01 Experimental Chemistry

Set B **Answer key**

A Multiple choice

9 MARKS

1 **B** burette [1]

A burette measures to the nearest 0.05 cm^3. A pipette measures one fixed volume and a measuring cylinder is less accurate.

2 **C** use a separating funnel, then find the boiling point [1]

A Filtration separates an insoluble solid from a liquid, not two liquids.

B Filtration does not separate two liquids, and sublimation does not test purity.

D Sublimation does not test the purity of a liquid.

3 **D** use a separating funnel [1]

Immiscible liquids form layers, so they are separated with a separating funnel. Their boiling points are similar, so distillation does not work well.

4 **B** sublimation [1]

Iodine changes straight from solid to gas on warming, leaving the sodium chloride behind.

5 **B** Y by fractional distillation and Z using a separating funnel [1]

The liquid with the lower boiling point, Y, is collected first by fractional distillation. In a separating funnel the denser liquid, Z, is at the bottom and runs off first.

6 **A** burette [1]

7 **B** 0.61 [1]

$$R_f = \frac{\text{distance moved by F}}{\text{distance moved by the solvent front}} = \frac{55}{90} = 0.61$$

8 **D** use of a separating funnel [1]

Oil and water are immiscible and form two layers, so a separating funnel separates them.

9 **C** iodine and sodium chloride [1]

The set-up is sublimation. Iodine sublimes and forms crystals on the cold funnel, while sodium chloride stays behind.

B Structured questions

22 MARKS

10 **(a)**

The blue dye and the yellow dye both have an R_f value of 0 (or almost 0) in pure water. [1]

There is no (or little) separation of the blue and yellow dyes. [1]

(b)

64% ethanol and 36% water [1]

All three dyes have the same R_f value (about 0.4) where the lines cross, so they form one spot.

(c)

R_f of the blue dye at 80% ethanol = 0.7 [1]

Distance travelled = 0.7 × 10.0 = 7.0 cm [1]

11 **(a)**

A locating agent is added to react with the amino acids and form coloured spots. [1]

Ultraviolet light can also be used for substances that show up under it.

(b)

S is the most soluble, as its R_f value is the highest in both solvents. [1]

R_f is the distance moved by the spot divided by the distance moved by the solvent, so the highest R_f means it travelled the furthest from the start line. [1]

(c)

Solvent 2, as all the amino acids are soluble in solvent 2. [1]

The R_f value of Q in solvent 1 is 0.00, which means it is insoluble in that solvent. [1]

12 **(a)(i)**

Ethanol [1]

(ii)

To make sure the condenser is fully filled with water, for more efficient cooling of the vapour into liquid. [1]

(iii)

To measure the temperature of the vapour entering the condenser, which is the boiling point of the liquid being collected. [1]

(iv)

No. Water and oil are immiscible. [1]

13 **(a)(i)**

Propanol is a flammable liquid. *or* It gives more even heating around the flask. [1]

(ii)

In Figure 1.2, the vapours escape into the surroundings, so less reactant is available for reaction. [1]

In Figure 1.1, the Liebig condenser condenses the vapours back into the flask, so more reactant is able to react to form more product. [1]

(b)(i)

To react with the colourless spots and make them visible (coloured). [1]

(ii)

Sample 2, as it has moved higher up the paper than sample 1. [1]

(iii)

$$R_f = \frac{\text{distance travelled by the sample}}{\text{distance travelled by the solvent front}}$$ [1]

(iv)

Sample 1: R_f = 0.20 to 0.24 (with working). It is tartaric acid. [1]

Sample 2: R_f = 0.44 to 0.48 (with working). It is malic acid. [1]