

## Chapter 3 – Lesson 1 (Part3)

### Organic Chemical Compounds in Living Organisms and Technological Applications

#### 1. Introduction to Biological Macromolecules and Cellular Energy

1. When glucose enters the cell, it is broken down through a process called:

- a) Photosynthesis
  - b) Cellular respiration
  - c) Digestion
  - d) Fermentation
- 

2. Which elements are found in carbohydrates in a ratio of 1:2:1?

- a) Carbon, Nitrogen, Oxygen
  - b) Carbon, Hydrogen, Oxygen
  - c) Hydrogen, Nitrogen, Oxygen
  - d) Carbon, Sulfur, Oxygen
- 

3. Which of the following is a monosaccharide?

- a) Starch
  - b) Glycogen
  - c) Glucose
  - d) Cellulose
- 

4. ATP is considered the direct source of energy for the cell because it:

- a) Stores genetic information
  - b) Produces oxygen
  - c) Releases energy when a phosphate bond breaks
  - d) Builds proteins
- 

5. Proteins are made up of small units called:

- a) Fatty acids
  - b) Amino acids
  - c) Nucleotides
  - d) Glucose units
- 

6. Which element is found in proteins but not always in carbohydrates or lipids?

- a) Nitrogen
  - b) Hydrogen
  - c) Oxygen
  - d) Carbon
-

**7. Lipids are important because they:**

- a) Store concentrated energy
  - b) Carry genetic information
  - c) Form enzymes only
  - d) Produce glucose
- 

**8. Phospholipids are important components of the:**

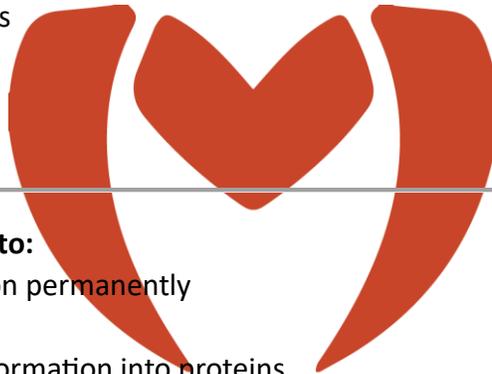
- a) Cell wall
  - b) Cell membrane
  - c) Nucleus
  - d) Ribosome
- 

**9. DNA is responsible for:**

- a) Storing genetic information
  - b) Producing ATP directly
  - c) Breaking down glucose
  - d) Storing fat
- 

**10. CRISPR-Cas9 technology is mainly used for:**

- a) Measuring glucose levels
  - b) Burning food samples
  - c) Genetic modification
  - d) Producing ATP
- 

**11. RNA mainly functions to:**

- a) Store genetic information permanently
  - b) Store fat in cells
  - c) Help convert genetic information into proteins
  - d) Produce glucose
- 

**12. Nucleic acids carry genetic information because their structure contains:**

- a) Chains of amino acids
  - b) Energy-rich phosphate bonds
  - c) Nitrogenous bases arranged in a specific order
  - d) Chains of fatty acids
- 

**13. The glucose molecule releases its energy in the cell to form:**

- a) DNA
  - b) ADP
  - c) ATP
  - d) RNA
-

**14. The third bond in the ATP molecule is characterized as being:**

- a) Weak and does not store energy
  - b) Strong and stores releasable energy
  - c) An ionic bond between two metal atoms
  - d) A hydrogen bond between two water molecules
- 

**15. Which of the following compounds is considered the main source of energy in the cell?**

- a) Proteins
  - b) Fats
  - c) Carbohydrates
  - d) Nucleic acids
- 

**16. Which of the following statements accurately explains the role of proteins?**

- a) They store long-term energy
  - b) They form cell walls
  - c) They speed up biological reactions and build tissues
  - d) They carry genetic information
- 

## 2. Carbohydrates

**17. Which carbohydrate is involved in forming the cell wall of plant cells?**

- a) Cellulose
  - b) Starch
  - c) Glycogen
  - d) Lactose
- 

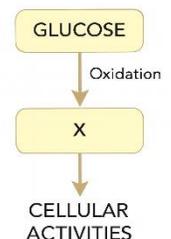
**18. Which carbohydrate is stored in the leaves and tubers of plants?**

- a) Glucose
  - b) Fructose
  - c) Starch
  - d) Glycogen
- 

**19. The diagram shows a biological process occurring inside a living cell.**

**What does the symbol (X) represent?**

- a) Water
  - b) Starch
  - c) ATP molecules
  - d) Mineral salts
- 



**20. Which of the following distinguishes the structure of ATP from ADP?**

- a) Type of sugar
  - b) Absence of a high-energy bond
  - c) Number of phosphate groups
  - d) Number of carbon atoms
- 

**21. Which of the following is considered the direct source of energy in living cells?**

- a) Glucose
  - b) Glycogen
  - c) ATP molecules
  - d) ADP molecules
- 

**22. What is the direct source of the energy stored in ATP required for muscle contraction?**

- a) Proteins
  - b) Glucose
  - c) Starch
  - d) Glycogen
- 

**23. CGM devices function to:**

- a) Reduce blood glucose levels
  - b) Convert carbohydrates into ATP
  - c) Track the availability of lipids as an energy source
  - d) Measure blood sugar level
- 

**24. Glucose monitoring devices help athletes obtain steady energy through all of the following except:**

- a) Understanding the effect of carbohydrates on energy production
  - b) Adjusting diet patterns
  - c) Measuring the amount of energy consumed
  - d) Regulating physical effort accurately
- 

**25. If the number of hydrogen atoms in a monosaccharide is X, how many carbon atoms does it contain?**

- a)  $\frac{1}{2}X$
  - b)  $X^2$
  - c)  $2X$
  - d)  $3X$
-

**26. Which sequence correctly represents the natural pathway of energy production inside the human body after eating cane sugar juice?**

- a) Starch → Glucose → Energy → ATP
  - b) sucrose → Glucose → ATP → Energy
  - c) Lactose → Glucose → Energy → ATP
  - d) Lactose → Glucose → ATP → Energy
- 

