RESPIRATION

1. 1992 Q7 P1

Active yeast cells were added to a dilute sugar solution in a container. The mixture was kept in a warm room. After a few hours bubbles of gas were observed escaping from the mixture.

(a) Write an equation to represent the chemical reaction above.

(b) What is the economic importance of this type of chemical reaction in industry?

2. 1993 Q9 P1

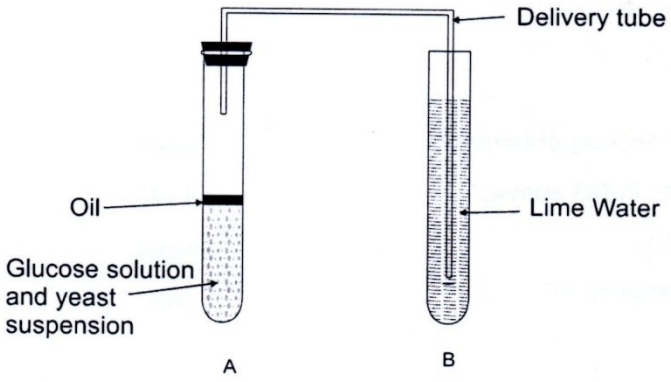
Give the formula for calculating the respiratory quotient (R.Q).

3. 1994 Q4 P1

Explain why a baby uses more heat per unit weight than an adult when to the same environmental conditions?

4. 1996 Q13 P1

The diagram below shows a set – up that was used to demonstrate fermentation



Glucose solution was boiled and oil added on top of it. The glucose solution was then allowed to cool before suspension.

(a) Why was the glucose solution boiled before adding the yeast Suspension? (1 mark)

(b) What was the importance of cooling the glucose solution before adding the yeast suspension? (1 mark)

(c) What was the use of oil in the experiment? (1 mark)

(d) What observation would be made in test tube B at the end of the experiment? (1 mark)

(e) Suggest a control for this experiment (1mark)

5. 1997 Q3 P1

6. 1999 Q2 P1

Give two reasons why accumulation of lactic acid during vigorous exercise leads to an increase in heartbeat. (2 marks)

7. 1999 Q16 P1

Describe the:

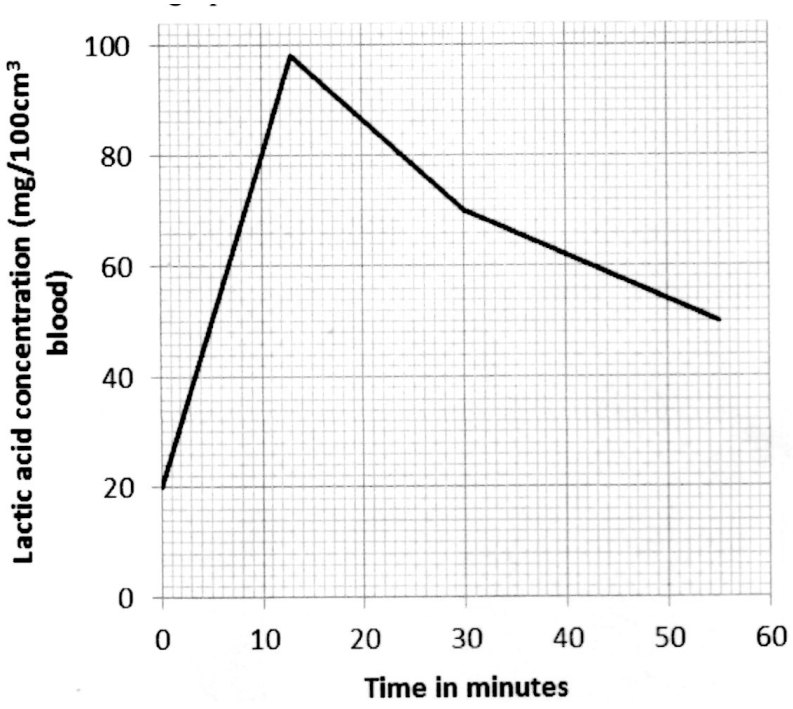
a) Process of inhalation in mammals. (10 marks)

b) Mechanisms of opening and closing of stomata in plants. (10 marks)

8. 2000 Q15 P1

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The concentration of the lactic acid in blood during and after an exercise was determined. The results are shown in the graph below



(a) (i) By how much did the lactic acid increase at the end of 13 minutes? (1 mark)

(ii) After how many minutes was the lactic acid concentration 71mg/ 100cm^3? (2 marks)

