AQA GCSE CHEMISTRY (HIGHER) · 8462

CHEMISTRY



MARK SCHEME

4.1.2 THE PERIODIC TABLE (PACK 2)

SCORE	PERCENTAGE
/217	%

STEMUP

These questions belong to AQA, not to us.

The examination questions, mark schemes and examiner comments in this pack were written and published by AQA. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with AQA and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. AQA has not endorsed, approved or been involved in the production of it. AQA and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

AQA publishes its past papers, mark schemes and examiner reports. Always check the current specification at aqa.org.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Q1.

(a) sodium has a lower density

1

sodium is more reactive

1

(b) hydrogen

1

(c) $OH^-(aq)$

1

[4]

Q2.

(a) (i) *incorrect or no element = **0** marks*

hydrogen

allow H / H_2

1

all the other elements are metals

allow hydrogen is a not an (alkali / group 1) metal

ignore hydrogen is a gas

OR

copper (1)

allow Cu

(copper) is not an alkali metal (1)

allow Cu is a transition element / metal

allow any valid specific chemical property eg Cu does not react with water

ignore references to electronic structure

ignore physical properties

1

(ii) Group 0 / noble gases

ignore Group 8

1

(b) (i) scandium / gallium / germanium

accept Sc / Ga / Ge

allow Krypton / Kr

1

(ii) predicted they were metals

allow atomic mass / weight

ignore atomic structure

STEMUP.CO.UK

1

predicted their (chemical/physical) properties / reactivity

accept any chemical / physical property

allow similar properties if mentioned in context of a group

1

(c) (i) (both) have <u>one</u> / <u>an</u> electron in the outer energy level / shell

ignore form single plus ions

1

(ii) *accept shell for energy level*

accept converse explanation for lithium

if 'outer' not mentioned, max 2 marks

ignore sodium reacts more easily

sodium loses one outer electron <u>more</u> easily (than lithium)

1

because outer electrons/energy level further from the nucleus in sodium **or** because sodium has <u>more</u> shells (than lithium)

*do **not** accept 'more outer shells'*

allow sodium (atom) is larger

1

because forces/attraction to hold outer electron are weaker in sodium (than lithium)

accept more shielding in sodium (than lithium)

1

[10]

Q3.

(a) (i) nucleus

1

(ii) protons

1

(b) protons / + / positive

electrons / – / negative

*both words needed in any order for **1** mark*

1

(c) nitrogen

allow N or N_2

1

(d) B **and** C

*both letters needed in any order for **1** mark*

*allow Li **and** Na*

1

STEMUP.CO.UK

(both) have one electron **or** same number of electrons in the outer energy level / shell

*allow both are in Group **1***
allow both are alkali metals
*allow both can lose <u>only</u> one electron **or** become +1 ions*
allow this mark if no letters given in boxes

1

[6]

Q4.

(a) because the nitrogen from dry air contained noble/Group 0 gases

ignore other gases

or

(because the nitrogen from dry air) contained argon / krypton / xenon

ignore helium and neon

1

and three / some of these gases, (argon, krypton, xenon) have a greater density than nitrogen

ignore helium and neon

or

and argon / krypton / xenon has a greater density than nitrogen

1

(b) (i) carbon dioxide would form / is a solid

accept carbon dioxide freezes or its freezing point is > –200°C

ignore melting point

or

(solid) carbon dioxide would block pipes

1

(ii) helium **(and)** neon

*both needed for **1** mark*
accept He and Ne

1

(iii) argon **(and)** oxygen

accept Ar and O_2

1

because there is only a difference of 3°C in their boiling points

accept because they have boiling points that are almost the same

1

[6]

STEMUP.CO.UK

Q5.

(a) transition elements

1

(b) These metals do not react with air

1

These metals do not react with water

1

[3]

Q6.

(a) all have seven electrons in their outer shell / energy level

1

(b) *must be comparative in all points or converse*

chlorine atom is smaller than bromine atom

or
chlorine atom has fewer shells than bromine atom

1

outer shell / energy level of chlorine has stronger (electrostatic) attraction to the nucleus than bromine

or
outer shell of chlorine is less shielded from the nucleus than bromine

1

so chlorine more readily gains an extra electron

1

[4]

Q7.

