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A2 Biology OCR

Unit F214: Communication, Homeostasis and Energy

Module 4.1 Respiration

Answers

1. *accept labelled sketch diagram for marking points below*

nitrogenous base / purine;
 adenine;
 pentose / 5 carbon, sugar;
 ribose;
three, phosphate groups / Pi; **R** phosphate molecule
 phosphorylated nucleotide;

A adenosine as an alternative to adenine **plus** ribose

4 max

[4]

2. **S**;
R;
S;

A – correct names instead of letters

[3]

- 3.

S & C

Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks

CREDIT one statement and a suitable explanation related to that (first) given statement (e.g. S3 + E3 but not S4 + E1)

DO NOT AWARD 2 marks for 2 statements or 2 explanations

S1 glucose is not the only substrate / there are other substrates;

'fats can (also) be respired' = E1

'fats can be respired as well as glucose' = S1 + E1

E1 named alternative substrate;

or

S2 ATP is produced / energy is released;

DO NOT CREDIT energy produced / made / created

E2 (by) substrate level / oxidative, phosphorylation;

or

S3 ATP / energy, required;

E3 (for) phosphorylation / glycolysis;

or

S4 is not a single step reaction / other steps involved / other products / other intermediates;

E4 named stage(s) / named intermediate compound(s);

Krebs cycle / ETC, happens = E4

'other stages such as link reaction are involved' = S4 + E4

e.g. pyruvate / acetyl CoA / acetate

IGNORE NAD(H) / FAD(H) / ATP

or

S5 enzymes are involved;

E5 dehydrogenation / decarboxylation / oxidative phosphorylation / named (respiratory) enzyme;

or

S6 coenzymes / NAD, involved;

DO NOT CREDIT NADP

E6 oxidative phosphorylation / link reaction / Krebs cycle / glycolysis;

or

S7 glucose does not, combine / react, (directly) with oxygen;

E7 (oxygen) used in oxidative phosphorylation / is final electron acceptor / is final hydrogen acceptor;

[2]

4. A ;
C ;
C ;
B ;

[4]

5. (i) **Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks**

glycolysis / glycolytic pathway;

CREDIT phonetic spelling but must have 'glycol...'

1

- (ii) **Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks**

cytoplasm;

CREDIT cytosol

DO NOT CREDIT cytoplasm, in / of, mitochondrion

1

- (iii) **Mark the first answer for each letter. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 mark**

D ATP;

E NAD;

ALLOW oxidised NAD

DO NOT CREDIT NADP / reduced NAD

F pyruvate;

ACCEPT pyruvic acid

3

[5]

6. (a) (i) removal of, carbon dioxide/carboxyl group;
removal of hydrogen; **R** H_2 /hydrogen molecules/hydrogen ions **A** $H/2H$ 2
- (ii) P and Q; 1
- (b) 1; 1
- (c) (i) 3; 2
1;

- (ii) 1 inner mitochondrial membrane/cristae;
 2 ref to (NADH) dehydrogenase;
 3 hydrogen split into protons and electrons;
 4 ref to, electron carriers/ETC/cytochromes;
 5 energy released from electrons;
 6 ref to protons pumped across membrane;
 7 protons accumulate in intermembranal space;
 8 proton gradient/pH gradient/H⁺ gradient;
 9 protons pass through ATPase; **A** *ATPsynthase/*
ATP synthetase/stalked particle
 10 ref. to oxygen (final) hydrogen/electron acceptor;
 11 formation of water; max
 4

- (d) fats/fatty acids, not respired;
 ref to (β -)oxidation (of fatty acids) requires NAD;
 NAD used in breakdown of alcohol;
 NAD is, limiting/in short supply/AW;
 fats formed from fatty acids plus glycerol;
 AVP; e.g. further detail of alcohol/fat metabolism max 3

[13]

**7. Award marks from labelled / annotated diagrams –
 but ensure that mp 2 only awarded if H clearly shown
 to be accepted by pyruvate**

- 1 (pyruvate / **F**) converted to lactate;
ACCEPT lactic acid
DO NOT CREDIT if pyruvate \rightarrow ethanol in the animal
is indicated/implied
DO NOT CREDIT wrong reaction type (e.g. oxidation)
- 2 **F** / pyruvate, accepts hydrogen (atoms);
ACCEPT pyruvic acid
DO NOT CREDIT hydrogen ions (unless also e⁻) / molecule
- 3 hydrogen from, **reduced NAD / reduced E**;
ACCEPT NADH / NADH₂ / NADH + H⁺
- 4 (catalysed by) lactate dehydrogenase;
for pyruvate \rightarrow lactate ACCEPT LDH
- 5 no, oxygen / O₂, to act as (final),
 hydrogen / electron, acceptor;
- 6 (so) link reaction / Krebs cycle / ETC, cannot take place;
*Needs a clear statement of **not** taking place*

***CREDIT** no, electron transport chain / electron carrier chain / chemiosmosis / oxidative phosphorylation*

- 7 NAD / E, regenerated / recycled / able to be re-used;
***IGNORE** reduced NAD, oxidised / reoxidised (as this does not give the idea of reusing it)*
- 8 allows glycolysis to continue / pyruvate continues to be made;
Needs a clear statement
- 9 limited / small amount of / some, ATP can be produced;
***CREDIT** 1 ATP (per pyruvate) / 2 ATP (rather than 28-38 per glucose) / only substrate level phosphorylation*
***IGNORE** 'enough ATP for ...'*

[5]

8. ref. to potassium hydroxide / soda lime;
 ref. to equilibration / use syringe to set manometer fluid (level);

leave for suitable length of time (minimum 20 minutes) and
 measure distance moved by fluid;
 repeats and calculate mean;
 calculate volume of oxygen taken up per minute;

AVP; e.g. ref to set-up of control tube (e.g. same mass of beads as of fungus) or (same volume of inert substance as substance A)
 detail of how to calculate volume of oxygen (by multiplying distance moved by fluid in capillary by $2\pi r$)

max 4

[4]