Cambridge Assessment International Education

Cambridge IGCSE™

CO-ORDINATED SCIENCES **0654/22**

Paper 2 Multiple Choice (Extended) **October/November 2022**

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.

IB22 11_0654_22/3RP

1 What do plants need for their nutrition?

A carbon dioxide, ions, organic compounds and light

B carbon dioxide, ions, organic compounds and water

C carbon dioxide, ions, light and water

D carbon dioxide, organic compounds, light and water

2 What is found in plant cells but **not** in animal cells?

A cell membrane

B cell wall

C nucleus

D cytoplasm

3 Glycerol is a component of which large molecules?

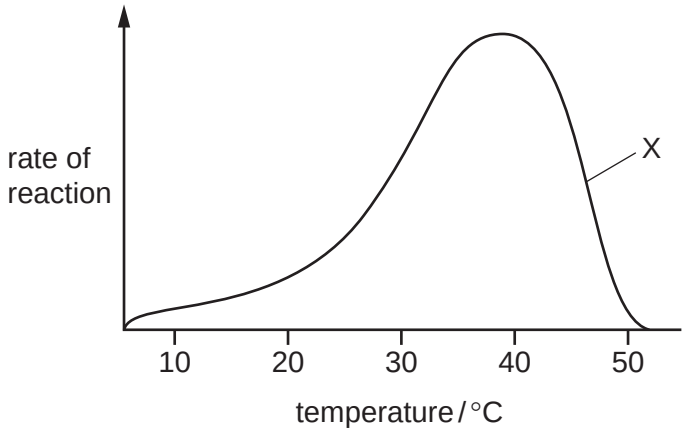
A fats

B glycogen

C proteins

D starch

4 The graph shows the rate of reaction of salivary amylase at different temperatures.



What does the graph show at point X?

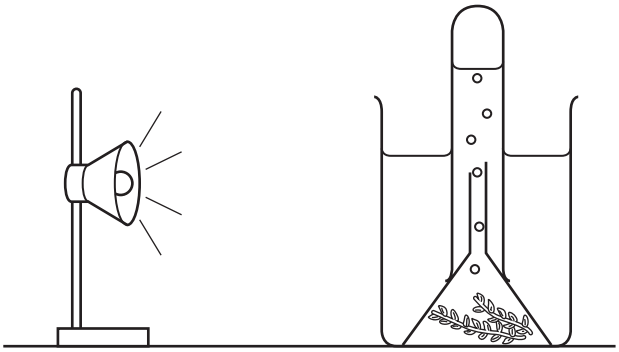
A The enzyme has stopped working.

B The reaction is nearly completed.

C The reaction rate is controlled by pH.

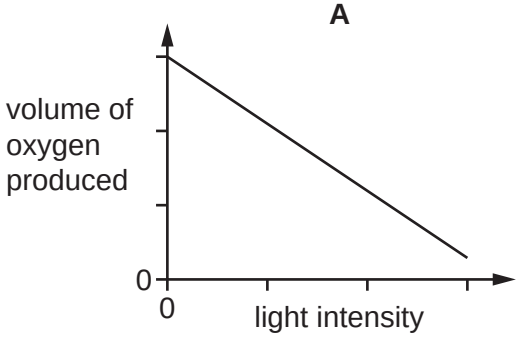
D The temperature is higher than the optimum.

5 The volume of oxygen produced by a submerged aquatic plant is investigated at different light intensities as shown.



Which graph shows how the volume of oxygen produced varies with light intensity?

