1. Describe the role of reduced NAD in respiring yeast cells in the absence of oxygen. (3)

M1 =

M2 =

M3 =

2. Describe how the production of lactate in muscle tissue **differs** from anaerobic respiration in yeast. (3)

M1 =

M2 =

M3 =

3. Most of the hydrogen atoms that are released by the Krebs cycle will take part in oxidative phosphorylation on the cristae of the mitochondria. Outline the process of oxidative phosphorylation. (5)

M1 =

M2 =

M3 =

M4 =

M5 =

4. Many chemicals will 'uncouple' oxidation from phosphorylation. In this situation, the energy released by oxidation of food materials is converted into heat instead of being used to form ATP.

One such compound is dinitrophenol, which was used in munition factories for the manufacture of explosives during the First World War. People working in these factories were exposed to high levels of dinitrophenol.

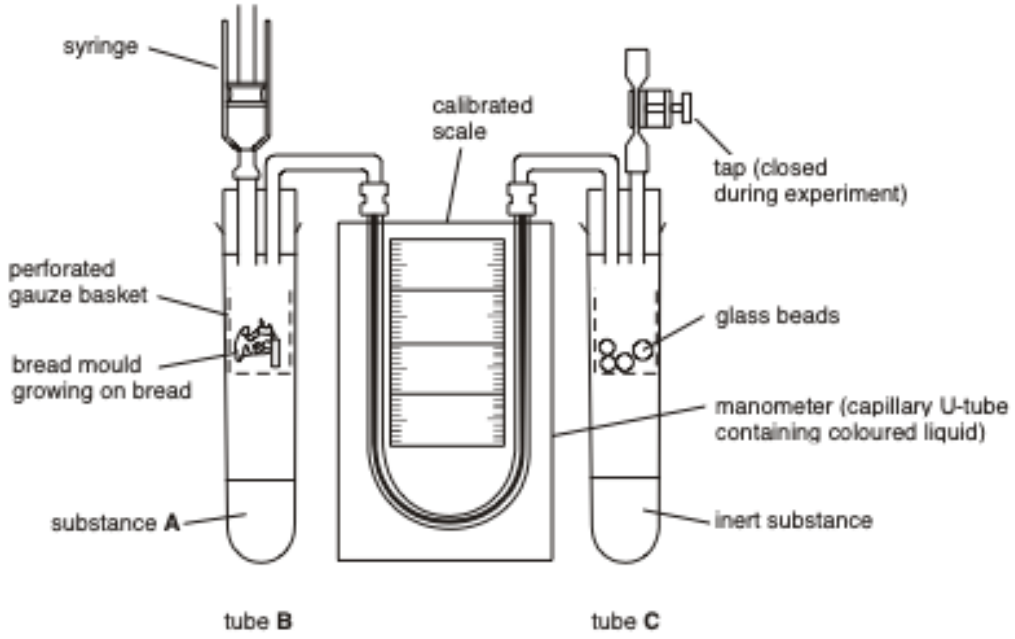
Suggest **and** explain why people working in munitions factories during the First World War became very thin regardless of how much they ate. (3)

M1 =

M2 =

M3 =

5. A respirometer can be used to measure the oxygen uptake of living organisms.



Describe how the apparatus shown in the diagram could be used to determine the **rate** of respiration of the bread mould, Mucor. (6)

