Assignment 1

Section: 09

Course

BIO 101

Submitted By:

Sumaiya Hossain Surovi

ID: 22301078

Department: CSE

Submitted To:

Kashmery Khan

Senior Lecturer

MNS Department

Brac University

1) I am discussing the main steps on how our body maintains blood glucose levels after eating a large meal in the following:

(i) Digestion and Absorption: The carbohydrates in the meal are broken down into glucose during digestion. This glucose is then absorbed into the bloodstream through the small intestine.

(ii) Insulin Release: In response to the rising blood glucose levels, the pancreas releases insulin into the bloodstream.

(iii) Cellular Uptake: Insulin acts as a key to allow glucose to enter cells, especially in muscle and fat tissue. This reduces blood glucose levels by facilitating glucose uptake into cells for energy or storage.

(iv) Liver Regulation: The liver plays a crucial role in maintaining blood glucose levels. It stores excess glucose as glycogen when levels are high and releases glucose into the bloodstream when levels drop.

(v) Hormonal Regulation: Hormones like glucagon and epinephrine are released in response to low blood glucose levels. They stimulate the liver to break down glycogen into glucose and release it into the bloodstream.

(vii) Feedback Mechanisms: The body has intricate feedback mechanisms that continuously monitor blood glucose levels and adjust insulin and other hormones accordingly to keep blood sugar within a narrow range.

(viii) Gut Hormones: Hormones released by the gastrointestinal tract, such as incretins, can also influence insulin release and glucose regulation after a meal.

Thus our body ensures that blood sugar levels remain stable. This intricate balance is vital for energy production and overall health, showcasing the remarkable efficiency of the human body in handling the challenges posed by large meals.

2) Isotopes:

Isotopes are atoms of the same element that have the same number of protons but a different number of neutrons. This means isotopes of an element have the same atomic number but different atomic masses.

Example: Hydrogen has three isotopes: protium (1 proton, 0 neutrons), deuterium (1 proton, 1 neutron), and tritium (1 proton, 2 neutrons).

Isotones:

Isotones are atoms that have the same number of neutrons but different numbers of protons. In other words, isotones have the same mass number but belong to different elements.

Example: Helium-4 (2 protons, 2 neutrons) and beryllium-7 (4 protons, 3 neutrons) are isotones as both of them have 4 neutrons.

Isobars:

Isobars are atoms of different elements that have the same atomic mass (the same total number of protons and neutrons). Isobars have different atomic numbers.

Example: Carbon-14 (6 protons, 8 neutrons) and nitrogen-14 (7 protons, 7 neutrons) are isobars as both of them have the same mass number of 14.

3) The statement "atoms are the building blocks of the biosphere" is a fundamental and accurate concept in the natural sciences. Atoms are indeed the basic units of matter and the foundation upon which all matter in the biosphere is constructed. I am discussing some points on the next page in favor of my opinion.

(i) Atoms as Building Blocks:

- Atoms are the smallest units of an element which consist of a nucleus (containing protons and neutrons) surrounded by electrons.
- These atoms combine to form molecules, which are the structural and functional units of life. For example, water is made up of two hydrogen atoms and one oxygen atom (H_2O).
- The arrangement of different atoms in molecules is what gives rise to the incredible diversity of substances and compounds in the biosphere, from DNA and proteins in living organisms to minerals in the Earth's crust.

(ii) Chemical Basis of Life:

- All biological processes are fundamentally chemical in nature. These processes involve the interactions and transformations of atoms and molecules.
- Biological macromolecules like proteins, nucleic acids, lipids, and carbohydrates are composed of atoms. For instance, proteins are made of amino acids, each containing carbon, hydrogen, oxygen, nitrogen, and sometimes sulfur.

(iii) Energy and Nutrient Cycles:

- The biosphere depends on the cycling of atoms and molecules. Nutrients such as carbon, nitrogen, and phosphorus cycle through ecosystems, affecting the growth of plants, the behavior of animals, and the health of the environment.
- Photosynthesis, which is the process by which plants convert carbon dioxide and water into glucose (a carbohydrate), is an excellent example of how atoms are transformed to sustain life within the biosphere.

In conclusion, we can say that the given statement is justified as the atom is the foundational concept in biology and chemistry.