(a) any **two** from:

- react with water **or** very reactive
- (react with water) releasing gas / hydrogen / fizzing
- (react with water) to form an alkaline / hydroxide solution
- form ions with a 1+ charge
  allow lose one electron from the outer shell
  ignore other references to electronic structure
  ignore physical properties

2

(b) any **three** from:

- some boxes contain two elements
  allow specific examples:

STEMUP.CO.UK

Co, Ni ***or*** *Ce, La* ***or*** *Di, Mo* ***or*** *Ro, Ru* ***or*** *Ba, V* ***or*** *Pt, Ir*

- groups / columns contain elements with different properties
  allow groups / columns contain both metals and non-metals
  ignore examples
- Newlands not a well-known / respected scientist
  ignore references to sugar factory
- new idea (not readily accepted by other scientists)
  allow musical scales thought to be silly by some scientists

3

(c) one for improvement **and** one for explanation from:

- left gaps (for undiscovered elements) (1)
- so that elements were in their correct group (1)
  allow so the elements fitted the pattern of properties

or

- did not always follow order of relative atomic weights / masses (1)
  ignore references to atomic number / electronic structure
- so that elements were in their correct group (1)
  allow so the elements fitted the pattern of properties

2

[7]

Q8.

(a) (i) B

1

(ii) E

1

(iii) F

1

(iv) D

1

(v) C

1

(b) (i) Br

do not accept BR or br or bR
ignore numbers
allow written in table if answer blank

1

(ii) I Br Cl

allow iodine, bromine, chlorine

STEMUP.CO.UK

allow I,B,C
allow capitals or lower case
allow 184, 58, -34
ignore numbers

1

(c) they are halogens

1

they become less reactive down Group 7

1

[9]

Q9.

(a) (i) a correct link between any two named elements eg same group / column same properties / number of outer electrons

allow some link between any two elements in the same group (in both Newlands and or the modern periodic table)

1

(ii) any **two** from:

ignore statements about lack of evidence / proof

- elements still being discovered

or
no gaps for undiscovered elements

- some boxes have 2 elements in them
- metals and non-metals in same column / mixed up

accept some elements in same column have different properties.
allow any sensible suggestion about misplaced elements eg copper in group 1 elements

- pattern for first 16 or so elements only

allow did not work for all elements

2

(b) (i) Cl > Br > I

accept reactivity / it decreases down the group

or

I < Br < Cl

1

Cl has 2 reactions, Br has 1 reaction, I doesn't react

owtte
allow Cl has most / more reactions and I has least / less reactions (must be clear about where Br fits in)

1

(ii) Br_2

STEMUP.CO.UK

allow multiples / fractions if correctly completed and balanced

1

(iii) (they) have 7 outer electrons

allow (they) have 7 electrons in highest occupied (energy) level / shells / rings

1

(c) *outer / last / final must be mentioned once in correct context, otherwise max **2** marks comparative required on all three points accept converse ie less reactive up group*

down group (atom / elements) bigger

or

outer electrons (level / shell /ring) further from nucleus / centre

ignore more electrons

or

more shells / level / rings

*do **not** accept more outer shells for this mark*

1

force(s) / attraction(s) are weaker

allow electron(s) attracted less easily

allow electron(s) less under influence (of nucleus)

or

more shielding

or

1

attracts less

*do **not** accept magnetic / gravitational / intermolecular forces*

electron(s) lost more easily

allow electron(s) more likely to be lost

allow easier to give away

1

[10]

Q10.

(a) (i) Sb

1

(ii) Se

1

(iii) Sn

1

STEMUP.CO.UK

(iv) Si

1

(b) (i) elements

1

(ii) potassium (K)

1

(iii) 0

1

[7]

Q11.

(a) (i) *it = copper*

(copper) stops barnacles / seaweed (sticking)

accept lead doesn't stop barnacles / seaweed (sticking)

ignore all other properties

1

(ii) *it = Muntz Metal*

(Muntz Metal) is less expensive / cheaper / cheapest

must be a comparison

accept copper is more expensive

ignore other properties

1

(b) (i) atomic absorption spec(troscopy) / spectrometry **or** mass spec(trometry) / spectroscopy

accept spectroscopy / spectrometry alone

allow AAS / MS

*do **not** allow NMR spectroscopy*

***or** IR spectrometry **or** chromatography*

1

(ii) *it = instrumental method*

sensitive **or** detect (very) small amounts
or only small sample needed

allow (more) precise

ignore accurate

allow converse for chemical method

ignore metal contains small amount / low concentration of iron

1

(c) any **two** from:

transition elements (= they)

- unreactive / not very reactive

allow does not corrode

ignore reference to rust

STEMUP.CO.UK

- strong / hard
  ignore tough / durable / hard wearing

- malleable / easy to shape
  ignore ductile / density / melting point

2

[6]

Q12.

