AQA GCSE CHEMISTRY (HIGHER) · 8462

CHEMISTRY



MARK SCHEME

4.1.2 THE PERIODIC TABLE (PACK 1)

SCORE	PERCENTAGE
/295	%

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Q1.

(a) 7

1

(b) small molecule

1

(c) F_2

1

(d) the reactivity decreases (going down Group 7)

allow the reactivity decreases from chlorine to iodine

1

(because) chlorine displaces bromine and iodine

allow (because) chlorine has two reactions

allow (because) neither bromine nor iodine can displace chlorine

1

(and) bromine displaces iodine **or** iodine does not react

allow (and) bromine has one reaction
***or** iodine has no reactions*

allow (and) iodine cannot displace bromine

1

(e) 80

1

(f) (1.2 kg =) 1200 (g)
or (900 g =) 0.9 (kg)

1

$$\left(\frac{900}{1200}\times 100\right) = 75(\%)$$

or

$$\left(\frac{0.9}{1.2}\times 100\right) = 75(\%)$$

allow an answer correctly calculated from:

$$\left(\frac{900}{\text{incorrect attempt at conversion of 1.2}}\times 100\right)$$

or

$$\left(\frac{\text{conversion of 900}}{1.2}\times 100\right)$$

1

*an answer of 75 (%) scores **2** marks*

[9]

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Q2.

(a) sodium oxide

allow Na_2O

1

(b) oxidation

1

(c) 13

1

(d) sodium hydroxide

1

(e) OH^-

1

(f) $(\text{volume} =) \frac{250}{1000}$ or ¼

or 0.25 (dm^3)

1

or

$(\text{mass per } cm^3 =) \frac{40}{1000}$ (g)

or 0.04 (g)

$(\frac{250}{1000} \times 40 =) 10$ (g)

1

*an answer of 10 (g) scores **2** marks*

(g) all points correct

allow a tolerance of ±½ a small square
*allow **1** mark for 3 points correct*
ignore any attempt at a line of best fit

2

(h) 39 °C

allow any value from 34 to 46 (°C)

1

[10]

Q3.

(a) FeS_2

*do **not** accept equations*

1

(b) 26

1

30

1

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26

1

must be this order

(c) any **two** from:

- iron has a high(er) melting / boiling point
- iron is dense(r)
- iron is hard(er)

allow iron is less malleable / ductile

- iron is strong(er)
- iron is less reactive

allow specific reactions showing difference in reactivity

- iron has ions with different charges
- iron forms coloured compounds
- iron can be a catalyst

allow iron is magnetic

allow the converse statements for sodium
allow transition metal for iron
allow Group 1 metal for sodium

ignore references to atomic structure

ignore iron rusts

2

(d) carbon is more reactive (than nickel)

allow converse

1

(so) carbon will displace / replace nickel (from nickel oxide)

allow (so) nickel ions gain electrons

or

(so) carbon will remove oxygen (from nickel oxide)

allow (so) carbon transfers electrons to nickel (ions)

1

(e) (total M_r of reactants =) 87

1

(percentage atom economy)

$$= \frac{59}{87} \times 100$$

allow (percentage atom economy)

$$= \frac{59}{\text{incorrectly calculated } M_r} \times 100$$

1

= 67.8 (%)

allow an answer from an incorrect calculation to 3 sig figs

1

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*an answer of 67.8 (%) scores **3** marks*

*an answer of 67.8160919 (%) or correctly rounded answer to 2, 4 or more sig figs scores **2** marks*

an incorrect answer for one step does not prevent allocation of marks for subsequent steps

[11]

Q4.