M1 =

M2 =

M3 =

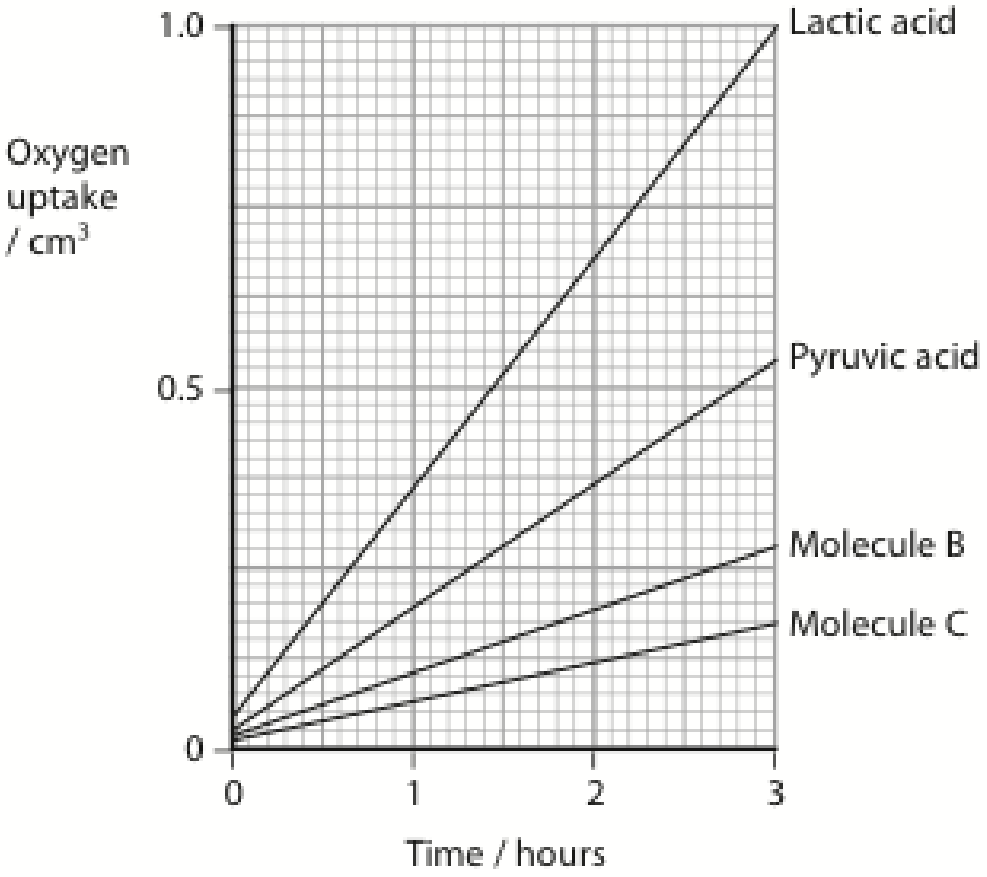
M4 =

M5 =

M6 =

6. An investigation was carried out into the ability of bacteria to use different substances as substrates for aerobic respiration. Cultures of bacteria were grown separately in media containing lactic acid or one of the substances shown in the diagram (pyruvic acid, molecule B or molecule C). Molecule B and Molecule C are intermediates in the Kreb's cycle.

The initial concentration of each of these substances in the media was the same. The oxygen uptake of each culture was measured over a period of time. The results are shown in the graph below.



Using the information in the diagram and the graph, suggest an explanation for the differences in oxygen uptake between bacteria using pyruvic acid, molecule B and molecule C as a substrate. (4)

M1 =

M2 =

M3 =

M4 =

7. The respiratory quotient (RQ) is used to show what substrates are being metabolised in respiration.
The RQ of a substrate may be calculated using the formula below:

$$RQ = \frac{\text{molecules of } CO_2 \text{ given out}}{\text{molecules of } O_2 \text{ taken in}}$$

An investigation into the RQ values of germinating maize seeds was carried out.

- A sample of maize seeds was soaked in water for one hour.
- The mean RQ value of some of the seeds was then calculated and the remaining seeds were then planted in soil.
- After 12 hours, the mean RQ value of some of the planted seeds was calculated.
- The remaining seeds were allowed to germinate and grow into seedlings.
- After 21 days, the mean RQ value of some of the seedlings was calculated.

The table below shows the results of the investigation.

stage of germination and growth	mean RQ
seeds soaked in water	5.6
seeds after 12 hours in the soil	0.8
seedlings after 21 days	1.0

Suggest an explanation for each of the RQ values shown in the table. (6)

M1 =

M2 =

M3 =

M4 =

M5 =

M6 =