

SUBJECT: BIOLOGY.

TOPICAL QUESTIONS AND ANSWERS.

CLASS: FORM 2 TOPIC

3: RESPIRATION.

1. Define respiration.

This is the oxidation/breakdown of food within cells to release energy.

2. Explain the significance of respiration in living organisms.

It yields energy (ATP) which enables organisms to move, grow, excrete and reproduce.

3. Where does respiration take place?

In the mitochondria of a cell.

4. Explain the roles of enzymes in respiration.

They catalyse reactions i.e. speed up respiration.

5. What is aerobic respiration?.

The breakdown of food substances presence of oxygen.

6. Give a word equation for aerobic respiration. **Glucose + oxygen - Water + carbon iv oxide
+ energy**

7. What is anaerobic respiration?.

The breakdown of food substances in the absence of oxygen.

8. What are obligate anaerobes?

These are the organisms which completely depend on the presence of oxygen to carry out respiration. They cannot survive in the absence of oxygen.

9. What are facultative anaerobes?

These are organisms which can survive both in the absence and presence of oxygen. They are partially anaerobes.

10. What are the end products of aerobic respiration?

Energy.

Carbon iv oxide.

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Water.

11. State the Word equation representing anaerobic respiration in plants.

Glucose---→ ethanol + carbon (iv) oxide + energy.

12. Name the end products of anaerobic respiration in plants.

Alcohol/ethanol.

Carbon iv oxide. Energy.

13. Give a word equation of anaerobic respiration in animals.

Glucose —> lactic acid + energy.

14. Name the end products of respiration in animals when there is insufficient oxygen supply.

Lactic acid. Energy.

15. Why is there a high rate of lactic acid production during a vigorous exercise?.

Because the demand for oxygen is more than supply leading to anaerobic respiration.

16. Why does lactic acid level reduce after exercise?

It is oxidized to form carbon iv oxide and water.

Some is converted to glucose.

Some is converted into glycogen.

17. State why accumulation of lactic acid during vigorous exercise lead to an increase in heartbeat.

To increase the oxygen supply, this helps in the removal of lactic acid which is poisonous to the tissues.

18. State the economic importance of anaerobic respiration.

Brewing of alcohol

Biogas production

Compost manure formation

Silage formation

Baking bread

Production of dairy products

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Fermentation of milk Sewage treatment

19. What is oxygen debt?

This is the amount of oxygen required to convert the accumulated lactic acid to water, carbon IV oxide and energy.

20. What is respiratory quotient (RQ)?

The ration of carbon IV oxide produced to oxygen consumed.

21. Why is respiratory quotient important?

Its calculation assists in identifying the kind of substrate being used in respiration.

22. Name three respiratory substrates.

Carbohydrates

Fats

Proteins

23. Why does anaerobic respiration of a given substrate yield a smaller amount of energy than aerobic respiration?

-Because some energy locked up in intermediate products like ethanol in plants and lactic acid in animals.

-Because substrate is completely oxidized in aerobic respiration.

24.Explain the disadvantages of anaerobic respiration

-Less energy produced in anaerobic respiration since food is partially oxidized while in aerobic respiration food is completely oxidized.

-Some metabolic wastes accumulate in cells affecting cellular functions

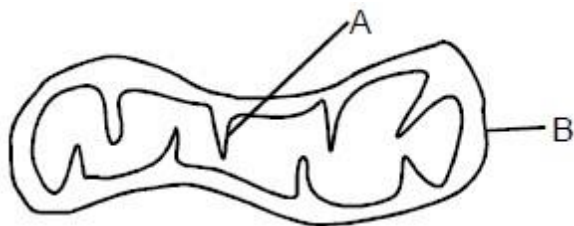
-Ethanol produced in plants and the lactic acid in animals is poisonous.

-causes muscle fatigue/muscle cramp and may stop muscle contraction.

25. Name a respiratory substrate usually available for energy release during starvation.

Protein;

26. The diagram below represents a cell organelle.



a).Name the part labelled B.

Outer membrane;

b) State the function of the part labelled A.

Attachment of respiratory enzymes; / have respiratory enzymes; 27.

Study the equation and answer the questions that follow.



a).Identify the type of respiration illustrated in the equation above.

Aerobic respiration;

b) Explain why lactic acid was not produced in the reaction illustrated in the equation above.

**-The glucose is completely broken down; (into carbon (IV) oxide, water and energy) -
Presence of oxygen; (gas)**

28.What is the meaning of Fermentation?