(a) potassium chloride **and** iodine

either order

allow KCl for potassium chloride and I_2 for iodine

1

(b) (chlorine's) outer electrons / shell closer to the nucleus

allow chlorine has fewer shells

allow chlorine atom is smaller than iodine atom

ignore chlorine has fewer outer shells

1

(so) the chlorine nucleus has greater attraction for outer electrons / shell

allow chlorine has less shielding

*do **not** accept incorrect types of attraction*

1

(so) chlorine gains an electron more easily

1

***max 2** marks can be awarded if the answer refers to chloride / iodide instead of chlorine / iodine*

allow converse statements

allow energy levels for shells throughout

(c) hydrogen chloride is made of small molecules

allow hydrogen chloride is simple molecular

1

(so hydrogen chloride) has weak intermolecular forces*

1

(intermolecular forces) require little energy to overcome*

1

do **not accept reference to bonds breaking unless applied to intermolecular bonds*

(d) (bonds broken = 4(412) + 193 =)1841

1

(bonds formed = 3(412) + 366 + **X** =) 1602 + **X**

1

−51 = 1841 − (1602 + **X**)

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allow use of incorrectly calculated values of bonds broken and / or bonds formed from steps 1 and 2 for steps 3 and 4

1

(**X** =) 290 (kJ/mol)

allow a correctly calculated answer from use of −51 = bonds formed − bonds broken

1

OR

alternative method ignoring the 3 unchanged C−H bonds

(412 + 193 =) 605 (1)

366 + **X** (1)

−51 = 605 − (366 + **X**) (1)

(**X** =) 290 (kJ/mol) (1)

*an answer of 290 (kJ/mol) scores **4** marks*

*an answer of 188 (kJ/mol) scores **3** marks*

*an incorrect answer for one step does **not** prevent allocation of marks for subsequent steps*

[11]

Q5.

(a) chlorine is toxic

allow carbon monoxide is toxic

allow poisonous for toxic
ignore harmful / deadly / dangerous

allow a poisonous gas is used / produced

allow titanium chloride is corrosive

1

(b) any **one** from:

- very exothermic reaction

  allow explosive
  allow violent reaction
  ignore vigorous reaction
  ignore sodium is very reactive

- produces a corrosive solution

  allow caustic for corrosive
  ignore alkaline

- produces hydrogen, which is explosive / flammable

  allow flames produced
  ignore sodium burns

1

(c) argon is unreactive / inert

allow argon will not react (with reactants / products / elements)

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1

oxygen (from air) would react with sodium / titanium
or
water vapour (from air) would react with sodium / titanium

allow elements / reactants / products for sodium / titanium

1

(d) metal chlorides are usually ionic

allow titanium chloride is ionic

1

(so)(metal chlorides) are solid at room temperature
or
(so)(metal chlorides) have high melting points

allow titanium chloride for metal chlorides

1

(because) they have strong (electrostatic) forces between the ions

ignore strong ionic bonds

or
(but) must be a small molecule or covalent

allow molecular

1

allow alternative approach:
*titanium chloride must be covalent **or** has small molecules (1)*
with weak forces between molecules
*do **not** accept bonds unless intermolecular bonds(1)*
(but) metal chlorides are usually ionic (1)

(e) sodium (atoms) lose electrons

*do **not** accept references to oxygen*

1

(f) $Na \longrightarrow Na^+ + e^-$

*do **not** accept e for e^-*

1

(g) (M_r of $TiCl_4$ =) 190

$$(\text{moles Na} = \frac{20\,000}{23} =) \ 870 \ (\text{mol}) *$$

1

$$(\text{moles } TiCl_4 = \frac{40\,000}{190} =) \ 211 \ (\text{mol}) *$$

1

allow **1 mark for 0.870 mol Na **and** 0.211 mol $TiCl_4$*
allow use of incorrectly calculated M_r from step 1

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either
(sodium is in excess because) 870 mol Na is more than the 844 mol needed
or
(because) 211 mol $TiCl_4$ is less than the 217.5 mol needed

the mark is for correct application of the factor of 4

other correct reasoning showing, with values of moles or mass, an excess of sodium or insufficient $TiCl_4$ is acceptable

allow use of incorrect number of moles from steps 2 and / or 3

1

alternative approaches:

approach 1:

(M_r of $TiCl_4$ =) 190(1)

(40 kg $TiCl_r$ needs)

$\frac{40}{190} \times 4 \times 23$ *(kg Na) (1)*

(=) 19.4 (kg) (1)

so 20 kg is an excess (1)

approach 2:

(M_r of $TiCl_4$ =) 190(1)

(20 kg Na needs)

$\frac{20}{4 \times 23} \times 190$ *(kg $TiCl_4$) (1)*

(=) 41.3 (kg) (1)

so 40 kg is not enough (1)

(h) (actual mass =) $\frac{92.3}{100} \times 13.5$

or
(actual mass =) 0.923 × 13.5

1

= 12.5 (kg)

allow 12 / 12.46 / 12.461 / 12.4605 (kg)

1

*an answer 12.5 (kg) scores **2** marks*

[15]

Q6.

(a) 4 Na + O_2 ⟶ $2Na_2O$

allow multiples

1

(b) (sodium) gains oxygen

1

(c) purple

1

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(d) aluminium chloride

1

(e) **Level 2 (3-4 marks):**
Relevant reasons are identified, given in detail and logically linked to form a clear account.

Level 1 (1-2 marks):
Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

Level 0
No relevant content

Indicative content

conclusion 1
- pH values above 7 are alkaline
- sodium oxide, calcium oxide and magnesium oxide do form alkaline solutions (so correct for those)
- not all metal oxides form solutions (so incorrect for zinc oxide)

conclusion 2
- pH values below 7 are acidic
- carbon dioxide, sulfur dioxide and phosphorus oxide do form acidic solutions (so correct for those)
- not all non-metal oxides form solutions (so incorrect for silicon oxide)]

4

(f) metal oxides produce alkaline solutions if they dissolve in water

*allow **1** mark for most metal oxides produce alkaline solutions*

2

[10]

Q7.

(a) **J**

1

(b) **M** and **Q**

either order

1

(c) **Q**

1

(d) **M**

1

(e) **L**

1

(f) **Level 3 (5-6 marks):**
A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.

Level 2 (3-4 marks):

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Some logically linked reasons are given. There may also be a simple judgement.

Level 1 (1-2 marks):
Relevant points are made. They are not logically linked.

Level 0
No relevant content

Indicative content

comparative points
- both tables have more than one element in a box
- both have similar elements in the same column
- both are missing the noble gases
- both arranged elements in order of atomic weight

advantages of Mendeleev / disadvantages of Newlands
- Newlands did not leave gaps for undiscovered elements
- Newlands had many more dissimilar elements in a column
- Mendeleev left gaps for undiscovered elements
- Mendeleev changed the order of some elements (e.g. Te and I)

points which led to the acceptance of Mendeleev's table
- Mendeleev predicted properties of missing elements
- elements with properties predicted by Mendeleev were discovered
- Mendeleev's predictions turned out to be correct
- elements were discovered which fitted the gaps

6

[11]

Q8.

(a) **B**

1

(b) **D**

1

(c) **E**

1

(d) **C**

1

(e) 92.5 × 6 **and**
7× 7.5

1

$$\frac{607.5}{100}$$

1

6.075

1

6.08

1

*allow 6.08 with no working shown for **4** marks*

[8]

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Q9.

(a) 13 (protons)

The answers must be in the correct order.

*if no other marks awarded, award **1** mark if number of protons and electrons are equal*

1

14 (neutrons)

1

13 (electrons)

1

(b) has three electrons in outer energy level / shell

allow electronic structure is 2.8.3

1

(c) **Level 3 (5–6 marks):**
A detailed and coherent comparison is given, which demonstrates a broad knowledge and understanding of the key scientific ideas. The response makes logical links between the points raised and uses sufficient examples to support these links.

Level 2 (3–4 marks):
A description is given which demonstrates a reasonable knowledge and understanding of the key scientific ideas. Comparisons are made but may not be fully articulated and / or precise.