(iii) What would be the concentration of lactic acid at the 60th minute? (1 mark)

(b) Give a reason for the high rate of production of lactic acid during the exercise (1 mark)

(c) Give a reason for the decrease in the concentration of lactic acid after the exercise (1 mark)

9. 2003 Q1 P1

A process that occurs in plants is represented by the equation below.

$$\underset{\text{(Glucose)}}{C_6H_{12}O_6} \longrightarrow \underset{\text{(Ethanol)}}{2C_2H_5OH} + \underset{\text{(Carbon dioxide)}}{2CO_2} + \text{Energy}$$

a) Name the process.

b) State the economic importance of the process named in (a) above

10. 2004 Q4 P1

11. 2005 Q6 P1

Name the substance which accumulates in muscles when respiration occurs with insufficient oxygen. (1 mark)

12. 2006 Q13 P1

a) In what form is energy stored in muscles (1 mark)

b) State the economic importance of anaerobic respiration in plants. (2 marks)

13. 2006 Q25 P1

(a) A dog weighing 15.2kg requires 216kj while a mouse weighing 50g requires

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2736kj per day. Explain. (2 marks)

(b) What is the end product of respiration in animals when there is sufficient oxygen supply? (1 mark)

14. 2007 Q13 P1

(a)Name the products of anaerobic respiration in

(i) Plants (1 mark)

(ii) Animals (1 mark)

(b)What is oxygen debt? (1 mark)

15. 2008 Q9 P1

Give three factors that determine the amount of energy a human being require in a day (3 marks)

16. 2008 Q15 P1

Explain what happens when there is oxygen debt in human muscles (2 marks)

17. 2008 Q27 P1

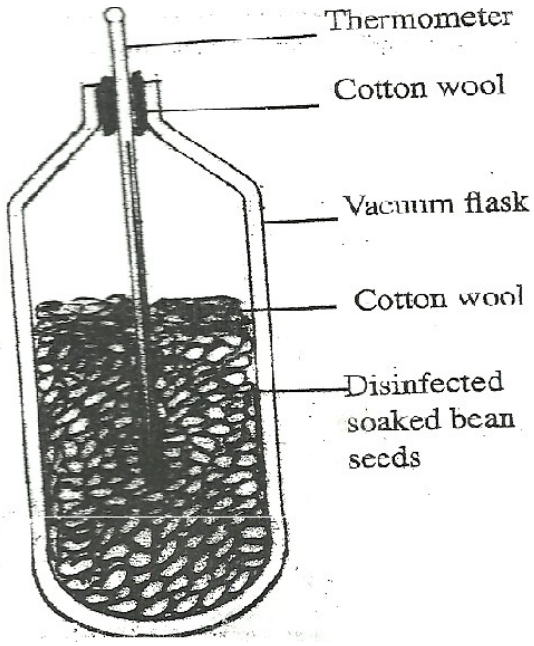
18. 2009 Q26 P1

How are the mitochondria adapted to their function? (2 marks)

19. 2009 Q27 P1

20. 2010 Q27 P1

In an experiment, disinfection soaked bean seeds were put in a vacuum flask which was then fitted with a thermometer as shown in the diagram below.



The temperature readings were taken every morning for three consecutive days.

a) Which process was being investigated? (1 mark)

b) i) what were the expected results? (1 mark)

ii) account for the answer in (b) (i) above? (2 marks)

c) Why were the seeds disinfected? (2 marks)

d) Why was a vacuum flask used in the set-up? (1 mark)

e) How would a control for this experiment be set? (1mark)

21. 2011 Q10 P1

a) Give two differences in the products of anaerobic respiration between plants and

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animals. (2 marks)

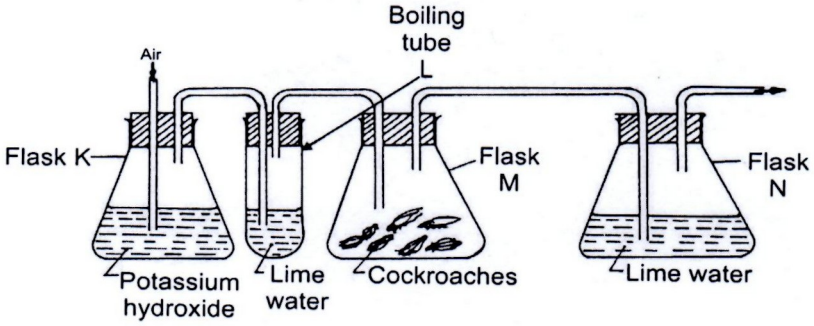
b) Name the site of anaerobic respiration in a cell. (1 mark)

22. 2011 Q19b P1

Write an equation that summarizes the process of aerobic respiration (1 mark)

23. 2012 Q7 P1

The diagram below represents a set-up that students used in an investigation.



