

M1.(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
- not used as catalysts
- white / colourless compounds
- only forms a +1 ion

M2. (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) $2\text{Na} + 2\text{H}_2\text{O} \rightarrow 2\text{NaOH} + \text{H}_2$
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

(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]

M3. (a) colour 1

(b) Fe_2O_3 or $(\text{Fe}^{3+})_2 (\text{O}^{2-})_3$ 1
2 and 3 should be below halfway on Fe and O

(c) (i) 4 4 1
or correct multiples

(ii) any **two** from: 2
ignore references to malleable / ductile / conductivity / stiff / boiling point / density

- high melting point
accept can withstand high temperatures
- strong / tough
accept not brittle
- hard
*do **not** accept flexible*
- not (very) reactive

[5]

##

(a) 75% Cu, 25% Ni 1
for 1 mark

(b) 70% segment shaded 1
for 1 mark

- (c) (i) copper
for 1 mark 1
- (ii) zinc
for 1 mark 1
- (d) 1. hard so will not wear away/scratch
for 1 mark 1
2. unreactive
so does not corrode/dissolve/or other
acceptable reason
(not does not react unless acceptable reason)
- (If given hard and unreactive allow 1 mark)
for 1 mark 1

[6]