Level 1 (1–2 marks):
Simple statements are made which demonstrate a basic knowledge of some of the relevant ideas. The response may fail to make comparisons between the points raised.

0 marks:
No relevant content.

Indicative content

Physical
Transition elements
- high melting points
- high densities
- strong
- hard

Group 1
- low melting points
- low densities
- soft

Chemical
Transition elements
- low reactivity / react slowly (with water or oxygen)
- used as catalysts
- ions with different charges
- coloured compounds

Group 1
- very reactive / react (quickly) with water / non-metals

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- not used as catalysts
- white / colourless compounds
- only forms a +1 ion

6

[10]

Q10.

(a) The forces between iodine molecules are stronger

1

(b) anything in range +30 to +120

1

(c) Brown

1

(d) $2\ I^- + Cl_2 \rightarrow I_2 + 2\ Cl^-$

1

(e) It contains ions which can move

1

(f) hydrogen iodine

1

[6]

Q11.

(a) (i) 7

1

(ii) –1

1

(iii) neutrons

1

(b) number of protons

1

(c) atom **Y**

1

(d) (i) Ne

allow neon

1

(ii) has a full outer shell

allow in Group 0

allow a noble gas

or

full outer energy level

allow the shells are full

or

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has 8 electrons in its outer shell

ignore in Group 8

1

[7]

Q12.

(a) (i) 7 / seven

1

(ii) 1

*do **not** accept –1*

1

Electron

1

(iii) isotopes

1

(b) (i) (sodium +) fluorine → sodium fluoride

1

(ii) compounds

1

(iii) mole

1

(iv) sodium (atom) loses

1

fluorine (atom) gains

1

one electron

1

ions formed

1

*allow sodium forms positive (ion) **or** fluorine forms negative (ion)*

allow form ionic bond

allow to gain a full outer shell of electrons

allow forms noble gas structure

***max 3** if reference to incorrect particle / bonding*

(v) Dissolve in water

1

High melting point

1

[13]

Q13.

(a) atomic weights

must be in this order

1

electrons

1

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proton numbers

1

(b) (i) H/hydrogen

allow H_2 or h

1

(ii) one / 1

allow alkali metals

1

(iii) Potassium (K)

1

(iv) Iron has a higher density than potassium

1

Iron forms ions that have different charges

1

(c) any **three** from:

- melts
- fizzes / bubbles / effervesces

allow gas produced

- sodium floats
- size of the sodium decreases

allow dissolves / disappears

- sodium moves

allow two marks for moves around on the surface of the water

3

[11]

Q14.

(a) (i) atomic weights

allow atomic masses

1

(ii) proton

allow proton number

1

(b) (i) F/fluorine

allow F_2

1

(ii) any **one** from:

- copper has a higher density
- copper is stronger
- copper is harder
- copper is less reactive

allow named property

ignore colour, conductivity, melting point and boiling point

allow converse for potassium

1

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(iii) relative distance from nucleus

allow more / fewer energy levels / shells or larger / smaller atom

1

relative attraction to nucleus

allow more / less shielding

1

relative ease of gain or loss of electron

1

opposite explanation of ease of gain or loss of electron for other group

1

max 3 marks if 'outer' not mentioned

[8]

Q15.

(a) Y

1

(b) W

1

(c) V

1

(d) W

1

(e) X

1

[5]

Q16.

(a) (i) Proton

1

(ii) Neutron

1

(b) In order of increasing atomic number

1

(c) (i) 9

1

(ii) Gas

1

(d) (i) gains (one) electron

1

(to gain a) full outer energy level **or** noble gas configuration

allow because it has seven outer electrons

1

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(ii) add sodium hydroxide (solution)

allow ammonia (solution) ***or*** *ammonium hydroxide* ***or*** *any other soluble hydroxide* ***or*** *flame test*

1

(forms a) blue precipitate

second mark dependent on suitable reagent being added

allow blue−green / blue / green if flame test given

1

[9]

Q17.