Anaerobic respiration in plants;

29.If oxygen is absent in a cell, what products are obtained in :

i) Animals

Lactic acid and energy; ii)

Plants

Ethanol / ethyl alcohol, carbon (IV) oxide and energy;

30. Differentiate between photosynthesis and respiration.

Photosynthesis

-Occurs in chloroplasts

and cytoplasm - Carbon (IV) oxide is used

Carbon (IV) oxide is

up

- Oxygen is released

- Occurs only in green plants

-Requires presence of light

Respiration

-Occurs in mitochondria

- Carbon (IV) oxide is produced

produced

-Oxygen is used up

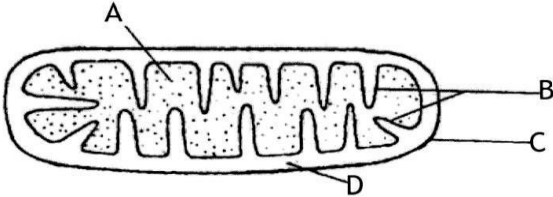
-Occurs in all organisms

**- Does not require presence
of light**

- Food substances synthesized

-Food substances broken down

31. The diagram below represents a cell organelle.



(i).Identify the organelle.

Mitochondrion

(ii).Name the part labelled B.

Cristae;

function of the part label A

(iii).State the

Site where respiration occur;

32. Other than carbon (IV) oxide, name other products of anaerobic respiration in plants.

Ethanol;

Energy;

33. Name the organelles that are abundant in the liver cells.

Mitochondria

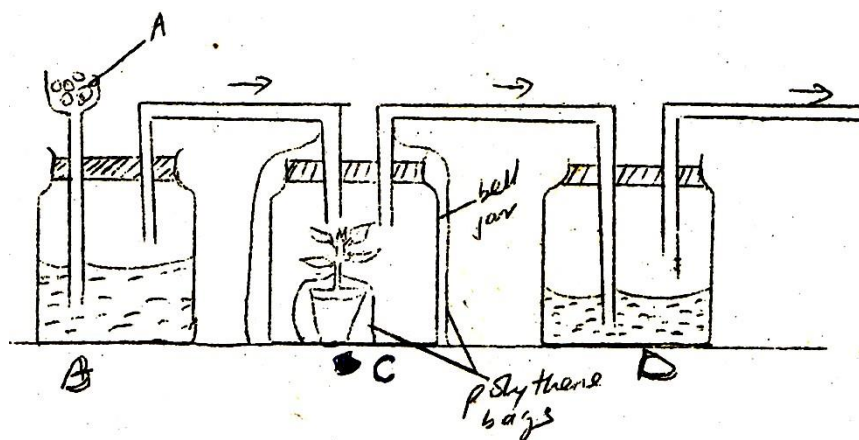
34.Give a reason why it is difficult to calculate Respiratory Quotient (RQ) in plants.

Carbon (IV) oxide produced in respiration is utilized in photosynthesis; oxygen produced in photosynthesis is used in respiration;

35. Explain why there is increased heart beat during vigorous exercise in man.

This is to remove the poisonous lactic acid produced by anaerobic respiration in muscles; and increase oxygen supply to the tissues;

36. The diagram below illustrate an experiment to demonstrate some aspects of respiration in a potted plant.



(a) Name and state the role of the chemical compound labeled A

Potassium hydroxide;
Absorbs carbon (IV) oxide (CO_2)

(b) What aspect of respiration is being demonstrated?

Production of CO_2 during respiration

(c) Name the reagents in set up B

and D.

Lime water

(d) What would be the results in set up B and D after the experiment has run for some time?

Clear;

(e). State the importance of covering the bell jar in set up C with a black polythene bag.

To prevent the process of photosynthesis

(f). Why was it necessary to enclose the pot with a polythene bag?

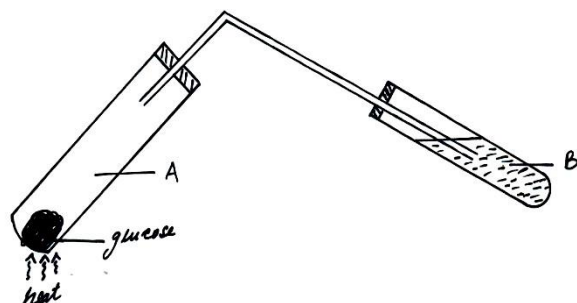
To prevent CO_2 from micro-organisms in the soil;

37. Give **three** factors that determine the amount of energy a human being requires in a day.

- **Age;**

- **Basal metabolic rate; - Occupation; - Activity.**

38. Students set up an experiment as shown below. Use it to answer the questions that follow.



(a) What was the aim of the experiment?