(a) Name the physiological process that was being investigated. (1mark)

(b) State the role of potassium hydroxide in flask **K**. (1mark)

(c) Account for the observation in boiling tube **L** and flask **N**. (2 marks)

24. 2012 Q14 P1

(a) Name the type of respiration that is most efficient. (1 mark)

(b) Giving a reason for your answer in (a) above (1 mark)

25. 2013 Q14 P1

Name three end products of anaerobic respiration in plants. (3 marks)

26. 2013 Q14 P1

State two reasons why accumulation of lactic acid leads to an increase in heart beat. (2 marks)

RESPIRATION

MARKING SCHEME

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1. 1992 Q7 P1

a) Cellulose ethanol + Carbon → Energy/heat energy/210 Kj

b) -Manufacture/production of ethanol (in breweries)/bread making.

2. 1993 Q9 P1

$$\frac{\text{(Volume of } C0_2 \text{ produced.}}{\text{(Volume of } 0_2\text{)}}$$

Rej. $\frac{C0_2}{0_2}$

3. 1994 Q4 P1

- A baby has a large surface area to volume ratio than an adult.

4. 1996 Q13 P1

(a) Drive out oxygen / air

(b)Avoid killing yeast cells/ denaturing enzymes in yeast

(c) To prevent air from getting into the glucose and yeast Suspension

(d) Limewater turns milky

(e) Used boiled yeast on glucose

5. 1997 Q3 P1

Alcohol, carbon dioxide and energy;

- accept Ethanol, C_2H_5OH/CH_3H_2OH.

6. 1997 Q2 P1

Lactic acid is poisonous to tissue and must be removed.

To increase supply of oxygen to tissues.

7. 1999 Q16 P1

Muscles of diaphragm contract; causing the diaphragm to flatten (from dome position. The external intercostals muscles contract internal intercostals muscles relax pulling the ribcage upward/forward and outward in man.

These movements increases the volume of the thoracic cavity; reducing the pressure; of the thoracic cavity; compared to atmospheric pressure; this causes the atmospheric air to rush into the lungs.

(Through the nostrils, trachea bronchioles and alveoli).

b) Theory- photosynthesis

Guard cells have chloroplasts; in the presence of light; photosynthesis occurs in guard cells, producing sugar in guard cells; osmotic pressure increases/osmotic potential lowers; water from neighboring /adjacent cells enter into guard cells; causing turgidity of guard cells; causing turgidity of guard cells.

Theory 1.

Guard cells have chloplasts; in the presence of light photosynthesis occur in the guard cells of stomata; producing in the guard cells; osmotic pressure increases/lowers osmotic potential water from the neighboring /adjacent cells, enter into guard cells; causing turgidity of guard cells .

The inner walls of the guard cells are thicker than outer walls; so during turgidity the inner walls stretch more; causing the guard cells to bulge outward; stomata opens.

Theory 2.

Guard cells have chloroplasts (Day) in light; photosynthesis occurs in the leaf/guard cells lowering the CO_2 concentrations; this increases PH/alkalinity which triggers of enzymatic conversion of starch to sugar (glucose); leading to

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low osmotic potential/ increased osmotic pressure in guard cells; guard cells absorb water from epidermal cells; thus becoming turgid; the inner walls are thicker than the outer walls; outer walls stench more than inner walls; causing guard cells to bulge outwards, stomata opens;

In the absence of light (night); no photosynthesis; CO_2 concentration increases due to respiration; PH lowered/ acidity increases; sugar converted to starch; osmotic pressure lowered/ osmotic potential increases; guard cells lose water to adjacent epidermal cell becoming flaccid; stomata close.

Day low H+ high PH opens stomata.
Starch glucose.

Theory 3
Guard cells have chloroplasts; in light AT produced; the energy drives K+ irons from adjacent epidermal cells into guard cells; accumulation of K+ raises osmotic pressure (lower osmotic potential) of guard cells; guard cells absorbs water from adjacent epidermal cells; becoming turgid; the inner walls are thicker than the outer walls so outer walls stretch more than inner walls causing guard cells to bulge outward. Stomata opens.