(a) gold

1

(b) atom (s)

1

(c) (i) protons

any order

allow proton

1

neutrons

allow neutron

1

(ii) 3 / three

1

(d) (i) Al

ignore any numbers / charges

1

(ii) any **two** from:

- limited resource
- expensive in terms of energy / mining
- effects on the environment, such as, landfill, atmospheric pollution, quarrying

allow uses a lot of energy to extract.

2

(e) resistant to corrosion

1

does not react (with water or food)

allow ***one*** *mark for low density with a suitable reason given*

1

[10]

Q18.

(a) (i) protons

allow "protons or electrons", but do not allow "protons and electrons"

1

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(ii) protons plus / and neutrons

1

(b) (because the relative electrical charges are) −(1) for an electron and +(1) for a proton

allow electrons are negative and protons are positive

1

and the number of electrons is equal to the number of protons

if no other mark awarded, allow 1 mark for the charges cancel out

1

(c) (the electronic structure of) fluorine is 2,7 and chlorine is 2,8,7

allow diagrams for the first marking point

1

(so fluorine and chlorine are in the same group) because they have the same number of or 7 electrons in their highest energy level or outer shell

if no other mark awarded, allow 1 mark for have the same / similar properties

1

(d) S

1

(e) (i) ions

1

(ii) molecules

1

[9]

Q19.

(a) (i) Na

allow sodium

1

(ii) Cu

allow copper

1

(iii) C

allow carbon

1

(iv) He

allow helium

1

(b) H

allow hydrogen

*do **not** allow H_2*

1

[5]

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Q20.

(a) (iron) is a metal

accept transition element

allow (iron) had different properties (to oxygen and sulfur)

ignore electrons

1

(b) so that elements with similar properties could be placed together

allow to make the pattern fit

ignore undiscovered elements

1

(c) atomic number(s)

allow proton number(s)

1

(d) all have one electron in the outer shell (highest energy level)

allow same number of electrons in the outer shell (highest energy level)

1

(so they) have similar properties
or
react in the same way

allow specific reactions e.g. with water

1

[5]

Q21.

(a) increase

1

(b) (i) Na^+ **and** Br^-

both required

1

(ii) sodium chloride

allow NaCl

*do **not** allow sodium chlorine*

1

(iii) chlorine is more reactive than bromine

allow converse argument

allow symbols Cl, Cl_2, Br and Br_2

allow chlorine / it is more reactive

*do **not** allow chloride **or** bromide*

1

(iv) fluorine

allow F / F_2.

*do **not** allow fluoride.*

1

[5]

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Q22.

(a) Li **and** K

either order
*allow lithium **and** potassium*

1

(b) Fe

allow iron

1

(c) N **and** As

either order
*allow nitrogen **and** arsenic*

1

(d) Cu

allow copper

1

[4]

Q23.

(a) (i) an electron

1

(ii) a neutron

1

(iii) 11

1

(iv) boron

1

(b) (i) GH_3

1

(ii) covalent

1

[6]

Q24.

(a) (i) Na

allow sodium / phonetic spelling
if more than one answer is given apply list principle

1

(ii) Fe

allow iron / phonetic spelling
if more than one answer is given apply list principle

1

(iii) Na **or** S

allow sodium or sulfur / sulphur / phonetic spelling
if more than one answer is given apply list principle

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1

(iv) S

allow sulfur / sulphur / phonetic spelling

if more than one answer is given apply list principle

1

(v) Na

allow sodium / phonetic spelling

if more than one answer is given apply list principle

1

(b) (i) any **three** from:

- effervescence / fizzing **or** bubbles **or** gas produced

  *do **not** allow incorrectly named gas*
- sodium melts **or** turns into a ball
- sodium moves (on the surface)
- steam / mist / vapour is produced

  ignore heat / temperature / flame / spark
- sodium gets smaller / disappears

  allow dissolves
- colour of indicator is darker / more intense near the sodium

  Must be linked to near the sodium.