A



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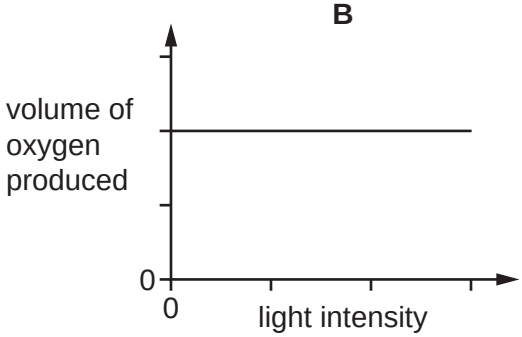

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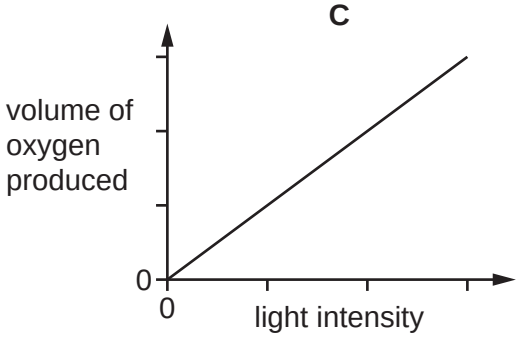

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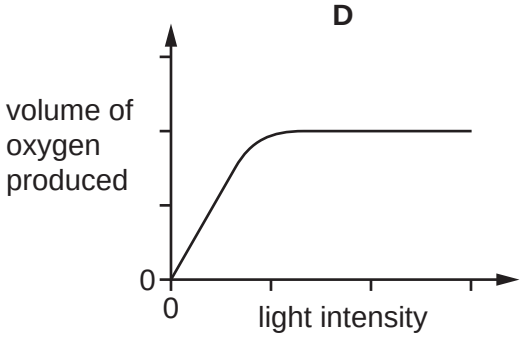


6 Which features of villi help to maximise the absorption of digested food?

1 a good blood supply

2 a large surface area

3 the presence of enzymes

4 the presence of lacteals

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

7 Which statement explains the effect of a higher temperature on the rate of transpiration?

A More water evaporates from the stomata, creating a water potential gradient that draws a column of water molecules up the xylem.

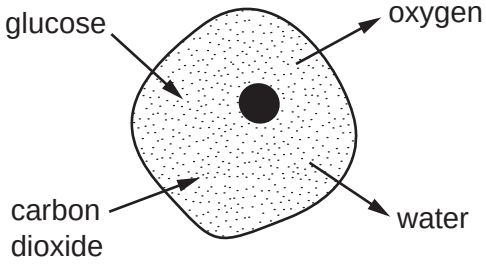
B Less water evaporates from the stomata, creating a water potential gradient that draws a column of water molecules up the xylem.

C More water evaporates from the stomata, creating a water potential gradient that draws a column of water molecules up the phloem.

D Less water evaporates from the stomata, creating a water potential gradient that draws a column of water molecules up the phloem.

8 Which diagram of a cell shows the correct movement of substances for the process of aerobic respiration?

A



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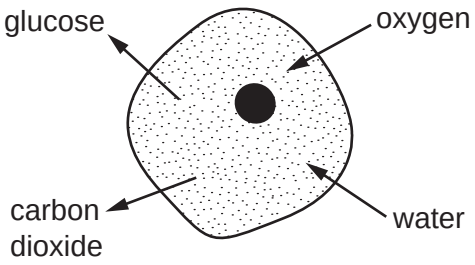

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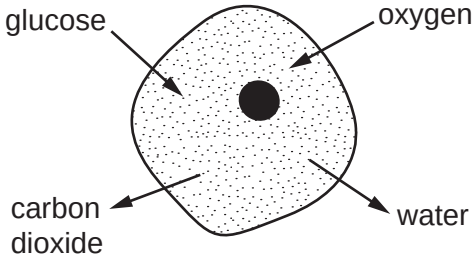

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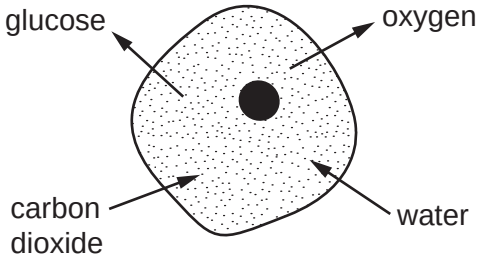


9 When a person moves from a brightly lit room into a dark room, the pupils in their eyes change in size.

Which row correctly describes the change in size and explains what causes this change?

	pupil size	radial muscles	circular muscles
A	decreases	contract	relax
B	decreases	relax	contract
C	increases	contract	relax
D	increases	relax	contract

10 What is most likely to describe a flower that is wind-pollinated?

A Anthers are small and inside the flower.

