**Metabolism topic test solutions**

**SECTION A: Multiple-choice questions (1 mark each)**

**Question 1**

*Answer:* D

*Explanation:*

The rate has an optimum pH value.

**Question 2**

*Answer:* D

*Explanation:*

Four double bonds = eight hydrogen atoms.

**Question 3**

*Answer:* A

*Explanation:*

The more double bonds, the more susceptible the fat is to oxidation

**Question 4**

*Answer:* C

*Explanation:*

CF = VIt/ΔT =(3.8×5×4×60)/4.3 =1060

**Question 5**

*Answer:* B

*Explanation:*

The co-enzyme helps shape the enzyme to match the substrate

**Question 6**

*Answer:* A

*Explanation:*

Lactose is a disaccharide

**Question 7**

*Answer:* D

*Explanation:*

Rancidity occurs near double bonds

**Question 8**

*Answer:* D

*Explanation:*

99 peptide bonds were broken requiring 99 molecules of water

**Question 9**

*Answer:* C

*Explanation:*

Animals use glycogen as an energy store

**Question 10**

*Answer:* C

*Explanation:*

5x17 + 5x16 + 4x37 = 313 kJ

**SECTION B: Short-answer questions**

**Question 1** (10 marks)

**a. i**. The food releases energy as it burns. The energy heats the water up. The magnitude of the change in

 temperature of the water reflects the heat content of the food. 2 marks

 **ii**. The apparatus will give low results due to significant heat losses to the air and due to the lack of

 insulation to the test tube. 2 marks

**b**. q= 4.18×28.8×21.4 = 2576 J ΔH = 2576/0.22 = 11.7 kJ g-1 3 marks

**c**. **i**. it takes a significant amount of oxygen to combust the food. High pressure is required to have sufficient

 oxygen. 1 mark

 **ii**. The food is to be burnt. Oxygen is required for the combustion. 1 mark

 **iii**. An electric current is passed into the food to spark it alight. 1 mark

**Question 2** (7 marks)

1. 3 marks

 

**b**. **i**. Triglycerides are non-polar and not soluble in the stomach. 1 mark

 **ii**. In adipose tissue 1 mark

**c**. C12H24O2(l) + 17O2(g) 🡪 12CO2(g) + 12H2O(l) 2 marks

**Question 3** (12 marks)

**a**. **i**. concentration of glucose in the blood 1 mark

 **ii**. A food that is high GI will release glucose very quickly. The graph shows the high GI concentrations as the highest of the three choices. White bread will be high GI as the flour has been ground, enabling it to react quickly in the stomach. Brown bread has large flour particles. It takes longer for the enzymes to break it down, meaning the release of glucose is much slower. 4 marks

 **iii**. Potato has a high amylopectin starch percentage. This breaks down quickly. Some rice has a high

 amylose percentage which is slower to break down and lower GI. 1 mark

1. i. cellulose is considered fibre to humans. We cannot digest it.

ii. cows have cellulase in their system. This enzyme can break cellulose down.

iii. elephants have a strong microbial system in their large intestine. This can break cellulose down.

2 + 2 + 2 = 6 marks

**Question 4** (6 marks)

**a. i.** Enzyme effectiveness varies with pH. Most enzymes have an optimum pH to operate at but it is not

 the same value for each enzyme. 2 marks

 **ii**. Enzymes like glutamic acid are acidic in water anyway. They are designed to operate at a lower pH.

 1 mark

 **iii**. pepsin will be in the stomach and chymotrypsin in the small intestine 1 mark

**b**. 2 marks



**Question 5** (5 marks)

**a.** sweetener 1 mark

**b. i**. The diet alternative will be much sweeter. 1 + 1 = 2 marks

 **ii**. The diet alternative will have less energy.

**c**.

 2 marks