To show that Carbon (IV) oxide is produced when glucose is heated;

(b) What observation would be made in test tube B?

A white precipitate was formed;

(c) Explain the results in (b) above

Carbon (IV) oxide combines with calcium hydroxide to form calcium carbonate that is insoluble.

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



a) Identify the process.

Alcoholic fermentation/Anaerobic respiration

b) State **two** economic importance of the process in (a) above **-Baking of bread**

- Alcoholic fermentation to make beer

- Milk fermentation in dairy industry to make yoghurt

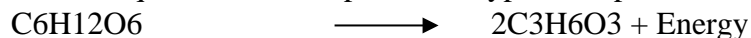
- Making of compost manure

- Production of organic acids such as acetic acid

- Production of biogas

c) Name the products that would be formed if a similar process occurred in animals. **Lactic acid + Energy.**

40. The equation below represents a type of respiration.



(a) Identify the type of respiration.

Anaerobic respiration in animals; must include in animals.

(b) Suggest **one** industrial application of the process named in (a) above.

-Beer brewing

-Bread baking / leavening of bread

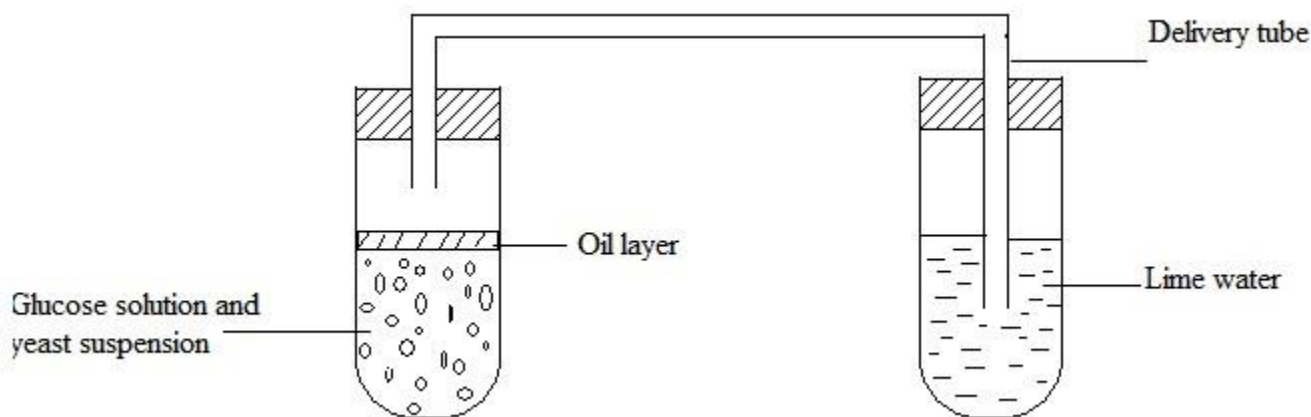
-Processing of dairy products

-Manufacture of wines and spirits

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Production of organic acids.

41. The diagram below shows a set-up that was used to demonstrate fermentation.



The glucose solution was boiled; then allowed to cool before adding the yeast suspension. Oil was then added on top of the mixture.

(a) Why was the glucose solution boiled before adding the yeast suspension?

To expel air / remove air;

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

Not to denature enzymes of yeast / not to kill the yeast. (c) What

was the use of the oil in this experiment?

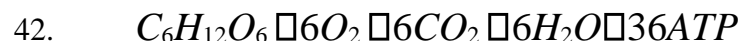
To prevent entry of air ; into glucose and yeast mixture.

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

To supply oxygen more faster; to break down the lactic acid; (to CO₂ + water and energy)

e).Suggest a control for this experiment.

Use of boiled yeast ; Use of yeast without glucose ; / Use of glucose without yeast.



Identify the type of respiration illustrated in the equation above.

Aerobic respiration

43. Explain why lactic acid is not produced during aerobic respiration.

The glucose is completely broken down; (into carbon (IV) oxide, water and energy)

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Presence of oxygen; (gas).