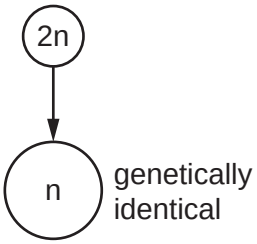
B Anthers are large and outside the flower.

C Stigmas are large and inside the flower.

D Stigmas are small and outside the flower.

11 If 2n is the diploid number of chromosomes in a nucleus, which diagram is correct for meiosis?

A



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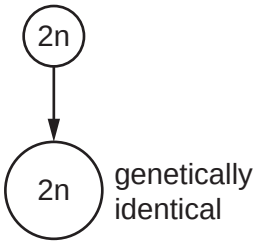

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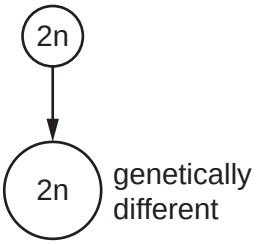

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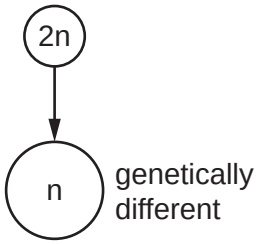


12 What is a producer in a food web?

A an organism that gets its energy by digesting plants

B an organism that makes its own food using light energy

C an organism that obtains energy from digested animals

D an organism that gets its energy from dead or waste organic matter

13 What is an undesirable effect of deforestation?

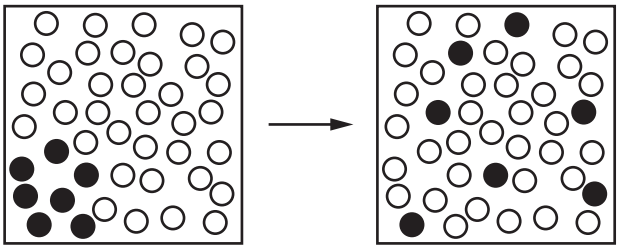
A It increases the oxygen concentration of the atmosphere.

B It leads to erosion and loss of soil.

C It makes land available for agriculture.

D It pollutes the air with methane.

14 Which change is represented by the diagram?



A condensation

B diffusion

C evaporation

D solidification

15 An atom of an element contains 9 protons, 10 neutrons and 9 electrons.

What is the nucleon number (mass number) of this element?

A 9 **B** 10 **C** 19 **D** 28

16 Which statements about the reaction between a metal and a non-metal are correct?

1 Metal atoms gain electrons.

2 Metal atoms lose electrons.

3 The non-metal is the reducing agent.

4 The non-metal is the oxidising agent.

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

17 1 g of hydrogen contains 6×10^{23} atoms.

The relative atomic mass of helium is 4.

How many atoms does 1 g of helium contain?

A 1.5×10^{23} **B** 3×10^{23} **C** 6×10^{23} **D** 2.4×10^{24}

18 Which ions gain and lose electrons during the electrolysis of concentrated aqueous sodium chloride?

	ions gaining electrons	ions losing electrons
A	H^+	Cl^-
B	H^+	OH^-
C	Na^+	Cl^-
D	Na^+	OH^-

19 Which row describes the type of energy change and the energy transfer when bonds are broken during a chemical reaction?

	type of change	energy transfer
A	endothermic	given out
B	endothermic	taken in
C	exothermic	given out
D	exothermic	taken in

20 The equations for reactions in the blast furnace are shown.

1 $C + O_2 \rightarrow CO_2$

2 $CO_2 + C \rightarrow 2CO$

3 $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

4 $CaO + SiO_2 \rightarrow CaSiO_3$

Which statement is correct?

