

**Topic 2.8 Cellular Respiration**

2.8.U2 ATP from cell respiration is immediately available as a source of energy in the cell.

1. Draw and annotate a molecule of ATP to show how it stores and releases energy.
2. List the three main cellular process that use ATP as a source of energy.

2.8.U1 Cell respiration is the controlled release of energy from organic compounds to produce ATP.

3. Define cell respiration
4. Cell respiration is an example of a metabolic process. State the type of molecules that control the process of respiration.
5. Explain why cell respiration must happen within every living cell.
6. Identify two organic molecules, other than glucose, which could be used for respiration.
7. Identify the two components of the cell in which respiration takes place.
8. Distinguish between the terms aerobic and anaerobic.

2.8.U4 Aerobic cell respiration requires oxygen and gives a large yield of ATP from glucose.

9. Label the diagram of aerobic cell respiration below.

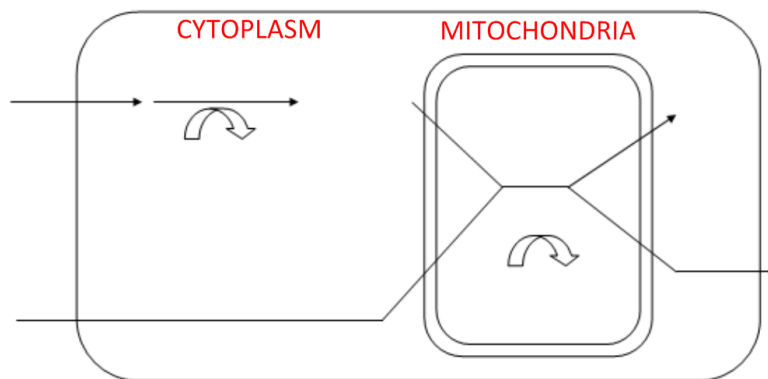
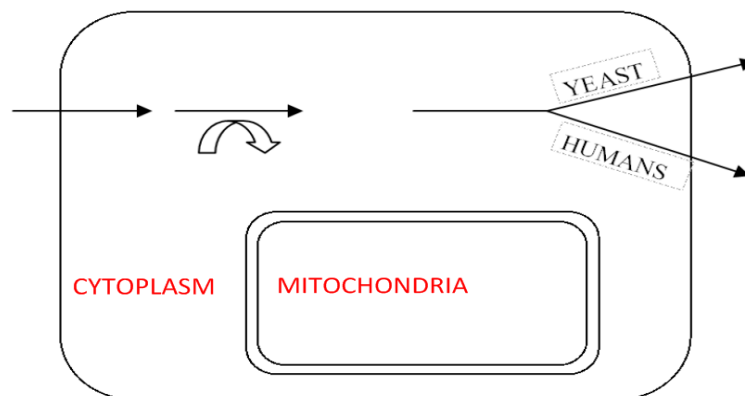


Image adapted from IB Biology Course Companion (Mindorff and Allott)

2.8.U3 Anaerobic cell respiration gives a small yield of ATP from glucose.

10. Label the diagram of anaerobic cell respiration below.



11. Complete the table below to compare and contrast aerobic and anaerobic respiration.

| Aerobic   | Anaerobic      |                |
|---|----------------|----------------|
| Glucose (and other hexose sugars) used in both types of respiration |                |                |
| Lipids and amino acids (if in excess) can also be used              |                |                |
| Oxygen in   |                |                |
|   | 2 ATP produced |                |
| Pyruvate is an intermediate compound in both types of respiration   |                |                |
|   | <i>Yeast</i>   | <i>Animals</i> |
| Carbon dioxide produced   |                |                |
| Water produced  |                |                |

2.8.A1 Use of anaerobic cell respiration in yeasts to produce ethanol and carbon dioxide in baking.

12. Describe how and why yeast is used in bread making.

13. Bioethanol is ethanol produced by living organisms, for use as a renewable energy source. It can be used as a fuel in vehicles, sometimes in a pure state and sometimes mixed with gasoline (petrol). Describe how bioethanol can be produced from plant material with reference to the function of yeast in the process.

2.8.A2 Lactate production in humans when anaerobic respiration is used to maximize the power of muscle contractions.

14. State three activities that require anaerobic respiration.

15. Aerobic respiration generates a much greater yield of ATP. Despite this it is still important for humans to carry out anaerobic respiration. State the main advantages to humans of anaerobic respiration.

16. Explain why anaerobic respiration can only be done for short periods of time.

17. Describe the term 'oxygen debt' and explain why it must be repaid after anaerobic respiration has stopped.

2.8.S1 Analysis of results from experiments involving measurement of respiration rates in germinating seeds or invertebrates using a respirometer. & Nature of Science: Assessing the ethics of scientific research—the use of invertebrates in respirometer experiments has ethical implications. (4.5)

Respirometers vary greatly in their design, but all can be used to calculate the rate of respiration by measuring the consumption of oxygen.

18. Explain the function of each of the following parts of the respirometer.

- |   |                                    |
|---|------------------------------------|
| a. Potassium hydroxide (alkali) solution: | c. Rubber bungs sealing each tube: |
| b. Capillary tube containing colored oil: | d. Syringe:                        |

19. The respirometer can be used to measure the rate of respiration in a range of experiments.

- Outline how the respirometer can be used to measure the impact of temperature upon respiration.
- The respirometer above can also be used to measure the respiration rate in small invertebrates. Describe the ethical and environment concerns that must be addressed before the respirometer can be used for animal experimentation.