44. 50cm³ of 10% glucose solution was boiled and allowed to cool. The solution was then poured into a vacuum flask and about 5cm³ of groundnut oil added to it. 10% yeast solution was introduced into the glucose solution using a pipette. A thermometer was placed in the flask and supported with a cotton wool plug. A second flask was set up as above, but containing cooled boiled water instead of 10% glucose solution. The temperature of each flask was recorded at the beginning and thereafter at hourly intervals for several hours.

a) Why was a vacuum flask used in this experiment?

To avoid loss of any heat generated in the flask;

b) What was the purpose of the second flask?

Control set up;

c) Write a word equation to summarize the reaction that took place in the first flask.

Glucose -----→ ; alcohol + carbon (IV) oxide + Energy;

d). Why was groundnut oil added to the flask?

To avoid infiltration of oxygen;

e). Why was it necessary to boil the glucose and the water before they were poured into the flask?

To expel any oxygen dissolved in the glucose;

45. If oxygen is absent in a cell, what products are obtained in :

i) Animals

Lactic acid and energy;

ii). Plants

Ethanol / ethyl alcohol, carbon (IV) oxide and energy;

46. Why does food stored in a refrigerator remain unspoiled longer than it does under ordinary conditions?

Low temperature suppresses/ inactivates enzymes produced by bacteria hence lowering their activity.

47. A student setup the following apparatus to investigate a physiological process in animals.

The set-ups were then left for one hour.

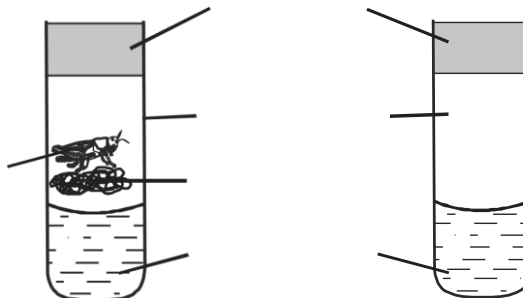
Rubber stoppers

Boiling Tube

Cockroach

Steel wool

Lime water



a) What was the aim of the experiment?

To investigate whether carbon (IV) oxide is produced during (aerobic) respiration by animals;

b) i) What observation was made in:

Tube A

White precipitate formed;

Tube B

Lime water remains colourless

ii) Account for

the change that occurs in Tube A.

Cockroach produces carbon (IV) oxide (which react with lime water); during aerobic respiration;

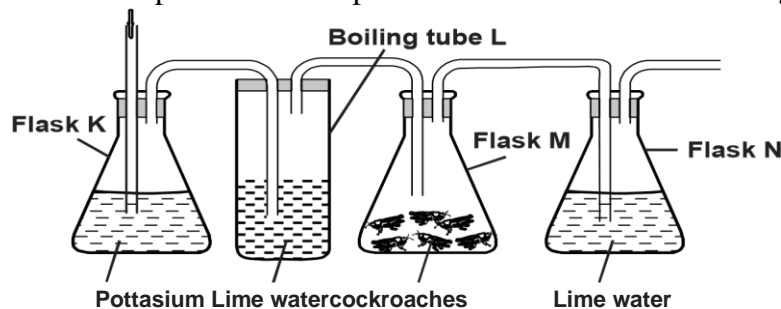
c).State the role of Tube B in the above experiment.

Control setup;

d) Explain what would be observed if a green leaf was introduced in Tube A in place of the cockroach then set-up exposed to light for one hour.

Limewater will remain colourless; Green tube uses the carbon (IV) oxide in the tube for photosynthesis;

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



a) Name the physiological process that was being investigated.

Respiration;

b) State the role of potassium hydroxide in a flask K.

In flask K potassium hydroxide removes/absorbs carbon (iv) oxide from the atmospheric air

c) Account for the observation in boiling tube L and flask N

L - lime water remains clear because carbon (IV) oxide has been removed; N - flask N lime water forms a white precipitate because the respiring cockroach produce carbon (IV) oxide.;

49. Name the organelles that would be most likely found in large numbers in cells that A cell in the ileum that actively takes in glucose.

Mitochondria.

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

a) Write an equation to represent the chemical reaction

Glucose -----→ Ethanol + carbon (IV) oxide + energy

$C_2H_{12}O_6$ -----→ $2C_2H_5OH + CO_2$ + energy

b). State two economic importance of this type of reaction.

- Milk fermentation in dairy industry to make yoghurt

- Making of compost manure

- Production of organic acids such as acetic acid