sn and Zn

26 The diagrams show two methods in which metal X is used to prevent the rusting of iron.



A student suggests that metal X must be less reactive than iron and must have a lower proton number than iron.

Which suggestions are correct?

	less reactive	lower proton number
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = yes

✗ = no

27 Aluminium is extracted from molten aluminium oxide by electrolysis.

Which material is used for the electrodes in the industrial extraction?

A aluminium

B carbon

C cryolite

D platinum

28 Which substance is used to remove odours in the treatment of the domestic water supply?

A carbon

B chlorine

C fluorine

D silver

29 Carbon dioxide, methane and oxygen are gases involved in the carbon cycle.

Which of these gases cause global warming?

A carbon dioxide only

B carbon dioxide and methane

C carbon dioxide and oxygen

D methane only

30 How many structural isomers are there with the molecular formula C_4H_9Cl?

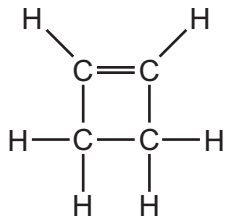
A 2 **B** 3 **C** 4 **D** 5

31 P is a branched hydrocarbon with the ratio of carbon atoms to hydrogen atoms being 1 : 2.

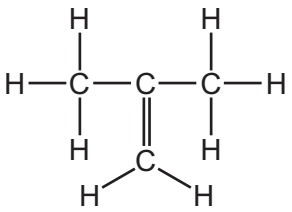
P has a relative molecular mass of 56.

What is the identity of P?

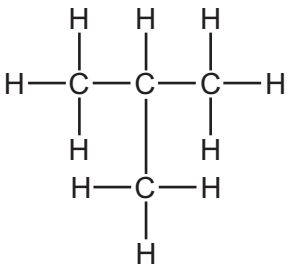
A



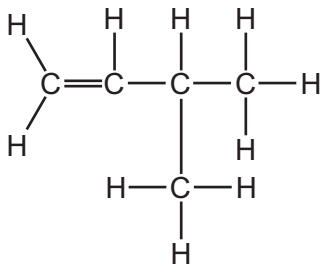
B



C



D



32 Which row gives the correct names of the two compounds?

	$CH_3CH_2CH{=}CH_2$	$CH_3CH(OH)CH_3$
A	but-1-ene	propan-1-ol
B	but-1-ene	propan-2-ol
C	but-2-ene	propan-1-ol
D	but-2-ene	propan-2-ol

33 Which equation represents the reaction of ethane with chlorine in the presence of ultraviolet light?

A $CH_3CH_3 + Cl_2 \rightarrow CH_3CH_3Cl + Cl$

B $CH_3CH_3 + Cl_2 \rightarrow CH_3CH_2Cl + HCl$

C $CH_3CH_3 + Cl_2 \rightarrow CH_2ClCH_2Cl + H_2$

D $CH_3CH_3 + Cl_2 \rightarrow CH_2CH_2 + 2HCl$

34 Which compound reacts with hydrogen in an addition reaction?

A $CH_3CHCHCH_3$

B $CH_3CH_2CH_2CH_3$

C $CH_3CH_2CH_2COOH$

D $CH_3CH_2CH_2CH_2OH$

35 Which statement about carboxylic acids is correct?

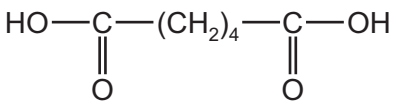
A They are prepared by the oxidation of alkanes.

B They decolourise bromine water.

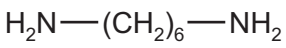
C They react with alcohols to form esters.

D They react with carbonates to form a salt, hydrogen and water.

36 The structures of X and Y are shown.



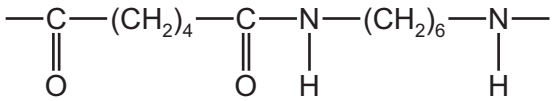
X



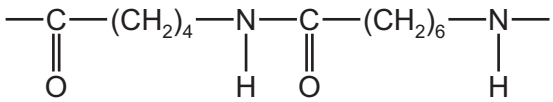
Y

What is the structure of the polymer formed when X and Y react together?