(a) Group O / 8
accept transition elements / metals

or noble / rare / inert gases
apply list principle

1

(b) (chemically) similar elements (now) in the same group / column
accept iodine has properties of Group 7 / halogens
or *iodine does not have group 6 properties*
or *converse for tellurium*
ignore 'it fits the pattern' or any reference to proton / atomic numbers / atomic structure

1

(c) any **three** from:
*ignore not enough evidence / proof **or** Mendeleev not respected*

- (some) boxes had <u>two</u> elements
  allow <u>two</u> correctly identified elements together (in the same box)

- Group 1: copper / silver unreactive (not like the others)
  allow copper / silver not alkali metals / Group 1

- there are non-metals and metals in the same group / box
  accept named examples

- Mendeleev left spaces / gaps
  accept (some chemists thought) there were no more elements to discover

- Medeleev reversed the order (for some elements)

3

(d) any **two** from:
ignore mass number / atomic weight / neutrons throughout

- elements arranged in proton / atomic number order
  allow number of protons / electrons increases across period

- group: elements in same group / column have same number of outer electrons

STEMUP.CO.UK

- elements in same period / row have same number of (electron) shells / energy levels

  allow number of (electron) shells / energy level increase down group

  allow <u>electron</u> rings

  allow orbits

2

[7]

Q13.

(a) (i) E

1

(ii) B

1

(iii) C

1

(iv) 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

[7]

Q14.

(a) left gaps

1

if placed consecutively, then elements would be in wrong group / have wrong properties / owtte

allow some elements didn't fit pattern

1

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

1

(elements in) same group have same number of <u>outer</u> electrons

1

any **one** from:

STEMUP.CO.UK

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

1

inner (3rd) shell / energy level is being filled
ignore shells overlap

1

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

or

2nd shell / energy level cannot have 18 electrons

1

[8]

Q15.

(a) (i) **A**

1

(ii) **F**

1

(iii) **E**

1

(iv) **C**

1

(v) **A or B**

1

(b) (i) Rb K Na
allow rubidium, potassium, sodium
*do **not** accept RB or NA*

1

(ii) decrease

or

become lower / smaller / less
allow from 180° C to 27° C

1

(c) They are harder than Group 1 metals.

1

They have higher melting points than Group 1 metals.

1

STEMUP.CO.UK

They often form coloured compounds but Group 1 compounds are usually white.

1

[10]

Q16.

(a) (i) UI / solution turns blue / purple

allow violet / lilac

1

any **two** from:

- floats
- melts / forms a sphere
- moves

*note: moves on surface = **2** marks (points 1 and 3)*

- effervescence / fizz / bubbles / gas

ignore the name of the gas

- (yellow) flame

ignore sparks / ignites / burns
allow dissolves

- reduces in size

ignore 'reacts violently' unqualified
ignore reference to exothermic / heat evolved

2

(ii) **2**Na + **2**H_2O → **2NaOH** + H_2

*correct equation = **2** marks*
allow correct multiples / fractions
if this equation is unbalanced,
*allow **1** mark for NaOH*

2

(b) *it = francium*

*outer electron / shell / energy level must be mentioned once for all **3** marks*

biggest atom **or** (outer) shell / energy level / electron furthest from nucleus **or** most (number of) shells

1

least attraction (to nucleus) **or** most shielding

allow the attraction is very weak
*do **not** allow less magnetic / gravitational attraction*

1

(outer) electron more easily lost / taken

ignore francium reacts more easily / vigorously

1

STEMUP.CO.UK

(c) any **two** from:

ignore other properties / specific reactions
they / it = transition elements

transition elements:

allow if state group 1 elements

- high melting point **or** high boiling point
  - *low melting point or low boiling point*
- high density
  - *low density*
- strong / hard
  - *weak / soft*
- not very reactive
  - *reactive*
- catalysts
  - *not catalysts*
- ions have different charges
  - *+1 ions*
- coloured compounds
  - *white compounds*

2

[10]

Q17.