A In reaction 1, carbon is reduced.

B In reaction 2, carbon dioxide is oxidised.

C In reaction 3, carbon monoxide is oxidised.

D In reaction 4, silicon dioxide is reduced.

21 Which statements about the elements in Group VII of the Periodic Table are correct?

1 Only one of them is a liquid at room temperature.

2 Their colours become darker down the group.

3 Their melting points and boiling points decrease down the group.

4 They are all metallic elements called halogens.

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

22 Filament lamps require an inert atmosphere.

Which gas is used to fill these lamps?

A argon

B helium

C hydrogen

D oxygen

23 Alloys are formed by dissolving one metal in another.

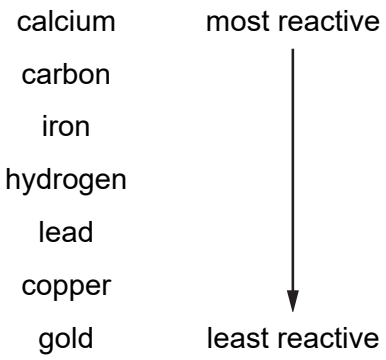
Alloys are ……1…… .

……2…… alloys conduct electricity.

Which words complete gaps 1 and 2?

	1	2
A	compounds	All
B	compounds	Some
C	mixtures	All
D	mixtures	Some

24 Part of the reactivity series is shown.



Which statement is correct?

A Calcium can be extracted by heating its oxide with hydrogen.

B Copper forms an oxide that can be reduced by heating with gold.

C Gold forms an oxide that cannot be reduced by heating with carbon.

D Lead can be extracted by passing hydrogen over its heated oxide.

25 Sulfur dioxide is oxidised to sulfur trioxide in the Contact process.

The equation for this reaction is shown.

$$2SO_2 + O_2 \rightleftharpoons 2SO_3$$

Which row describes the conditions for this reaction?

	catalyst	temperature / °C	pressure / atm
A	Fe	200	2
B	Fe	450	250
C	V_2O_5	200	250
D	V_2O_5	450	2

26 What is **not** a use of limestone?

A manufacture of calcium oxide

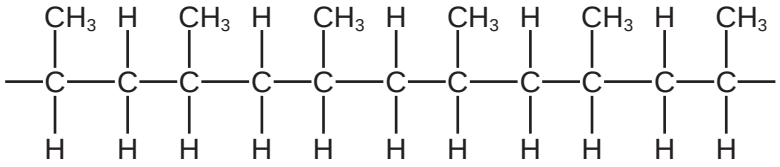
B neutralising industrial waste products

C purifying water

D treating acidic soil

27 Which diagram represents the structure of nylon?

A



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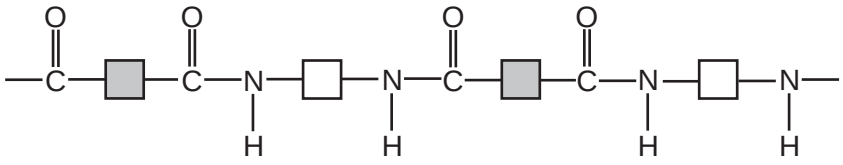

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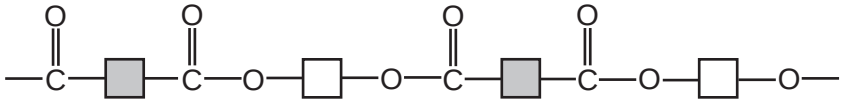

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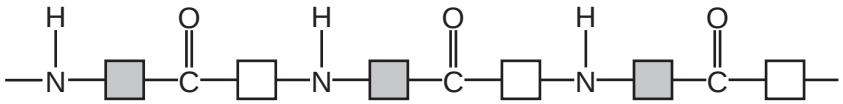


28 A rock has a mass of 360 g.

A large measuring cylinder contains 500 cm^3 of water.