**27. Which substance do muscles depend on to obtain the energy needed for contraction and relaxation during running?**

- a) Starch
  - b) Glycogen
  - c) Mineral salts
  - d) Proteins
- 

### 3. Proteins & Lipids

**28. Which organic compounds form muscles, enzymes, and some hormones?**

- a) Nucleic acids
  - b) Carbohydrates
  - c) Lipids
  - d) Proteins
- 

**29. Which of the following does NOT belong to proteins?**

- a) Insulin hormone
  - b) Glycogen
  - c) Keratin
  - d) Amylase enzyme
- 

**30. Knowing that pepsin is a protein-digesting enzyme, which of the following does NOT apply to it?**

- a) It is consumed during chemical reactions
  - b) It increases the rate of chemical reactions
  - c) It breaks proteins into smaller parts
  - d) It is composed of amino acids
- 

**31. Which of the following organic molecules is found in all living cells?**

- a) Starch
  - b) Cellulose
  - c) Glycogen
  - d) Protein
-

**32. Which of the following food substances provides the highest amount of energy?**

- a) 10 g glucose
  - b) 10 g starch
  - c) 10 g glycogen
  - d) 10 g fat
- 

**33. Which of the following is an essential structural component of cell membranes?**

- a) Oils
  - b) Phospholipids
  - c) Glycogen
  - d) Cellulose
- 

**34. Which of the following materials are used by animal cells to obtain energy?**

- a) Starch and cellulose
  - b) Glycogen and fats
  - c) Cellulose and oils
  - d) Oils and starch
- 

**35. Which of the following substances is involved in the formation of some hormones?**

- a) Oils
  - b) Cellulose
  - c) Phospholipids
  - d) Cholesterol
- 

**36. One calorie is equivalent to:**

- a) 41.8 J
  - b) 8.41 J
  - c) 4.18 J
  - d) 84.1 J
- 

**37. When equal masses are compared, the ratio of the caloric content of white sugar to pure vegetable oil is:**

- a) Equal to one
  - b) Greater than one
  - c) Less than one
  - d) Equal to zero
-

**38. If the body obtains a certain amount of energy by oxidizing 5 g of sugar (X), how many grams of fat are approximately required to produce the same amount of energy?**

- a) 2
- b) 5
- c) 10
- d) 15

**39. Which statement best explains the role of lipids in helping some animals adapt to different environmental conditions?**

- a) Lipids are considered a natural source of energy in the body
- b) Stored fat under the skin of the polar bear
- c) Lipids are involved in cell membrane structure
- d) Lipids contribute to the formation of some hormones

**40. According to the table, which option correctly represents the organic compounds that the Arctic hare can store in its body?**

	Carbohydrates	proteins	lipids
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✓
D	✗	✗	✓

#### 4. Nucleic acid

**41. Which of the following is NOT a component of a nucleotide?**

- a) Phosphate group
- b) Pentose sugar
- c) Sulfur element
- d) Nitrogenous base

**42. The genetic code results from differences in the:**

- a) Arrangement of phosphate groups
- b) Type of pentose sugar
- c) Arrangement of nitrogenous bases
- d) Number of atoms forming the pentose sugar

**43. Which nitrogenous base is not involved in CRISPR-Cas9 technology?**

- a) Adenine
  - b) Thymine
  - c) Uracil
  - d) Guanine
- 

**44. Which of the following is not considered an application of CRISPR-Cas9 technology?**

- a) Improving produced strains
  - b) Protein formation
  - c) Disease resistance
  - d) Gene therapy
- 

**45. Which of the following represents the basic building units of nucleic acids?**

- a) Monosaccharides
  - b) Amino acids
  - c) Fatty acids
  - d) Nucleotides
- 

**46. How many types of nucleotides are found in RNA?**

- a) 8
  - b) 5
  - c) 4
  - d) 2
- 

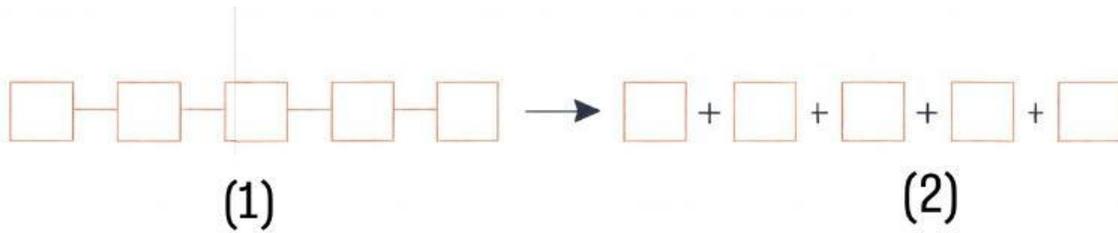
**47. Which nitrogenous base is specific to DNA?**

- a) A
  - b) U
  - c) C
  - d) T
- 

**48. Genetic traits are passed from parents to offspring through:**

- a) Proteins found in body cells
  - b) Variations in nucleotides in RNA
  - c) Carbohydrates found in body cells
  - d) Variations in nucleotides in DNA
-

49. Using the diagram shown, which option in the table is correct?



(1)	(2)
Amino acids	protein
protein	Fatty acids
nucleotides	DNA
DNA	Nucleotides

50. Which of the following statements about the electron microscope is incorrect?

- Scientists can study DNA molecules at the molecular level using it
- It works by using a beam of electrons
- It depends on visible light to function
- It helps in understanding how molecules are arranged inside cells

5. Write the scientific term

- What is the immediate energy source used by living cells?
- What is the heat energy released when one gram of food is completely burned?
- Which nucleic acid stores genetic information within the nucleus of eukaryotic cells?
- Which nucleic acid is involved in translating genetic information into proteins in humans?
- What is the term for the entire genetic material of an organism?

6. The adjacent table shows the percentages of proteins, fats, and carbohydrates in four different meals.

1- Which meal is more likely to be stored in the liver cells?

2- From which meal would the body benefit the most in building its tissues?