3

(ii) hydroxide **or** OH^-

allow OH without a charge

*do **not** allow OH^+*

1

(c)

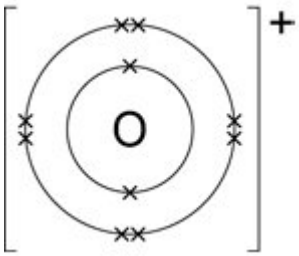


diagram showing electron configuration of ion is 2,8

1

charge on ion is +

Bracket not necessary

$[2,8]^+$ is worth 1 mark as there is no diagram

1

[11]

Q25.

(a) (i) any **one** from:

- one electron in the outer shell / energy level
- form ions with a 1+ charge

1

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(ii) any **one** from:

- hydrogen is a non-metal
- (at RTP) hydrogen is a gas
- hydrogen does not react with water
- hydrogen has only one electron shell / energy level
- hydrogen can gain an electron **or** hydrogen can form a negative / hydride / H^- ion
- hydrogen forms covalent bonds **or** shares electrons

accept answers in terms of the Group 1 elements

1

(b) (i) (bromine) gains electrons

it = bromine

*do **not** accept bromide ion gains electrons*

ignore loss of oxygen

1

(ii) I_2

must both be on the right hand side of the equation

1

$+ 2e^-$

*$2I^- - 2e^- \rightarrow I_2$ for **2** marks*

1

(iii) fluorine is the smallest atom in Group 7 **or** has the fewest energy levels in Group 7 **or** has the smallest distance between outer shell and nucleus

*the outer shell **must** be mentioned to score 3 marks*

1

fluorine has the least shielding **or** the greatest attraction between the nucleus and the outer shell

1

therefore fluorine can gain an electron (into the outer shell) more easily

1

[8]

Q26.

(a) (i) atomic weight

1

(ii) groups

1

(iii) left a gap

1

(iv) had not been discovered by 1869

1

(b) protons

must be in correct order

1

electrons

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1

(c) sodium and nickel are both metals

1

sodium is more reactive than nickel

1

(d) (i) bromine

allow Br_2 / Br

*do **not** allow bromide*

1

(ii) iodine is less reactive (than bromine)

it = iodine

allow converse

*do **not** allow bromide*

1

[10]

Q27.

(a) (i) E

1

(ii) C

1

(iii) A

1

(b) (i) quickly melted

allow melts in contact with water,

allow bp 100 °C (of water) shows mp is low

ignore one other piece of information

1

(ii) easily cut

ignore one other piece of information

1

(iii) effervescence / fizzing / bubbling

ignore named gas

ignore one other piece of information

1

[6]

Q28.

(a) similar properties

allow same properties

allow correct example of property

ignore answers in terms of atomic structure

1

(b) (i) in order of atomic / *proton* number

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allow increasing number (of protons)

1

(ii) elements in same group have same number (*of electrons*) in outer shell **or** *highest energy level*

allow number (of electrons) increases across a period

1

(c) any **two** from:

statements must be comparative

- stronger / harder

ignore higher densities

- less reactive
- higher melting points

ignore boiling point

2

(d) *reactivity increases down group*

allow converse throughout

*for next three marks, outer electron needs to be mentioned once otherwise max = **2***

1

outer electron is further from nucleus

allow more energy levels / shells

allow larger atoms

1

less attraction between outer electron and nucleus

allow more shielding

1

therefore outer electron lost more easily

1

[9]

Q29.

(a) if placed consecutively, then elements would be in wrong group / have wrong properties

allow some elements didn't fit pattern

1

left gaps

1

(b) (elements placed in) atomic / proton number order

1

(elements in) same group have same number of outer electrons

1

any **one** from:

- number of protons = number of electrons
- reactions/(chemical) properties depend on the (outer) electrons

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- number of shells gives the period

  allow number of shells increases down the group

1

(c) (i) (transition elements usually) have same / similar number of outer / 4th shell electrons

allow 2 electrons in outer shell

1

(because) inner (3rd) shell / energy level is being filled

ignore shells overlap

1

(ii) 2nd shell / energy level can (only) have maximum of 8 electrons

accept no d-orbitals

or

2nd shell / energy level cannot have 18 electrons

1

[8]

Q30.