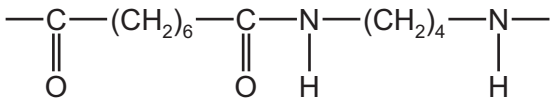
A



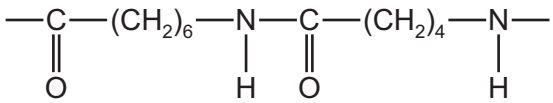
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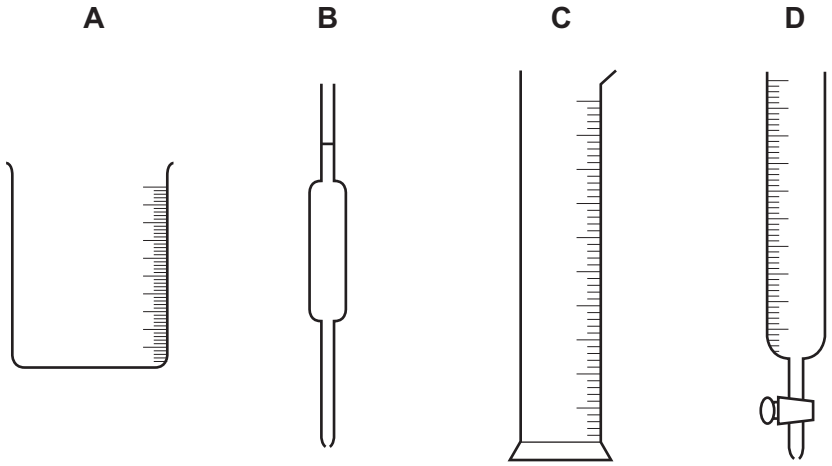
C



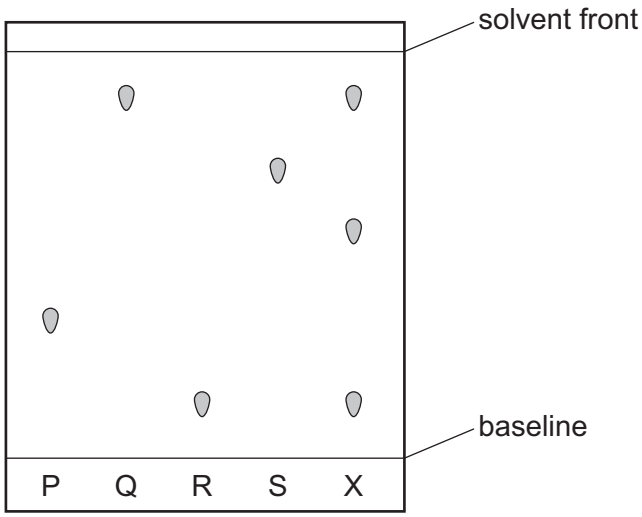
D



37 Which diagram shows a measuring cylinder?



38 A chromatogram of mixture X and pure substances P, Q, R and S is shown.



Which statement is correct?

A R is completely insoluble in the solvent used.

B The R_f value of Q is greater than the R_f value of S.

C X is a mixture of Q, R and S.

D The paper is placed in the solvent with the solvent above the baseline.