Meals	Protein %	Lipids %	Carbohydrates%
1	76	9	15
2	17	0	83
3	33	32	35
4	15	83	2

“The following schematic diagram shows a polysaccharide stored in a green plant. From that, answer the following



1-What is the name of this sugar

2-How might this sugar contribute to the production of energy in the cell? Explain.”

## Chapter 3 – Lesson 2 (Part1)

### Vital Processes in Living Organisms and the Stability of the Biosphere

#### 1. Introduction to Transport Systems in Plants and Humans

##### 1.The movement of water in xylem vessels depends mainly on:

- A) Cohesion and adhesion only
  - B) Cohesion, adhesion, and the pulling force resulting from transpiration
  - C) Active transport of energy
  - D) Pulling force resulting from transpiration only
- 

##### 2.The presence of lignin in the walls of xylem vessels helps to:

- A) Store organic materials
  - B) Give cells flexibility and softness
  - C) Resist tension pressure during the ascent of water
  - D) Regulate the opening of stomata
- 

##### 3. Transport in plants and transport in humans are similar in that both:

- A) Occur in one direction
  - B) Aim to distribute materials and energy within the body
  - C) Depend on lignin
  - D) Depend on transpiration
- 

##### 4. In the human circulatory system, digested nutrients are transported to cells through:

- A) Blood capillaries
  - B) Arteries
  - C) Veins
  - D) The heart
- 

##### 5.Which tissue is responsible for transporting water and mineral salts from the roots to the leaves?

- a) Phloem tissue
  - b) Xylem tissue
  - c) Capillaries
  - d) Heart
- 

##### 6.The cohesion–adhesion theory explains that the upward movement of water in plants depends on:

- a) Air pressure only
  - b) Cohesion, adhesion, and transpiration pull
  - c) Gravity only
  - d) A pump inside the stem
-

**7. What is the main function of phloem tissue in plants?**

- a) Transporting water only
  - b) Transporting products of photosynthesis
  - c) Fixing the plant in the soil
  - d) Absorbing mineral salts
- 

**8. Which organ works as a muscular pump in the circulatory system?**

- a) Lungs
  - b) Arteries
  - c) Heart
  - d) Capillaries
- 

**9. In pulmonary circulation, deoxygenated blood is transported to the:**

- a) Liver
  - b) Kidneys
  - c) Lungs
  - d) Brain
- 

**10. Systolic pressure refers to:**

- a) The lowest blood pressure during heart relaxation
  - b) The highest blood pressure during heart contraction
  - c) Blood pressure in capillaries
  - d) Blood pressure in veins only
- 

**11. Which process involves the loss of water vapor from plant leaves?**

- a) Photosynthesis
  - b) Transpiration
  - c) Respiration
  - d) Excretion
- 

**12. Which organelle is responsible for producing energy in the cell?**

- a) Nucleus
  - b) Ribosome
  - c) Mitochondria
  - d) Vacuole
- 

**13. Blood viscosity increases when there is:**

- a) An increase in blood cell count
  - b) A decrease in blood cell count
  - c) Only a decrease in temperature
  - d) An increase in oxygen
-

## 2. Transportation in plant

### 14. Transport in plant tissue occurs through:

- A) Structures similar to hollow tubes
  - B) Thick-walled structures
  - C) Structures made of lignin
  - D) Living structures containing companion cells
- 

### 15. The lignin deposited in xylem vessels functions to:

- A) Store food
  - B) Facilitate water movement through them
  - C) photosynthesis process
  - D) Increase water pressure inside them
- 

### 16. Companion cells in phloem tissue help in:

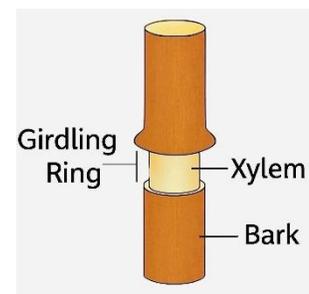
- A) Storing sugars during winter
  - B) Preventing the collapse of sieve tubes
  - C) Providing mechanical support to the tissue
  - D) Regulating the movement of food substances
- 

### 17. During winter, sugars are stored in some plants in the form of sucrose in the:

- A) Leaves
  - B) Stems
  - C) Roots
  - D) Flowers
- 

### 18. If a ring of bark is removed from a plant stem as shown in the figure, which of the following is expected to occur?

- A) Water moves from soil to roots
  - B) Water moves from stem to leaves
  - C) Mineral salts move from stem to leaves
  - D) Sugars move from leaves to roots
- 



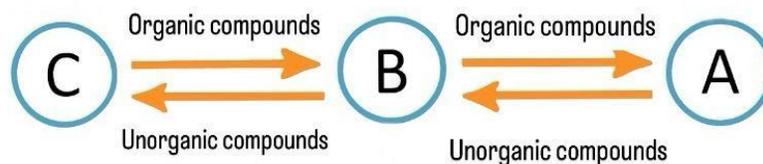
**19. What happens to the rate of transpiration and the rate of water flow in the stem from early morning until noon?**

- A) Increase / Increase
- B) Increase / Decrease
- C) Decrease / Increase
- D) Decrease / Decrease

**20. During transpiration, the ratio between the number of water molecules in a leaf cell and the number of water molecules in a stem cell is:**

- A) Less than one
- B) Greater than one
- C) Equal to zero
- D) Equal to one

**21. The following figure shows the direction of movement of materials inside one of the trees**



	(A)	(B)	(C)
a	Root	Leaf	Stem
b	Leaf	Stem	Root
c	Leaf	Root	Stem
d	Root	Stem	Leaf

### 3. Transportation in human

**22. Which heart chamber receives deoxygenated blood?**

- A) Right atrium
- B) Left atrium
- C) Right ventricle
- D) Left ventricle

**23. Blood that reaches the brain cells comes from the heart from :**

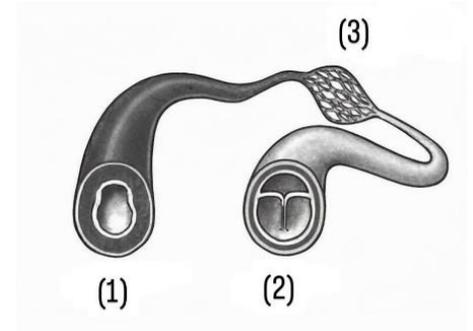
- A) Left atrium
  - B) Right atrium
  - C) Left ventricle
  - D) Right ventricle
- 