(a) (i) any **two** from:

- bubbles / effervescence / fizzing

  ignore hydrogen / gas produced
- lithium disappears / gets smaller

  allow dissolves

  *do **not** allow melts / burns*
- lithium moves on the surface of the water

  ignore floats
- (universal indicator) turns blue / purple

2

(ii) 2

left-hand side correct

1

2

right-hand side correct

allow multiples for full credit

1

(iii) light / burn, which will give a (squeaky) pop / explosion

1

(iv) all have 1 electron in their outer shell / energy level

allow have the same number of electrons in their outer shell / energy level

1

(b) They react with oxygen

1

They have low melting points

1

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(c) (i) electronic structure [2,8,8] is drawn

*incomplete inner shells scores a maximum of **1** mark*

1

charge is +

*allow [2,8,8]$^{+}$ for **1** mark*

1

(ii) because (in potassium) the outer shell electron is further away from the nucleus **or** because potassium atoms are larger than sodium atoms

*it should be clear that the candidate is referring to the outer shell electron: if this is not clear a maximum of **2** marks can be awarded*

1

therefore the outer shell electron is less strongly attracted to the nucleus **or** is more shielded from the attraction of the nucleus and so the outer shell electron in potassium is more easily lost

1

***3** marks can be scored for answering the question in terms of sodium*

1

[13]

Q31.

(a) 1 / one

1

(b) (i) protons

1

(ii) neutrons

1

(iii) 7

1

(c) (i) losing

1

(ii) a positive

1

(iii) electrostatic

1

(d) high melting points

1

strong bonds

1

(e) (i) 58.5

1

(ii) mole

1

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(f) very small (particles) **or**

ignore tiny / small / smaller / microscopic etc.

1-100nm in size **or**

(particle with a) few hundred atoms

1

[12]

Q32.

(a) number

1

0

allow 8

1

(b) beryllium **or** magnesium **or** strontium **or** barium **or** radium

allow correct symbols

1

(c) (i) an alkali metal

1

(ii) a transition metal

1

(d) for undiscovered elements

accept so elements with similar properties were in the same groups

accept so elements fitted the pattern of properties

1

[6]

Q33.

(a) (i) gas

1

(ii) Increases

1

(b) (i) –1

allow Cl^-

allow –

allow negative

1

(ii) sodium + chlorine → sodium chloride

allow correct symbol equation

1

(c) reduce microbes

accept sterilise

accept prevent diseases

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allow disinfect
allow kill bacteria / germs / microbes / micro-organisms
allow to make it safe to drink
ignore get rid of bacteria

1

(d) any **one** from:

- no freedom of choice
  allow unethical
- fluoride in toothpaste
- too much can cause fluorosis
  allow too much can cause damage to teeth

1

[6]

Q34.

(a) (i) hydrogen
accept H_2
allow H

1

(ii) hydroxide
accept OH^-
allow OH
*do **not** accept lithium hydroxide*

1

(b) any **two** from:
'it' = potassium

potassium:
accept converse for lithium

- reacts / dissolves faster
  allow reacts more vigorously / quickly / violently / explodes
  ignore reacts more
- bubbles / fizzes faster
  allow fizzes more
  allow more gas
- moves faster (on the surface)
  allow moves more
- melts
  allow forms a sphere
- produces (lilac / purple) flame
  allow catches fire / ignites
  *do **not** accept other colours*

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2

[4]

Q35.

(a) groups

1

(b) it is a non-metal

allow it is not a metal

1

(c) to the right of column 7 / Group 7

accept in Group 0

ignore Group 8 / noble gases

1

(d) (atomic) number

allow proton number

1

[4]

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