

Question 5 (Answer: A)

- Diffusion is the net movement down a concentration gradient.
- So it runs from a *higher* concentration to a *lower* one.
- It needs no energy input – it happens because of the particles' own random motion.

1(a)(i)	table drawn with a minimum of two columns and a header line ; appropriate column / row headings with units for concentration and time ; recording of four correct concentrations linked to any four times ; four correct conversions to seconds ;
1(a)(ii)	as the <u>concentration</u> (of hydrochloric acid) increases, the rate of <u>diffusion</u> increases / ora ;
1(a)(iii)	<i>Independent:</i> <u>concentration</u> (of hydrochloric acid) ; <i>dependent:</i> time (for the whole cube to change colour / for diffusion) ;
1(a)(iv)	<i>any two from:</i> repeat (at least) twice more / multiple times ; cut the agar to equal size pieces / AW ; use white, card / background, to help determine the, end-point / AW ; <i>idea of</i> testing each cube, individually / not all at the same time ; use, clean / different, syringes ; keeping temperature constant / using a thermostatically controlled water-bath ;
1(a)(v)	<i>any two for one mark ;</i> • using a knife / cutting • acid • (universal) indicator

1(b)

*independent variable***1** (at least) two different temperatures ;*dependent variable***2** (measuring) length / mass / volume, of the potato pieces before **and** after ;**3 & 4 & 5 details of method ;;;**

- drying / removing excess water, before weighing
- *ref. to* use of a cork borer / potato chipper, to prepare the piece of potato
- *ref. to* peeling the potato / using potato without skin
- putting potato pieces in (a beaker containing) water / sugar solution / salt solution / solution
- *ref. to* making sure potato is covered by the solution / submerged
- *ref. to*, equilibration time, AW, before adding potato (if putting the potato into a beaker that is then put into the water-bath)
- method of maintaining at least one of the temperatures

6 & 7 variables kept constant ;;

- type / species / age, of potato / plant tissue
- initial, surface area / dimensions / mass
- concentration of solution / same water potential
- time (in solution) / stated time, e.g. left for one hour

8 at least three trials / repeat investigation (at least) twice more ;**9** relevant safety measure ;

1(a)(i)	net movement / AW, of particles ; from a region of higher concentration to a region of their lower concentration (as a result of their random movement) ;
1(a)(ii)	<u>kinetic</u> (energy) ;
1(b)(i)	aerobic respiration ;
1(b)(ii)	arrow drawn from inside to outside of epithelial cell ;
1(c)	<i>type:</i> active transport ; <i>explanation:</i> (particles move from) low(er) concentration to high(er) concentration ; uses energy ;
1(d)	<i>any two from:</i> starch is insoluble ; starch is (too) large ; starch has already been broken down / AW ;
1(e)	<i>any six from:</i> 1 <i>idea of</i> before immersion cells are turgid / <i>idea of</i> after immersion cells are flaccid or plasmolysed ; 2 <i>idea of</i> before immersion cell membrane or cytoplasm pushes against cell wall / <i>idea of</i> after immersion cell membrane or cytoplasm pulls away from cell wall ; 3 <i>idea of</i> before immersion increased turgor <u>pressure</u> / <i>idea of</i> after immersion decreased turgor <u>pressure</u> ; 4 ref to osmosis ; 5 salt solution is concentrated or has a lower water potential / cytoplasm is dilute or has a higher water potential ; 6 water moves from high water potential to low water potential ; 7 through a partially permeable membrane ; 8 cytoplasm / vacuole / cell contents, is darker (after immersion) / ora ; 9 cytoplasm / vacuole / cell contents, are more concentrated (after immersion) / ora ;