(a) (i) elements

1

(ii) atomic weight

1

(iii) atomic (proton) number

1

(b) (i) transition metals

1

(ii) has a higher melting point is harder

2

[6]

Q18.

(a) 40 (Ca) + 137 (Ba) ÷ 2 = 88.5

accept a recognition that the average is near 88
***or** it is the average of the other two*
accept Sr is midway between Ca and Ba

STEMUP.CO.UK

1

(b) eg newly discovered elements / atoms didn't fit (into triads) **or** didn't apply to all elements / atoms **or** lot of exceptions

he = Döbereiner

*ignore Mendeleev left spaces **or** not enough evidence*

1

(c) any **two** from:

- fizzes / bubbles / gas

  hydrogen alone is insufficient

  ignore incorrect name if 'gas' stated

- violent / vigorous / explodes / very fast reaction

  accept container explodes

  ignore strong reaction

- floats / on surface

  ignore sinks

- moves (very quickly)

- melts (into a ball)

- bursts into flame

  accept (bright) light

  ignore colour / glow

- gets smaller / (reacts to) form a solution / dissolves / disappears etc

- steam / gets hot (owtte)

  *ignore alkaline solutions **or** change in colour etc*

2

(d) (i) same number of electrons in outer shell

accept energy level for shell

accept a correct reference to a specific group

eg (all) have one electron in outershell / (all) lose one electron (when they react)

1

(ii) electrons fill an inner / 3rd shell

accept energy level for shell
accept d-level being filled
accept specific reference to 3rd shell
accept descriptions in terms of 3d & 4s etc

1

(usually) same number of outer / 4th shell electrons

1

(iii)

it = lithium

STEMUP.CO.UK

*accept energy level for shell **or** converse reasoning for potassium*

outer shell electron closer to nucleus

accept fewer shells / smaller atom

1

more (electrostatic) attraction (to nucleus) / electrons less likely to be lost

accept less shielding / isn't much shielding

ignore nucleus has more influence but accept nucleus has more influence over the outer electron(s)

*do **not** accept magnetic / gravitational attraction*

1

[9]

Q19.

(a) conducts (electricity) **or**

accept flexible

allows electrons / current to flow

ignore conducts heat

1

(b) electron

1

(c) (i) lithium>copper>tungsten **or**

Li>Cu>W

all correct

*allow **1** mark for one metal in the correct position*

2

(ii) has high / highest melting point

accept has high / highest boiling point

or

can withstand the highest temperature

1

(d) unreactive

1

[6]

Q20.

(a) Mendeleev

1

(b) groups

1

STEMUP.CO.UK

(c) undiscovered

1

(d) compound

1

[4]

Q21.

(a) (i) Halogens

1

(ii) They consist of molecules

1

They have coloured vapours

1

(b) (i) 7 / seven

1

(ii) liquid

1

(iii) astatine

allow obvious mis-spelling

ignore At

1

(c) chlorine reacts with (the) bromide [owtte]

1

chlorine reacts with (the) iodide [owtte]

allow chlorine reacts with both

or

*chlorine has more reactions for **2 marks***

or

*bromine reacts with one **and** iodine does not react at all for **2** marks*

1

Q22.

(a) kills bacteria / sterilises (water)

allow kills microorganisms / microbes / germs

*allow 'makes (water) safe (to drink)' **or** disinfectant*

*ignore cleans water **or** removes impurities / bacteria*

1

(b) goes colourless / decolourised (from red / red-brown / brown / yellow / orange)

allow colour disappears

*ignore 'goes clear' **or** discoloured*

*do **not** accept incorrect initial colour*

*do **not** accept precipitate*

1

STEMUP.CO.UK

(c) (i) Br_2 **and** $2Cl^-$

allow multiples / fractions if whole equation balanced

1

(ii) changes to red / red-brown / brown / yellow / orange

*do **not** accept effervescence / fizzing / precipitate / gas given off*

ignore vapour / temperature changes / ignore initial colour

1

(d) (i) 7 outer electrons **or**

same number of outer electrons

allow last / final shell for outer
allow energy level / orbit / ring for shell
allow 'need to gain 1 e^- to have a full outer shell'
ignore 'similar number of outer electrons'

