Mark schemes

Q1.

(a) the yellow dye travels further

allow converse argument

allow stationary phase for paper

1

(because the yellow) dye has a weaker attraction to the (chromatography) paper

if no other mark awarded

*allow for **1** mark*

the weaker the attraction to the (chromatography) paper the greater the distance travelled (by the dye)

1

(b) (in Experiment **2**) the yellow dye travels further

allow mobile phase for solvent

1

(because) the solvents are different

1

(and) the yellow dye is more soluble in ethanol (than water)

allow the yellow dye is less soluble in water (than ethanol)

or

(and) the yellow dye is more attracted to ethanol (than water)

allow the yellow dye is less attracted to water (than ethanol)

OR

(in Experiment **1**) the yellow dye does not travel as far (1)

(because) the solvents are different (1)

(and) the yellow dye is less soluble in water (than ethanol)

allow (and) the yellow dye is more soluble in ethanol (than water)

(and) the yellow dye is less attracted to water (than ethanol) (1)

or

allow (and) the yellow dye is more attracted to ethanol (than water)

1

(c) **A** is an impure (substance)
and
B is a pure (substance)

*allow **A** is a mixture*
and
***B** is a pure (substance)*

1

(because) **A** contains two dyes
and
B contains one dye

*allow (because) **A** produces two spots*
and
***B** produces one spot*
*if no other mark awarded allow **1** mark for*
***A** contains two dyes (so) is impure (substance)*
or
***A** contains two dyes (so) is a mixture*
or
***B** contains one dye (so) is pure (substance)*

1

(d)

$$0.48 = \frac{5.4}{\text{distance moved by solvent}}$$

1

(distance moved by solvent =)

$$\frac{5.4}{0.48}$$

1

=11.25 (cm)

allow 11.25 correctly rounded to
at least 2 significant figures

1

(e) the ratio / proportion of spot distance (moved) to solvent distance (moved) is fixed / constant

allow the distance travelled by the spot relative to the distance travelled by the solvent is constant
allow the distance travelled by the spot is (directly) proportional to the distance travelled by the solvent

1

(f) any **two** from:

- (more) sensitive
- (more) accurate
- fast(er)

allow small(er) sample
allow greater resolution

2

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Q2.

(a) (test) add barium chloride (solution)

ignore (hydrochloric / nitric / sulfuric) acid

allow add barium nitrate (solution)

1

(result) white precipitate

MP2 is dependent upon MP1 being awarded

1

(b) the yield is smaller at higher temperatures because the reaction is exothermic

1

(c) there are more moles / molecules (of gas) on the left

allow converse

ignore particles

1

(so the position of) equilibrium shifts to the right

1

(d) any **two** from:

- the yield is already high
- more energy required
- risk of explosion is increased
- higher income from increased yield is outweighed by the extra expenditure
- increased cost of safety precautions

allow requires stronger vessels

allow requires thicker walls

2

(e) vanadium (V)

1

[8]

Q3.

(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]