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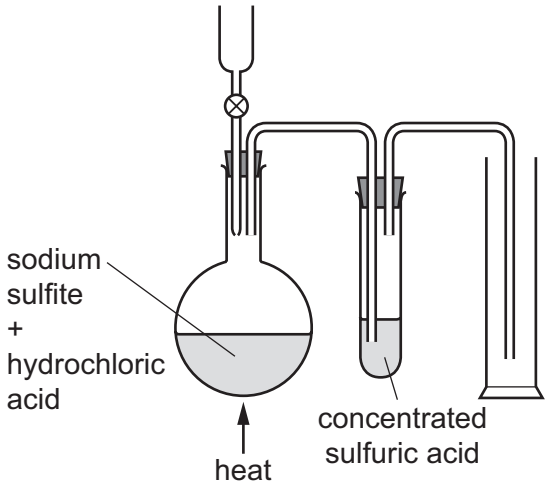
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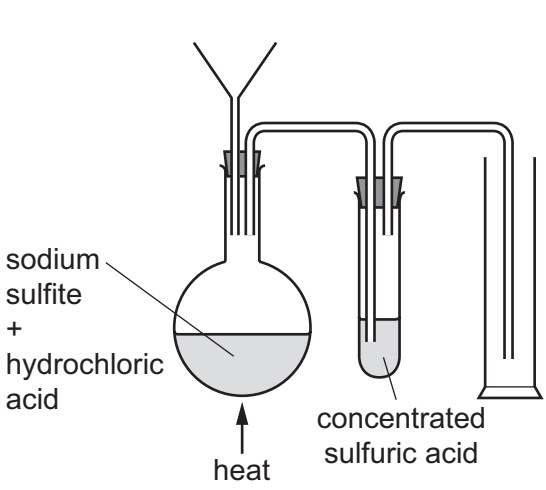
39 Sulfur dioxide is a gas that is prepared by heating sodium sulfite with hydrochloric acid. It is an acidic gas. Sulfur dioxide is more dense than air.

Which set of apparatus is suitable for preparing and collecting a dry sample of sulfur dioxide?

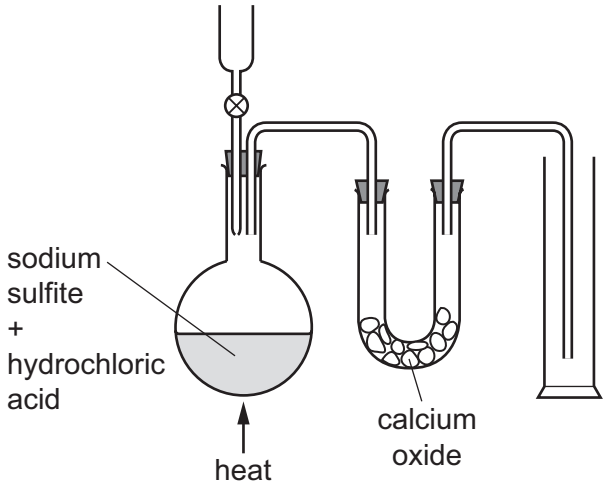
A



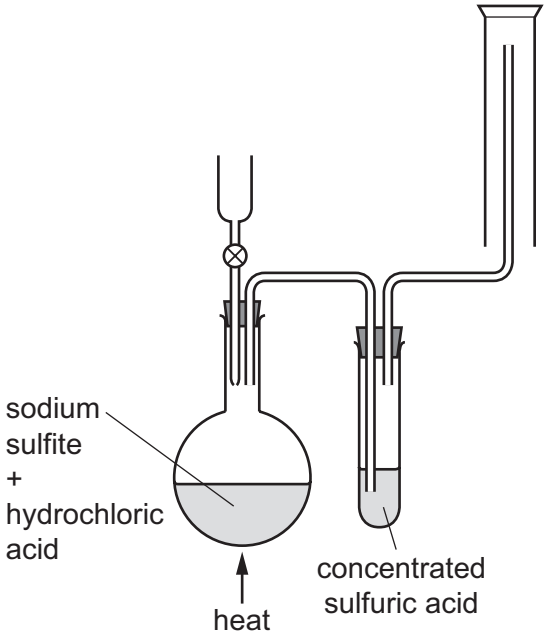
B



C



D



40 A colourless solution of compound W is tested separately with a few drops of aqueous sodium hydroxide and a few drops of aqueous ammonia.

No precipitate is observed in either of the tests.

What is the cation in W?

A Al^{3+} **B** Ca^{2+} **C** Cu^{2+} **D** NH_4^+

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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 –	113 Nh nihonium –	114 Fl flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

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.).