In the absence of light (night) ATP rapidly decreases; no energy of potassium +ions pump ion; migrate by diffusion from guard cells to adjacent epidermal cells; become flaccid; the thinner outer walls of guard cells shrink (OWWTE; thicker inner walls reduces their curvature/OWTTE; thus closing the stomata.

8. 2000 Q15 P1

(a) (i) 78/78 mg/ $100cm^3$
(ii) 8.5^{th} and 29.5^{th} / 8min 30 sec and 29 min 30 sec
(iii) 47 mg/100cc; Acc. 47

(b) - The demand for oxygen is more than the supply
- leading to anaerobic respiration. Acc. Lactic acid converted to glucose/Glycogen

(c) Lactic acid is oxidized (to form CO_2 and H_2O)
Acc. Lactic acid is converted to glucose/ glycogen

9. 2003 Q1 P1

a) Anaerobic respiration / fermentation; Acc. Alcohol production / drawing dough.
b) Brewing/ Banking.

10. 2004 Q4 P1

-Ethanol / Alcohol
-Energy / ATP/ 210kj / heat;
Rej. atp, formula of alcohol.

11. 2005 Q6 P1

Lactic acid

12. 2006 Q13 P1

(a) - A.T.P/ adenosine triphosphate rej A.T.P
(b) -Brewing of alcohol accept examples;
- Baking of bread.

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- Biogas production
- Compost manure formation
- Silage formation
- Commercial production of citric acid
- Sewage treatment.

13. 2006 Q25 P1

(a) A mouse has a larger surface area to volume ratio than a dog, hence losses more energy per unit body weight/ mouse losses heat faster than a dog.

(b) Lactic acid, accept energy/ ATP

14. 2007 Q13 P1

(a) (i) Ethanol and carbon (iv) oxide

(ii) Lactic acid

(b) It is the state when human body undergoes anaerobic respiration producing lactic acid. Oxygen has to be taken into the body to break the lactic acid

15. 2008 Q9 P1

Body size; sex; age

16. 2008 Q15 P1

Muscles respire anaerobically; resulting in accumulation of lactic acid in the tissue; causing fatigue/ muscle crumps.

17. 2008 Q27 P1

(Anaerobics) micro organism/ bacteria breakdown harmful substances in sewage

18. 2009 Q26 P1

Inner membrane is highly folded / have cristae to provide a large surface area; / for attachment of respiratory enzyme.

19. 2009 Q27 P1

Baking / brewing

Rej: formation of butter, cream, glucose

- Formation of dairy products – cheese, yoghourt, sour milk;
- Formation of organic acids – oxalic acid, Vinegar (Ethamic acid, citric acid, butyric acid)

20. 2010 Q5 P1

a) Respiration (Rej: external respiration/ anaerobic respiration)
Acc: aerobic respiration.

b) i) Rise/ increase in thermometer / temperature reading.

ii) stored starch/ glucose/ carbohydrates in germination seeds are broken down/ oxidized to get energy. Some of the energy is released to get energy; some of the energy is released as heat.

c) To kill bacteria/ fungi/ micro-organisms; that would cause decay/ decomposition / respire. (of the bean).

d) To conserve heat/prevent heat loss to surrounding

e) Use similar set up with dead disinfected seed.
Use dead disinfected bean seed/ use of dry bean seeds; acc formaldehyde / formalin for disinfection sodium hypochlorite.

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21. 2011 Q10 P1

i) Lactic acid in animals while in plants it is ethanol / alcohol;

ii) No carbon IV oxide produced in aerobic respiration in animals while anaerobic respiration in plants produces carbon IV oxide (2 marks)

22. 2011 Q19b P1

a) Glucose + oxygen $\longrightarrow$ carbon IV oxide + water + energy

(1 mark)

23. 2012 Q7 P1

(a) Respiration

(b) (potassium hydroxide) removes/absorbs CO_2 (from atmospheric air);

(c) L- Lime water remains clear because carbon (IV) oxide has been removed

N- Lime water forms a white ppt/turbid because the respiring cockroaches produce carbon (IV) oxide

24. 2012 Q14 P2

(a) Aerobic respiration

(b) Releases more energy (per unit mass) NB (b) tied to (a)

24. 2013 Q14 P1

- Ethanol / Ethel / Ethanoic acid
- Carbon (IV) oxide
- Energy

24. 2013 Q15 P1

- To increase supply of oxygen to oxidize accumulating lactic acid to carbon(IV) oxide, water and energy
- To transport lactic acid to the liver where its converted to glycogen

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