**24. Which of the following occurs when a person exerts effort?**

- A) low rate of sweat secretion
  - B) supplying muscles with carbon dioxide
  - C) Decrease in breathing rate
  - D) increase in ADP molecules in muscles
- 

**25. In the adjacent figure, the indicated blood vessels (1), (2), (3) in order are:**

- A) Vein – Artery – Capillaries
- B) Artery – Capillaries – Vein
- C) Capillaries – Artery – Vein
- D) Capillaries – Vein – Artery



**26. The following cases show some transport pathways in the human body:**

- (1) From left ventricle to kidney cells
- (2) From brain cells to right atrium
- (3) From left ventricle to brain cells
- (4) From right ventricle to lungs

**Which pathway contains only oxygenated blood?**

- A) (1) and (3)
  - B) (2) and (4)
  - C) (1) and (3)
  - D) (3) and (4)
-

**27. Which blood vessel carries oxygenated blood from the lungs to the heart?**

- A) Aorta
  - B) Pulmonary artery
  - C) Vena cava
  - D) Pulmonary vein
- 

**28. Which body system works with the circulatory system to supply oxygen to all body parts?**

- A) Digestive system
  - B) Respiratory system
  - C) Excretory system
  - D) Skeletal system
- 

**29. Both the circulatory system and the excretory system cooperate in?**

- A) Transport of digestive food
  - B) increase the heart rate
  - C) getting rid of metabolic waste
  - D) Regulating the respiratory rate
- 

**30. Which of the following blood vessels carries blood from all over the body to the heart ?**

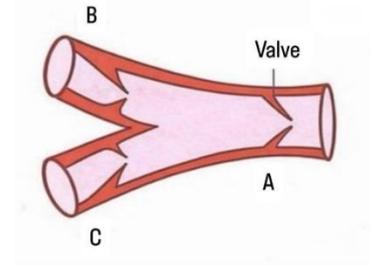
- A) Aorta
  - B) Pulmonary artery
  - C) Vena cava
  - D) Pulmonary vein
- 

**31. Which of the following blood vessels there is exchange of gases between the blood and the cells of the body :**

- A) Blood capillaries
  - B) All the vessels
  - C) The veins
  - D) Arteries
-

**32. The following figure shows the meeting of the two veins (b),(c) together then which of the following illustrates the figure ?**

- A) C → A , A → B
- B) A → B , A → C
- C) A → C , B → A
- D) C → A , B → A



**33. Which of the following is TRUE about the systolic pressure of the heart?**

- A) represents the minimum value of blood pressure
- B) the result of heart relaxation arises
- C) its normal value is 120mmHg
- D) represents the maximum pressure that affects the blood on the veins

**34. Which of the following is TRUE about the diastolic pressure of the heart?**

- A) represents the minimum value of blood pressure
- B) its normal value is 120mmHg
- C) the result of the heart contraction arises to pump blood
- D) represents the maximum pressure that affects the blood on the arteries

**35. Which of the following causes an increase in human blood pressure?**

- A) Decrease in blood density
- B) Decrease in blood viscosity
- C) Dehydration
- D) Increased flexibility of blood vessels

**36. A patient with arteriosclerosis (hardening of the arteries) suffers from ?**

- A) Decreased blood pressure
- B) High blood pressure
- C) Decrease in red blood cells
- D) Kidney nerve defect

**37. At which of the following systolic blood pressure values could a person be suffering from arteriosclerosis?**

- A) 60 mmHg
- B) 80 mmHg
- C) 120 mmHg
- D) 150 mmHg

**38. What material is most commonly used in making the blood pressure measuring device?**

- A) Copper                      B) Gold                      C) Silver                      D) Mercury
- 

**39. Which of the following is similar between the pulmonary artery and the veins of the limbs?**

- A) The pulmonary artery carries oxygenated blood  
B) The pulmonary artery carries deoxygenated blood  
C) They have the same internal cross-sectional area  
D) They have the same blood pressure value
- 

**40. A patient with sickle cell anemia (continuous breakdown of red blood cells) suffers from:**

- A) Decreased blood pressure and increased viscosity  
B) increased blood pressure and decreased viscosity  
C) Increased blood pressure and viscosity  
D) Decreased blood pressure and viscosity
- 

#### 4. Essay questions

**41. Why does water rise in plants despite the absence of an internal pump?**

**42. Why are there two types of vascular tissues in plants (xylem and phloem)?**

**43. Write the scientific term for each of the following statements:**

1) Tissue responsible for transporting water and dissolved mineral salts absorbed from the soil to the leaves.

2) Tissue responsible for transporting manufactured food from the leaves to all parts of the plant.

**44. Give reasons for the following:**

1) The walls of xylem vessels are supported by lignin.

2) Hydrogen bonds between water molecules help in the upward movement of water in plants.

## Chapter 3 – Lesson 2 (Part2)

**1) Which of the following organelles is responsible for energy production?**

- a) Chloroplast    b) Mitochondrion    c) Vacuole    d) Nucleus

**2) Cellular respiration in the cells of a living organism begins with \_\_\_\_\_.**

- a) Alcoholic fermentation  
b) Glucose breakdown (Glycolysis)  
c) Lactic acid fermentation  
d) Oxidation of glucose

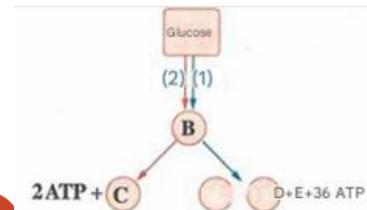
**3) The adjacent diagram shows cellular respiration inside a muscle cell. Study it carefully, then answer:**

**(I) Which of the following represents (1) and (2) respectively?**

- a) Aerobic respiration / Anaerobic respiration  
b) Glycolysis (breakdown of glucose) / Aerobic respiration  
c) Anaerobic respiration / Aerobic respiration  
d) Anaerobic respiration / Glycolysis (breakdown of glucose)

**(II) Which letter in the diagram represents lactic acid?**

- a) B    b) C    c) D    d) E



**4) Which of the following is required in abundance to remove muscular fatigue?**

- a) Glucose    b) Oxygen    c) Glycogen    d) ADP

**5) From the following equation:**



Which of the following choices in the table is correct for (X), (Y), and (Z)?