1

(ii) bromine / it (atom) is bigger **or**

must be a comparison

outer electrons (level / shell) further from nucleus **or** more shells

*do **not** accept more outer shells*
ignore more electrons

forces / attractions are weaker **or** more shielding **or** attracts less

*do **not** accept magnetic / gravitational / intermolecular forces*
allow 'electron(s) attracted less easily'

electron(s) gained less easily

*"outer / last / final" must be mentioned once, otherwise max **2** marks.*
accept converse for chlorine throughout where clearly stated

3

(e) (i) white precipitate **or** white solid

ignore names of chemicals

1

(ii) cream precipitate **or** cream solid

allow pale yellow / off-white precipitate / solid
ignore names of chemicals

1

[10]

Q23.

(a) potassium / it is an alkali metal **or** it is in group 1 **or** it is reactive

it = potassium

allow argon is a noble gas / unreactive / group 0

ignore references to atomic structure

ignore references to correct physical properties

1

STEMUP.CO.UK

(b) group 4 / they are metals and non-metals

accept element missing or gap left

ignore differences in properties

1

(c) it / they fitted at the beginning / end of the table

ignore left gaps / spaces

1

[3]

Q24.

(a) (i) B

1

(ii) A

1

(iii) E

1

(iv) D

1

(b) (i) Mendeleev and Newlands

1

(ii) atomic weight

1

(iii) chemical reactions

1

(iv) electrons

1

Q25.

(a) (i) undiscovered elements owtte

1

(ii) they would be in the wrong group / have the wrong / different properties / don't fit the pattern owtte

allow atomic weights may have been wrong

1

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

- elements arranged in proton / atomic number order

  ignore mass number / atomic weight / neutrons throughout
- group: elements in the same group / column have same number of outer electrons owtte
- group: number of shells increase down group
- period: elements in the same period / row have the same number of shells / energy levels

STEMUP.CO.UK

- period: number of protons / electrons increase across period
- atomic number: link of atomic number to number of protons
- atomic number gives number of electrons

3

(ii) it would mean splitting a proton / electron

or

implication of splitting proton / electron

1

(c) *must be a comparison*

(outer) electron closer (to nucleus)

accept fewer (electron) shells / energy levels
fluorine is the smaller/est

1

stronger/est attraction (to nucleus) owtte

*do **not** allow magnetic / intermolecular forces*

or

less screening (by inner electrons)

1

electron gained more easily

*need some indication of <u>outer</u> electron shell somewhere in explanation otherwise max of **2** marks*

1

[9]

Q26.

(a) (i) floated / (moved on) surface

accept does not sink
ignore it melted

1

(ii) melted / molten

ignore heat is given off

1

(iii) hydrogen

allow H_2

1

(b) (i) potassium / rubidium / caesium / francium

accept: K / Rb / Cs / Fr

1

(ii) they are metals

1

STEMUP.CO.UK

they form ions with a 1+ charge

1

(c) (i) atomic weight

1

(ii) similar

1

(iii) groups

1

(d) left gaps owtte

1

[10]

Q27.

(a) acts as barrier between sodium and air / oxygen / water (vapour)

accept because they are reactive
ignore oil will not react

1

(b) **2**Na + **2**H_2O → **2**NaOH + H_2

allow multiples / fractions

1

(c) these metals react with water producing an alkaline solution

or

produce solution with pH greater than 7 / high pH

owtte
allow produce OH. ions
not *these metals are / form alkalis*
ignore 'strong' pH

1

(d) *it = potassium*
*<u>outer</u> electron must be mentioned once for all **3** marks*

bigger atom
or
outer shell electron further from nucleus
or
more shells

or
converse argument for sodium less reactive provided sodium is specified

1

less attraction to nucleus
or
more shielding

not *less magnetic attraction*

1

STEMUP.CO.UK

outer electron more easily lost

ignore *potassium reacts more easily*

1

[6]

Q28.

