Mark schemes

Q1.

(a) $CuFeS_2 + \mathbf{4O_2} \rightarrow CuSO_4 + FeSO_4$

allow multiples

*allow O_2 for **1** mark*

2

(b) (M_r = 63.5 + 56 + (2 x 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) $2\ Rb + 2\ H_2O \rightarrow 2\ RbOH + H_2$

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 =) $\frac{(90.48 \times 20)+(0.27 \times 21)+(9.25 \times 22)}{100}$

allow (relative atomic mass =) $\frac{1809.6 + 5.67 + 203.5}{100}$

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]