	X	Y	Z
a	Enzymes	Energy	Glucose
b	Glucose	Enzymes	Energy
c	Energy	Glucose	Enzymes
d	Glucose	Energy	Enzymes

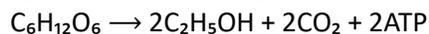
**6) How many ATP molecules are produced from the fermentation resulting from the breakdown of one glucose molecule in a muscle cell?**

- a) 2    b) 18    c) 36    d) 38

**7) Which of the following does NOT agree with the occurrence of anaerobic respiration in a muscle?**

- a) Increase in lactic acid concentration in the muscle  
b) Absence of oxygen supply to the muscle  
c) Production of a large number of ATP molecules  
d) Muscular fatigue

**8) From the following reaction:**

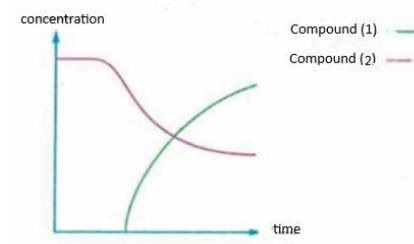


Where does this reaction occur?

- a) Companion cells   b) Muscle cells   c) Yeast fungus   d) Wood vessels

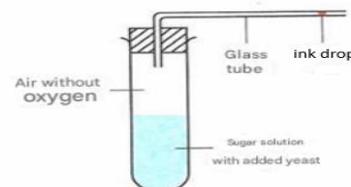
**9) The adjacent graph represents the concentrations of two compounds resulting from the oxidation of food substances in the absence of oxygen as a source of energy. What do compounds (1) and (2) represent, respectively?**

- a) ADP / Glucose  
b) Lactic acid / Glucose  
c) Ethanol / ATP  
d) CO<sub>2</sub> / Lactic acid



**10) The adjacent diagram shows an experiment used to verify respiration in yeast. What happens to the ink drop?**

- a) It moves quickly inward  
b) It moves slowly inward  
c) It moves outward  
d) It remains constant in its position



**11) In one of the chemical reactions, if the heat content of the products is less than the heat content of the reactants, then the reaction is:**

- a) Endothermic  
b) Exothermic  
c)  $\Delta H$  has a positive value  
d)  $\Delta H = 0$

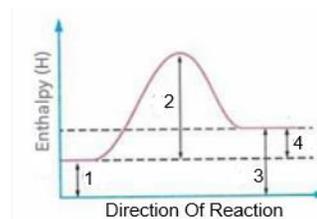
**12) From the following reaction:**     $2NO(g) + O_2(g) \rightarrow 2NO_2(g) + 112 \text{ kJ}$

The value of  $\Delta H$  is:

- a) Negative, because the reaction is endothermic  
b) Positive, because the reaction is endothermic  
c) Negative, because the reaction is exothermic  
d) Positive, because the reaction is exothermic

13) In the adjacent graph, which numbered parts indicate the change in heat content of the reaction ( $\Delta H$ ) and the activation energy respectively?

- a) (1) / (3)  
b) (2) / (4)  
c) (3) / (4)  
d) (4) / (2)

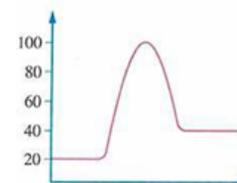


14) What is the process during which the temperature of the surrounding medium decreases, and what is the sign of its energy?

- a) Endothermic process, negative      b) Endothermic process, positive  
c) Exothermic process, negative      d) Exothermic process, positive

15) The adjacent graph shows the change in energy during a chemical reaction. Which of the following represents the type of reaction and the value of  $\Delta H$ ?

- a) Endothermic, +20 kJ      b) Exothermic, +20 kJ  
c) Endothermic, -20 kJ      d) Exothermic, -20 kJ



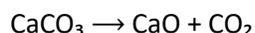
16) The process represented by the equation:



Which of the following statements describes the previous process?

- a) Bond breaking occurs and the process is endothermic  
b) Bond breaking occurs and the process is exothermic  
c) Bond formation occurs and the process is exothermic  
d) Bond formation occurs and the process is endothermic

17) From the following reaction:



What is the mass of calcium oxide produced from the decomposition of 10 g of calcium carbonate?

[Ca = 40, C = 12, O = 16]

- a) 178 g    b) 56 g    c) 17.8 g    d) 5.6 g

18) The mass of carbon in 2 moles of  $\text{CaCO}_3$  equals:

- a) 24 g    b) 12 g    c) 6 g    d) 0.48 g

19) The mass of 0.25 mole of sodium carbonate ( $\text{Na}_2\text{CO}_3$ ) equals:

[Na = 23, C = 12, O = 16]

- a) 106 g    b) 53 g    c) 26.5 g    d) 23 g

**20) Which of the following samples has the greatest mass?**

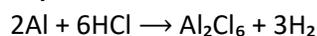
[N = 14, H = 1, O = 16]

- a) 1 mole of N<sub>2</sub>H<sub>4</sub>      b) 2 moles of NO  
c) 3 moles of NH<sub>3</sub>      d) 2.5 moles of N<sub>2</sub>

**21) Which of the following pairs includes an exothermic process and an endothermic process respectively?**

- a) Photosynthesis / Transport of substances across membranes  
b) Cellular respiration / Photosynthesis  
c) Cell division / Cellular respiration  
d) Photosynthesis / Cell division

**22) From the reaction:**



What is the mass of hydrogen gas produced from the reaction of 25 g of aluminum with excess hydrochloric acid?