(a) B

1

(b) eg link between Li, Na, K, (Rb, Cs)

or Mg, Ca, (Sr, Ba)

or F, Cl, Br, I

*allow any **two** elements in the same group (in both Newland's **and** the modern periodic table)*

1

linked appropriate comment about that link eg similar physical / chemical properties **or** similar specific reactions **or** same number of outer electrons

*if no elements identified, allow **1** mark for a general comment about elements **in the same column** having similar properties*

"every eighth element has similar properties" = ***1*** *mark*

1

(c) any **two** from:

- no gaps for undiscovered elements **or** elements still being discovered
- some boxes have 2 elements
- metals and non-metals in same column / mixed up / some elements in the same column had different properties
- pattern for first 16 or so elements only
- any sensible suggestion about misplaced elements eg copper in group 1 metals

2

(d) alkanes are not elements **or** alkanes are compounds

ignore molecule / molecular

1

[6]

Q29.

(a) tungsten

1

has the high(est) melting point

accept that metals other than tungsten are likely to melt

1

STEMUP.CO.UK

(b) argon

1

is an unreactive gas

accept that gases other than argon are reactive

accept that argon is a noble gas or in Group 0

1

[4]

Q30.

(a) D

1

(b) B

1

(c) F

1

(d) G

1

(e) H

1

[5]

Q31.

(a) **Quality of Written Communication**

The answer to this question requires ideas in good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme.

*maximum **2** marks if ideas not well expressed*

any **three** from:

*do **not** accept flames*

floats

fizzes / bubbles or produces a gas

ignore reference to heat

indicator goes blue / purple / violet (alkaline colour)

3

water level in test tube goes down **or** gas fills the test tube

lithium 'dissolves' (owtte)

moves around (on surface of water)

steam

(b) lithium hydroxide

1

hydrogen

STEMUP.CO.UK

1

(c) more violent / reactive

accept a description of the reaction which indicates greater violence

1

(d) (i) decreases

1

and then slows down **or** levels off

1

(ii) 26(°C)

1

[9]

Q32.

(a) comment + relevant example gets **1 + 1** marks
third marking point can be **either** a comment **or** an example unrelated to first comment i.e. 3 comments would be max **2** marks

max 3

(could be many answers)

ignore references to music

e.g. many elements in the groups have very dissimilar properties e.g. Cu + K
(= 2 marks)

two elements in one place on the table e.g. Ce or La
(= 2 marks)

no clear division between metals and non-metals **or** metals and non-metals jumbled / mixed up (could give example from table)

Newlands didn't allow spaces for new elements

(b) any **two** from:

elements with dissimilar properties are separated **or** grouped elements with similar properties

gaps left for elements to be added when discovered

relative atomic mass order not followed in all cases (so that elements go in groups with other similar elements) **or** Mendeleev in proton number order

groups related to electronic structure **or** group number equals number of outer electrons

new groups created **or** iron, cobalt nickel in a group **or** eight groups instead of seven

STEMUP.CO.UK

correct elements in periods 2 and 3

reactivity trends in groups **or** reactivity trends across periods

separates metals and non-metals

2

[5]

Q33.

(a) (i) argon **and** potassium **or** tellurium **and** iodine **or** cobalt **and** nickel

accept correct symbols
*allow argon **and** calcium*

1

(ii) it would place them in incorrect groups (owtte)

*idea of not being placed with elements which have similar properties **or** converse argument*

accept would not have same number of electrons in outer shell
allow it would put them in wrong period if linked to argon and potassium / calcium

*do **not** accept reasons based just on protons*
*do **not** accept metals and non-metals mixed up*

1

(b) any **two** from:

- each successive atom has one more electron
- atoms in the same group have the same number of electrons in their outer shells / energy levels

  number of electrons in outer shell = group number

- across a period an energy level / shell is being filled
- in the next period the next energy level / shell is being filled

  accept period number = shell number

2

[4]

Q34.

(a) react with oxygen / oxidise / burn in oxygen / burning / combustion **or** tungsten to tungsten oxide **or** makes an oxide

key idea is oxidation
ignore breaking ignore fire / flames / exothermic
ignore react with air

1

(b) it is (very) unreactive / not reactive / inert / does not react with tungsten **or** it is a noble gas **or** it is in group 0 or 8 or 18

*do **not** accept unreactive / inert metal **or** argon is not very reactive*

1

STEMUP.CO.UK

full outer shell (of electrons) / 8 electrons in outer shell

1

does not need to gain / lose / swap / transfer / share electrons **or** does not need to form bonds

does not bond ionically / covalently

1

[4]

Q35.

(a) F

accept indium / In

1

(b) C

accept sodium / Na

1

(c) A

accept hydrogen / H / H_2

1

[3]

STEMUP.CO.UK