The rock is now lowered into the water and completely submerged. The water level in the measuring cylinder rises to 650 cm^3.

Which calculation gives the density of the rock?

A $\frac{360}{150}\ g/cm^3$

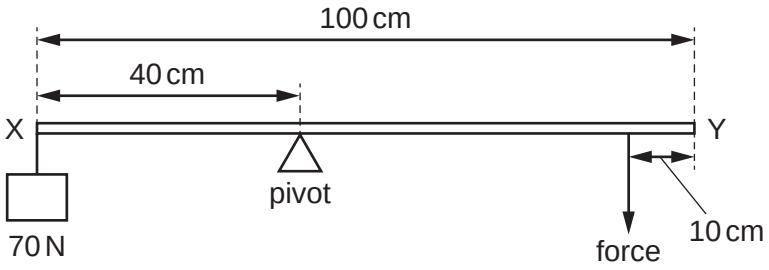
B $360 \times 150\ g/cm^3$

C $\frac{360}{650}\ g/cm^3$

D $360 \times 650\ g/cm^3$

29 The diagram shows a beam XY of length 100 cm. The weight of the beam can be ignored. There is a pivot at 40 cm from end X and a load of weight 70 N is suspended at end X.

The beam is balanced by a force acting at 10 cm from end Y.



What is the magnitude of this force?

A 47 N **B** 56 N **C** 70 N **D** 280 N

30 A force acting on an object increases the kinetic energy of the object from 20 J to 50 J in 5.0 s.

What is the average power produced by the force?

A 4.0 W **B** 6.0 W **C** 10 W **D** 14 W

31 From which type of energy is electrical energy transferred in a hydroelectric power station?

A chemical potential energy

B elastic potential (strain) energy

C gravitational potential energy

D nuclear energy

32 The liquid in a liquid-in-glass thermometer is replaced with a different liquid that expands more for the same increase in temperature.

The scale on the thermometer is changed because of the new liquid.

What happens to the sensitivity and what happens to the range of the thermometer?

	sensitivity	range
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

33 One cause of air movement in the atmosphere is convection.

Which statement describes air that rises in the atmosphere due to convection?

A It is cooler and less dense than the surrounding air.

B It is cooler and more dense than the surrounding air.

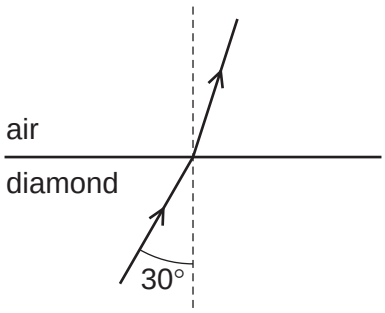
C It is warmer and less dense than the surrounding air.

D It is warmer and more dense than the surrounding air.

34 The critical angle for diamond in air is 25°. Light travels faster in air than in diamond.

Which diagram shows the path of light passing from diamond into air?

A



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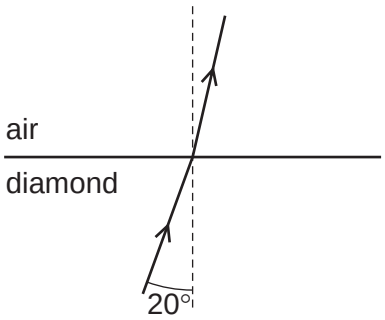

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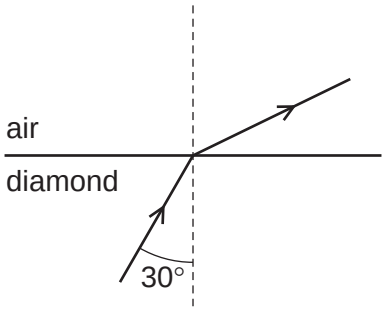