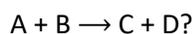
[Al = 27, H = 1]

- a) 0.41 g      b) 1.2 g      c) 1.8 g      d) 2.8 g

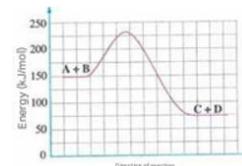
**23) The mass of 2 moles of ozone (O<sub>3</sub>) equals ..... (Given that O = 16)**

- a) The mass of 1 mole of O<sub>2</sub>      b) The mass of 2 moles of O<sub>2</sub>  
c) one and a half the mass of 2 moles of O<sub>2</sub>      d) twice the mass of 2 moles of O<sub>2</sub>

**24) From the adjacent graph, what is the value of the heat content change (ΔH) for the reaction:**

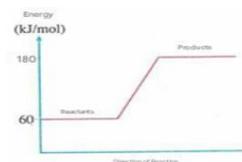


- a) -225 kJ/mol      b) -75 kJ/mol  
c) +75 kJ/mol      d) +225 kJ/mol



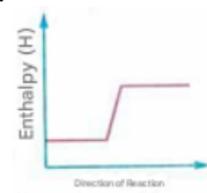
**25) From the adjacent graph, what is the value of the heat content change (ΔH) during the reaction?**

- a) +120 kJ/mol      b) -120 kJ/mol  
c) +240 kJ/mol      d) -240 kJ/mol



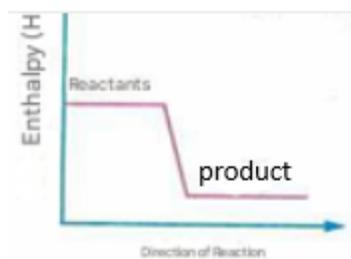
**26) Which of the following reactions can be represented by the adjacent graph?**

- a)  $\text{A} + \text{B} \rightarrow \text{C} + \text{D} + 50 \text{ kJ}$   
b)  $\text{A} + \text{B} + 50 \text{ kJ} \rightarrow \text{C} + \text{D}$   
c)  $\text{A} + \text{B} - 50 \text{ kJ} \rightarrow \text{C} + \text{D}$   
d)  $\text{A} + \text{B} \rightarrow \text{C} + \text{D} \quad \Delta\text{H} = -50 \text{ kJ}$

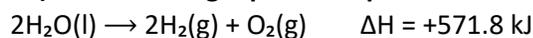


**27) Which of the following statements correctly describes the chemical reaction represented by the adjacent graph?**

- a) The total heat content of the reactants is greater than the total heat content of the products
- b) The energy required to break the bonds of the reactant molecules equals the energy released during the formation of the product molecules
- c) The total heat content of the products is greater than the total heat content of the reactants
- d) The energy stored in the reactant molecules is less than the energy stored in the product molecules



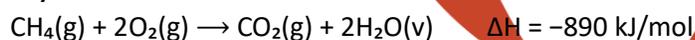
**28) The following equation represents the decomposition of water:**



It is clear that the formation of one mole of water from its elements in their standard states is a/an \_\_\_\_\_ process.

- a) Exothermic process releasing 571.8 kJ/mol
- b) Exothermic process releasing 285.9 kJ/mol
- c) Endothermic process absorbing 571.8 kJ/mol
- d) Endothermic process absorbing 285.9 kJ/mol

**29) From the reaction:**

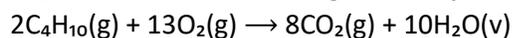


The amount of heat released from the combustion of 3 moles of methane gas equals:

- a) 2670 kJ
- b) 890 kJ
- c) 296.6 kJ
- d) 1780 kJ

**30) When ammonium chloride dissolves in water, the temperature of the solution decreases. This means that the process is:**

- a) Endothermic and  $\Delta H$  has a positive sign
- b) Endothermic and  $\Delta H$  has a negative sign
- c) Exothermic and  $\Delta H$  has a negative sign
- d) Exothermic and  $\Delta H$  has a positive sign

**31) Butane burns according to the equation:**

What is the number of moles of carbon dioxide produced from the combustion of 3 moles of butane gas ( $\text{C}_4\text{H}_{10}$ )?

- a) 4
  - b) 8
  - c) 12
  - d) 24
- 

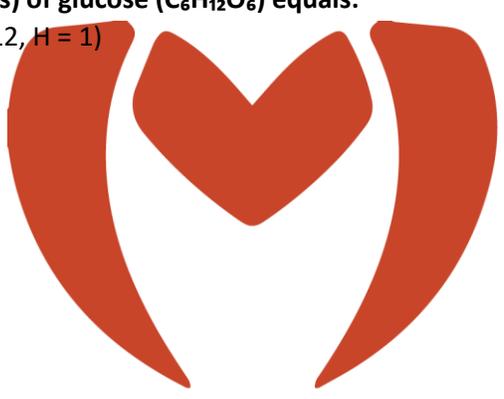
**32) From the following equation:**

It can be concluded that the heat content of water vapor is ..... the heat content of liquid water.

- a) Less than
  - b) Equal to
  - c) Greater than
  - d) Half of
- 

**33) The molar mass (in grams) of glucose ( $\text{C}_6\text{H}_{12}\text{O}_6$ ) equals:**

(Atomic masses: O = 16, C = 12, H = 1)

- a) 16
  - b) 80
  - c) 100
  - d) 180
- 

## Chapter 3 – Lesson 3

**1) Which of the following is considered a gaseous waste produced as a result of the cellular respiration process?**

- a) Oxygen    b) Hydrogen    c) Nitrogen    d) Carbon dioxide
- 

**2) Which of the following is produced from the breakdown of excess amino acids in the liver?**

- a) CO<sub>2</sub>    b) Ammonia    c) Bilirubin    d) Water
- 

**3) Which of the following is considered a harmful metabolic waste resulting from the digestion of a piece of meat eaten by a person?**

- a) Nitrogen    b) Amino acids    c) Ammonia    d) CO<sub>2</sub>
- 

**4) Which of the following is NOT considered a metabolic waste?**

- a) CO<sub>2</sub>    b) Nitrogen    c) Water    d) Urea
- 

**5) Which of the following is NOT an importance of the process of food metabolism for the body?**

- a) Obtaining the energy necessary for the body  
b) Building essential biological molecules  
c) Obtaining food  
d) Resisting infection
- 

