

Solutions

Each answer shows the steps, then the **result**.

2.1

- any two: releases energy in small usable amounts; quickly made and re-made; small and soluble (moves easily)

2.2

- lipids

3.1 B

- $RQ = 8/10 = 0.8$

3.2 B

- Soda lime absorbs the CO_2 , so the gas volume falls only by the oxygen used

3.3

(a)

- $RQ = \frac{102}{145} = 0.70$

(b)

- it shows a lipid is being respired

3.4

(a)

- $\text{volume} = 45 \text{ mm} \times 1.0 \text{ mm}^2 = 45 \text{ mm}^3$; $\text{rate} = 45/15 = 3.0 \text{ mm}^3 \text{ min}^{-1}$

(b)

- the soda lime absorbs all the CO_2 released, so the only change in gas volume is the oxygen taken in

3.5

(a)

- $RQ = \frac{\text{CO}_2 \text{ produced}}{\text{O}_2 \text{ used}}$; $A = \frac{12.0}{12.0} = 1.0$, so A is respiring **carbohydrate**; $B = \frac{8.4}{12.0} = 0.7$, so B is respiring **lipid**

(b)

- A lipid molecule contains proportionally far less oxygen than a carbohydrate, so more oxygen must be taken from the air for each carbon dioxide released — giving a lower RQ

(c)

- Glucose holds a large amount of energy, and releasing it all at once would waste most of it as heat and damage the cell; ATP releases a small, usable amount from one bond, so energy can be delivered in the size the reaction needs; it is soluble and moves easily within the cell; and it is quickly re-formed from ADP and phosphate, so it is recycled rather than stored

(d)

- Temperature — it changes the rate of respiration and also the volume of the gas being measured; the mass or number of seeds, and their stage of germination, so the rates compared are per equivalent amount of tissue