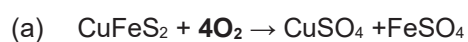


Mark schemes

Q1.

allow multiples

allow O₂ for 1 mark

2

(b) $(M_r = 63.5 + 56 + (2 \times 32) =) 183.5$

1

$$(\% \text{ of copper} =) \frac{63.5}{183.5} \times 100$$

allow correct use of incorrectly determined M_r

1

$$= 34.6 (\%)$$

allow 34.60490 correctly rounded to at least 2 significant figures

1

(c) (test) (add) sodium hydroxide (solution)

1

(result) blue precipitate

OR

(test) flame test (1)

(result) green (flame) (1)

allow blue-green (flame)

1

MP2 is dependent upon MP1 being awarded

(d) (the use of) bacteria

1

to produce leachate solutions (that contain metal / copper compounds)

1

[9]

Q2.

(a) any **one** from:

- more vigorous bubbling (for rubidium)
 - bigger / brighter flame (for rubidium)
- allow converse statements for potassium*
allow (rubidium) catches fire more quickly
allow (rubidium) moves around more quickly
allow (rubidium) explodes
allow (rubidium) disappears more quickly
allow (rubidium) melts more quickly

1

(b) (rubidium's) outer shell / electron is further from the nucleus

- allow the (rubidium) atom is larger*
allow (rubidium) has more shells

1

(so) there is less (electrostatic) attraction between the nucleus and the outer electron (in rubidium)

- allow (so) there is more shielding between the outer electron and the nucleus (in rubidium)*

1

(so) the outer electron (in rubidium) is more easily lost

- allow (so) less energy is needed to remove the (outer) electron (in rubidium)*

1

- allow energy level for shell throughout*
allow converse argument in terms of potassium

(c) $2 \text{ Rb} + 2 \text{ H}_2\text{O} \rightarrow 2 \text{ RbOH} + \text{H}_2$

- ignore state symbols*
allow multiples
allow 1 mark for H_2
allow 1 mark for RbOH

3

(d) the noble gases have boiling points that increase going down the group

1

(e) (relative atomic mass =) $\frac{(90.48 \times 20) + (0.27 \times 21) + (9.25 \times 22)}{100}$
 $\frac{1809.6 + 5.67 + 203.5}{100}$
allow (relative atomic mass =) 18.096 + 0.0567 + 2.035

1

= 20.1877

1

= 20.2

*allow an answer correctly rounded to 3 significant figures
from an incorrect calculation which uses all of the values in
the table
ignore units*

1

[11]