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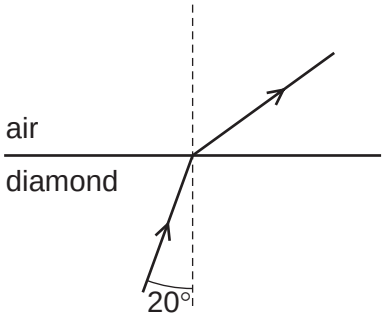


35 The speeds of sound in three different states of the same substance are 480 m / s, 1500 m / s and 1800 m / s.

Which row gives the state for each of these speeds?

	480 m / s	1500 m / s	1800 m / s
A	gas	liquid	solid
B	gas	solid	liquid
C	solid	gas	liquid
D	solid	liquid	gas

36 Which type of magnet can be switched on and off many times per second?

A an electromagnet only

B a permanent magnet only

C both electromagnets and permanent magnets

D neither electromagnets or permanent magnets

37 A plastic rod is rubbed with a cloth causing a negative charge on the rod.

Which statements are correct?

1 The rod gains electrons.

2 The cloth loses electrons.

3 The cloth becomes positively charged.

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

38 The maximum current in a food mixer during normal use is 3.1 A.

What is the most suitable rating for a fuse used to protect the mixer?

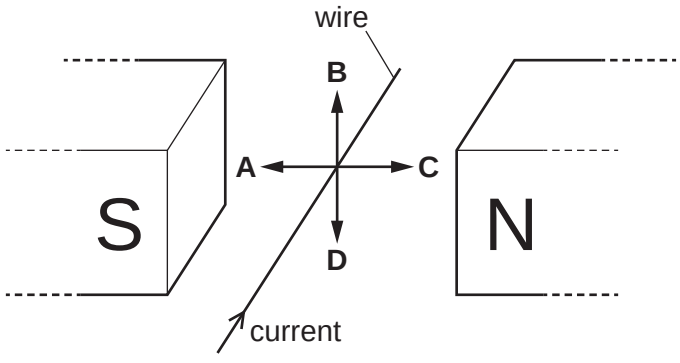
A 1 A **B** 3 A **C** 5 A **D** 8 A

39 A current-carrying wire is placed between the poles of a magnet, as shown.

The current direction in the wire is shown.

A force is produced on the wire.

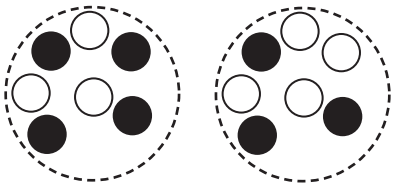
In which labelled direction does the force act?



40 The diagrams represent pairs of nuclei of some atoms.

Which pair shows nuclei of different isotopes of the same element?

A



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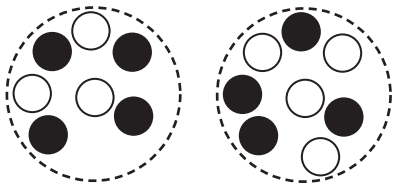

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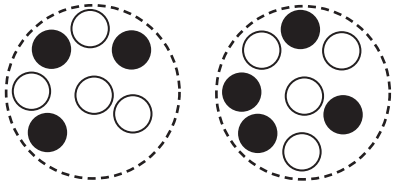

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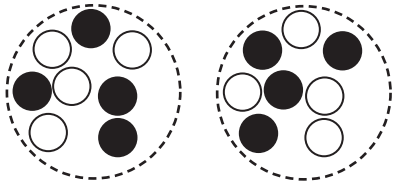

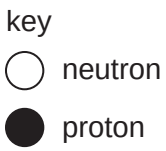

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The Periodic Table of Elements

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.).