



CHEMISTRY ONLINE
— **TUITION** —

Phone: +442081445350

www.chemistryonlinetuition.com

Email: asherrana@chemistryonlinetuition.com

BIOLOGY

ENERGY TRANSFERS IN & BETWEEN ORGANISMS

Level & Board	AQA (A-LEVEL)
TOPIC:	RESPIRATION
PAPER TYPE:	SOLUTION - 2
TOTAL QUESTIONS	6
TOTAL MARKS	32

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Respiration - 2

1.

(a) The Bohr effect increases the efficiency of oxygen transportation through the blood. After hemoglobin binds to oxygen in the lungs due to the high oxygen concentrations, the Bohr effect facilitates its release in the tissues, particularly those tissues in most need of oxygen.

OR

Increases dissociation of oxygen

For aerobic respiration at the tissues/muscles

(b)

Time = 10 minutes

Ratio = 1.6875:1

(c)

Increase in breathing rate,

Similar $p\text{CO}_2$ per breath, but more breaths.

(d) Muscle fibres have a limited amount of phosphocreatine.

2.

(a)

- More acetylcoenzyme A would enter the Krebs cycle
- So the Krebs cycle generates more reduced coenzymes/more reduced coenzymes pass their electrons to the electron transfer chain
- More ATP would be produced
- Athletes could build slow muscle fibres without exercising
- Having more slow muscle would increase endurance

(b)

It is because blood to thicken and thickened blood could block the coronary arteries.

3.

(a)

Some cyclists will gain a bigger advantage

There are health risks associated with taking EPO

4.

(a)

- Line graph with rate on y axis and temperature on x axis and linear scales
- Values calculated to appropriate sf
- Rates correctly calculated and plotted, with ruled line connecting points and no extrapolation

(b) 8 or 9

(c) To determine the total amount of carbon dioxide secreted at 30°C during the recording period, you would need to measure the rate of respiration and the time duration. One way to measure the rate of respiration is by using a respirometer, which measures changes in gas volume.

OR

Determine the area under the curve

(d) Historically, temperature and CO₂ have followed similar patterns because the heating or cooling of Earth's surface can lead to changes in the concentrations of greenhouse gases in the atmosphere, which can then cause additional warming or cooling.

OR

- Enzymes / metabolism faster
- Higher rate of respiration and carbon dioxide production / release
- Spiracles open more often / remain open to excrete / get rid of carbon dioxide / get more oxygen

5.

(a) The link reaction occurs in the mitochondrial matrix. In the first step, carbon dioxide and hydrogen are removed from two pyruvate molecules,

producing two acetyl groups. The hydrogen removed is transferred to NAD, reducing it. In the second step, coenzyme A combines with the acetyl group to form acetyl CoA.

OR

Oxidation of hydrogen removed from pyruvate and carbon dioxide released;

Addition of coenzyme A.

(b) Oxaloacetate is the first substrate to bind to the enzyme. This induces the enzyme to change its conformation, and creates a binding site for the acetyl-CoA. Only when this citroyl-CoA has formed will another conformational change cause thioester hydrolysis and release coenzyme A.

OR

Change in shape of active site moulds around the substrate

Substrate / active site now complementary.

(c)

Is a competitive inhibitor / attaches to active site

Reduces enzyme-substrate / E-S complex forming.

6.

(a)

Produces NAD / oxidises reduced NAD

NAD used in glycolysis.

OR

It is beneficial to convert pyruvate to lactate when oxygen is not available because it allows substrate-level ATP synthesis substrate-level phosphorylation to continue

(b) The conversion of lactate to pyruvate allows for the continuation of aerobic respiration, which is the most efficient way of producing energy in cells. By converting lactate back to pyruvate, muscles can utilize the oxygen available to generate ATP, the energy currency of cells.

OR

Pyruvate is used in aerobic respiration / lactic acid is toxic / harmful / causes cramp / muscle fatigue.



I am Sorry !!!!!



DR. ASHAR RANA
M.B.B.S / MS. CHEMISTRY



- Founder & CEO of Chemistry Online Tuition Ltd.
- Completed Medicine (M.B.B.S) in 2007
- Tutoring students in UK and worldwide since 2008
- CIE & EDEXCEL Examiner since 2015
- Chemistry, Physics, Math's and Biology Tutor

CONTACT INFORMATION FOR CHEMISTRY ONLINE TUITION

- UK Contact: 02081445350
 - International Phone/WhatsApp: 00442081445350
 - Website: www.chemistryonlinetuition.com
 - Email: asherrana@chemistryonlinetuition.com
- Address: 210-Old Brompton Road, London SW5 OBS, UK