**6) Which of the following clarifies the relationship between excretion and maintaining internal balance in the body?**

- a) Eliminating excess water only  
b) Maintaining the stability of the body's internal environment  
c) Energy production  
d) Transporting oxygen
- 

**7) Which of the following substances has multiple methods by which the body gets rid of it?**

- a) Excess water    b) CO<sub>2</sub>    c) Medicines    d) Ammonia
- 

**8) Which of the following excretory substances is eliminated from the body by the kidneys, lungs, and skin?**

- a) Carbon dioxide    b) Water    c) Urea    d) Salts
- 

**9) What is the main function of the kidneys in humans?**

- a) Getting rid of salts only  
b) Getting rid of carbon dioxide and toxins  
c) Regulating ionic balance and eliminating toxic substances  
d) Getting rid of excess water only
-

**10) Which of the following statements about the kidney in humans is incorrect?**

- a) Its size is approximately the size of the hand
- b) It is responsible for producing urine
- c) It resembles a bean in shape
- d) It is directly connected to the urinary bladder

**11) Which of the following is NOT one of the main components of urine?**

- a) Glucose
- b) Excess water
- c) Excess salts
- d) Urea

**12) All of the following ions are needed by the body to regulate osmotic pressure inside and outside the cells, EXCEPT .....**

- a) Sodium
- b) Potassium
- c) Lead
- d) Chlorine

**13) All of the following are reabsorbed once again from the kidney nephrons into the blood, EXCEPT .....**

- a) Glucose
- b) Urea
- c) Water
- d) Potassium ions

**14) What is the expected result of a person not drinking sufficient amounts of water?**

- a) Blood osmotic pressure increases
- b) The nomination process stops
- c) The number of times of urination increases
- d) The concentration of ions in the blood decreases

**15) Which of the following choices in the table indicates an increase in the percentage of water contained in the urine of a healthy person?**

The quantity of water drunk by the person	Activity exerted	Surrounding body temperature
a) Large	Low	Low
b) Low	Increased	Low
c) Large	Low	High
d) Low	Increased	High

**16) When the concentration of salts in the blood increases, the kidneys respond by .....**

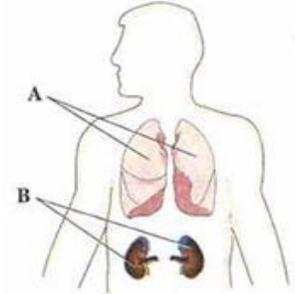
- a) Secreting more sweat
- b) Increasing water reabsorption
- c) Increasing water excretion
- d) Storing excess salts

**17) If the kidneys fail to perform their function, the first thing to be affected is .....**

- a) Oxygen level
- b) Percentage of wastes in the blood
- c) Number of blood cells
- d) Hormone production

**18) The adjacent figure shows some of the body organs that participate in the process of excretion. Which substance is distinguished by being excreted by organ (A) but not by organ (B)?**

- a) H<sub>2</sub>O
- b) CO<sub>2</sub>
- c) Bilirubin
- d) Urea



**19) In a healthy person, as atmospheric temperature increases, the rate of urine production .....**

- a) Decreases
- b) Increases
- c) Is not affected
- d) Increases then decreases

**20) All of the following are components of sweat, EXCEPT .....**

- a) Ammonia
- b) Urea
- c) Water
- d) Mineral salts

**21) The concentration of toxic substances in the body increases when .....**

- a) The rate of anaerobic respiration decreases
- b) Metabolic wastes accumulate
- c) The rate of sweat secretion increases
- d) The concentration of mineral ions decreases

**22) Which of the following is one of the functions of the skin layer in humans?**

- a) Regulating body temperature
- b) Extracting nitrogenous wastes from the blood
- c) Producing sweat
- d) Preventing bacterial invasion of the body

**23) Which of the following organs cannot excrete water from the body?**

- a) Skin
- b) Lungs
- c) Kidneys
- d) Liver

**24) What explains the ability of the skin to maintain body temperature?**

- a) The small number of blood capillaries around the sweat glands
- b) Accumulation of wastes on the skin surface
- c) The small amount of wastes in sweat
- d) Secretion of water in the form of sweat, then its evaporation

**25) If one of the persons sits in a room at a temperature of 40°C for 30 minutes, what is expected to happen to the temperature of his skin surface and the rate of sweat secretion?**

- a) Decreases / Decreases
- b) Decreases / Increases
- c) Increases / Decreases
- d) Increases / Increases

**26) Which of the following choices in the table represents the body's response when feeling severe cold?**

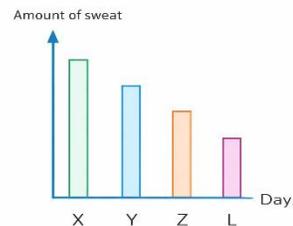
Sweat secretion	Urine production
a) Increases	Increases
b) Increases	Decreases
c) Decreases	Increases
d) Decreases	Decreases

**27) What can be observed when examining two equal quantities of urine and sweat from the same person?**

- a) The percentage of salts is equal in both
- b) The percentage of water is equal in both
- c) The percentage of nitrogenous wastes is higher in urine
- d) The percentage of nitrogenous wastes is higher in sweat

**28) The graph opposite shows the amount of sweat the body produces during four days in the four seasons. Which of the following represents the amount of sweat produced after drinking one liter of water on a day in July?**

- a) L
- b) Z
- c) Y
- d) X



**29) What is the main function of sweat secretion?**

- a) Lowering the body's temperature
- b) Eliminating excess salts
- c) Excreting excess water beyond the body's need
- d) Eliminating nitrogenous wastes

**30) Study the adjacent table.**

Which samples were collected on a cold day?

Sample volume of urine (cm <sup>3</sup> )	Sample volume of sweat (cm <sup>3</sup> )
a) 0.8	1.5
b) 0.8	1.2
c) 1.5	0.8
d) 1.2	1.1

**31) The following table shows the quantity of water and salts lost from the body through the kidneys and the skin on a hot day and a cold day:**

Day	Quantity of water lost (cm <sup>3</sup> )		Quantity of salts lost (g)	
	Kidneys	Skin	Kidneys	Skin
Hot	0.4	2.3	14.4	5.8
Cold	1.8	0.1	20.2	0.1

**32) Which of the following can be concluded after studying the table?**

- a) The amount of water lost from the kidneys on the cold day is less than that on the hot day.
- b) The kidneys lose more salts on the hot day compared with the salts lost on the cold day.
- c) The quantity of salts lost from the body is approximately equal on both days.
- d) The kidneys do not lose any quantity of water on the hot day.

**32) Which of the following layers of the skin contain its components: sweat glands and hair follicles?**

- a) Epidermis
- b) Dermis
- c) Epidermis and dermis
- d) hypodermis

**33) Which of the following has a role in regulating body temperature?**

- a) Sweat glands only
- b) Hair follicles only
- c) Sweat glands and blood vessels
- d) Hair follicles and blood vessels

**34) Which of the following skin layers acts as a thermal insulator?**

- a) Epidermis
- b) Base of the epidermis
- c) Dermis
- d) hypodermis

**35) Where can the below biological process shown occur?**

**(Amino acids → Ammonia → Urea)**

- a) Skin
  - b) Lungs
  - c) Kidneys
  - d) Liver
- 

**36) Which of the following shows the correct pathway by which the body gets rid of urea?**

- a) Liver → Kidney → Urethra → Urinary bladder → Ureter
  - b) Liver → Urethra → Kidney → Ureter → Urinary bladder
  - c) Liver → Kidney → Ureter → Urinary bladder → Urethra
  - d) Liver → Ureter → Kidney → Urinary bladder → Urethra
- 

**37) When examining a urine sample of a healthy person after eating a meal containing large quantities of red meat the previous night, which of the following would be found in the highest percentage in the sample?**

- a) Proteins
  - b) Amino acids
  - c) Urea
  - d) Ammonia
- 

**38) Which of the following human organs plays an important role in maintaining the balance of amino acid levels in the blood?**

- a) Lungs
  - b) Skin
  - c) Kidneys
  - d) Liver
- 

**39) Bilirubin is produced from the breakdown of .....**

- a) Enzymes
  - b) Amino acids
  - c) White blood cells
  - d) Red blood cells
- 

**40) Which of the following is NOT a component of bile juice?**

- a) Hemoglobin
  - b) Bilirubin
  - c) Cholesterol
  - d) Some pigments
- 

**41) Which of the following excretory organs is responsible for detoxifying poisons and foreign substances?**

- a) Skin
  - b) Liver
  - c) Kidneys
  - d) Lungs
-

---

**42) Which of the following substances is expected to be present in a blood sample at a higher-than-normal level in a patient suffering from kidney failure?**

- a) Glucose
- b) Ammonia
- c) Urea
- d) Salts

---

**43) Which of the following substances does NOT pass through the semi-permeable membrane of the artificial kidney?**

- a) Proteins
- b) Water
- c) Mineral salts
- d) Urea

---

**44) The process of sweating is considered an application of the concept of .....**

- a) Internal balance only
- b) Thermal balance only
- c) Nominaton
- d) Thermal balance and evaporation

---

**45) In which stage of the carbon cycle in nature is organic carbon transferred from one organism to another?**

- a) Respiration of plants
- b) Photosynthesis
- c) Feeding of animals
- d) Decomposition of organic matter

---

**46) Which of the following is NOT one of the biological processes that contribute to increasing the percentage of CO<sub>2</sub> in the atmosphere?**

- a) Respiration of plants
- b) Decomposition of organic matter
- c) Respiration of decomposers
- d) Combustion of fossil fuels

---

**47) Which of the following living organisms contributes to decreasing the percentage of carbon in the atmosphere?**

- a) Producers
  - b) Decomposers
  - c) Primary consumers
  - d) Secondary consumers
-

**48) Which of the following biological processes is considered a direct source of carbon found in the carbohydrates stored in plant tissues?**

- a) Respiration
  - b) Excretion
  - c) Photosynthesis
  - d) Decomposition
- 

**49) Carbon returns to the atmosphere from living and dead organisms respectively through the processes of .....**

- a) Respiration / Decomposition
  - b) Respiration / Photosynthesis
  - c) Photosynthesis / Decomposition
  - d) Excretion / Respiration
- 

**50) Which of the following living organisms has a role in fixing atmospheric nitrogen in the soil?**

- a) Green plants
  - b) Nitrogen-fixing bacteria
  - c) Mushrooms (bread mold)
  - d) Herbivores
- 

**51) Nitrogen reaches producers after the process of .....**

- a) Respiration
  - b) Decomposition of organic matter
  - c) Photosynthesis
  - d) Nitrogen fixation
- 

**52) The process of nitrogen fixation occurs by some types of microorganisms in .....**

- a) Soil
  - b) Atmospheric air
  - c) Ocean water
  - d) Groundwater
- 

**53) Carnivores obtain nitrogen compounds through .....**

- a) Producers
  - b) Herbivores
  - c) Bacteria
  - d) Fungi
- 

**54) Phosphorus compounds are found in .....**

- a) Atmospheric air and soil
  - b) Atmospheric air only
  - c) Rocks and soil
  - d) Water only
-

**57) Which of the following elements is not found in the atmosphere but enters into the composition of some organic compounds?**

- a) Nitrogen
- b) Carbon
- c) Oxygen
- d) Phosphorus

**58) Which of the following spheres is NOT part of the phosphorus cycle in nature?**

- a) Biosphere
- b) Atmosphere
- c) Lithosphere
- d) Hydrosphere

**Answer the following:**

**1) Compare between urine and sweat in terms of:**

- Excretory organ
- Quantity of water

	urine	sweat
Excretory organ		
Quantity of water		

**2) Compare between the kidneys and the liver in terms of:**

- The role of each in maintaining the internal balance of the body

	kidneys	liver
role in maintaining the internal balance of the body		

**3) What is the role of the following organs in the process of excretion?**

- a) Kidneys
- b) Skin
- c) Liver
- d) Lungs