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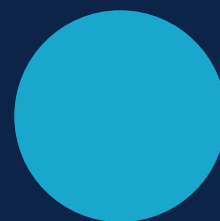
ANNUAL EXAM PREPARATION

9TH CLASS CHEMISTRY

Energetics

Chapter 05

**80 High-Yield MCQs
with Answers & Explanations**



Correct answers highlighted ✓ | Clear explanations

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Section 1: Basic Concepts (System, Surroundings, and Energy)

1 In chemical energetics, what is the study of energy changes during a chemical reaction called?

A Thermodynamics

B Chemical Energetics ✓

C Kinetics

D Electrochemistry

Explanation: Chemical energetics specifically focuses on the flow of energy (heat) in a chemical reaction, whereas thermodynamics is the broader field dealing with energy and its transformations in general.

2

What is defined as the total amount of thermal energy stored in a compound?

A Heat

B Work

C **Enthalpy**



D Activation Energy

Explanation: Enthalpy (H) is essentially the heat content of a system at constant pressure. It represents the total thermal energy stored within the substance.

3

Which of the following is the correct unit for measuring enthalpy?

A Joules (J)

B **Kilojoules per mole (kJ mol^{-1})**



C Newton (N)

D Kelvin (K)

Explanation: Since enthalpy is the heat content per amount of substance, it is measured in kilojoules per mole. Heat itself is measured in Joules, but molar enthalpy uses kJ mol^{-1} .

4 In a chemical system, what do we call everything outside the system that interacts with it?

A The container

B The universe

C The surroundings ✓

D The environment

Explanation: The system is the specific reaction being studied (reactants, products, catalyst, solvent), while the surroundings encompass everything else, like the beaker, the air, and the burner.

5 If energy is transferred from the system to the surroundings, the change is called:

A Endothermic

B Exothermic ✓

C Isothermal

D Adiabatic

Explanation: "Exo" means out. When a system loses energy to its surroundings, it releases heat, making it an exothermic process.

6

Which sign is conventionally used to represent the enthalpy change (ΔH) for an endothermic reaction?

A Negative (-)

B

Positive (+)



C Neutral (0)

D Depends on the temperature

Explanation: In endothermic reactions, the system absorbs energy from the surroundings. By convention, this gain in energy is represented by a positive ΔH .

7

When boiling water in a beaker, the water molecules act as the:

A Surroundings

B

System



C Catalyst

D Enthalpy

Explanation: The water undergoing the physical change (boiling) is what we are studying, so it is the system. The beaker and the burner providing the heat are the surroundings.

8**Thomas Young first used the word 'energy' in the field of physics in which year?****A 1802** ✓**B 1850****C 1902****D 1750**

Explanation: According to historical notes in the text, Thomas Young introduced the term 'energy' to physics in 1802.

9**Which form of energy is stored in a molecule due to the bonds between its atoms?****A Heat Energy****B Kinetic Energy****C Chemical Energy** ✓**D Potential Energy**

Explanation: Chemical energy is a form of potential energy specifically stored in the chemical bonds holding atoms together in a molecule.

10

When energy is evolved during a reaction, what happens to the total enthalpy of the system?

A It increases

B It decreases



C It remains constant

D It becomes zero

Explanation: Evolving energy means the system is losing heat to the surroundings. Therefore, the total heat content (enthalpy) of the system decreases.

Section 2: Enthalpy and Heat

11**What is the standard enthalpy of reaction (ΔH°)?****A** The heat change at 100°C and 1 atm**B****The heat change when reactants and products are in their standard states****C** The heat change at absolute zero**D** The heat change without a catalyst

Explanation: Standard enthalpy change is a specific measurement taken under standard conditions (usually 298 K and 1 atm) where all substances are in their standard physical states.

12**How is heat different from enthalpy?****A** Heat is a state function, enthalpy is not**B****Heat is a form of energy transfer due to temperature difference, enthalpy is a property of the system****C** Heat is measured in kJ/mol, enthalpy in Joules**D** There is no difference

Explanation: Heat is energy in transit (flowing from hot to cold), while enthalpy is the total internal heat content of a system at a given state.

13

For a reaction at constant pressure, the change in enthalpy (ΔH) is equal to:

A The work done

B The heat evolved or absorbed



C The activation energy

D The bond energy

Explanation: At constant pressure, any heat released or absorbed by the reaction directly changes the system's enthalpy, making $q_p = \Delta H$.

14

Which of the following is true about the enthalpy of a system?

A It can be measured directly with a thermometer

B It is always negative

C It cannot be measured directly, only the change (ΔH) can be measured



D It is independent of the number of molecules

Explanation: Absolute enthalpy (H) is impossible to measure directly. We can only measure the *change* in enthalpy (ΔH) during a process.

15

In the reaction $2\text{CO}_{(g)} + \text{O}_{2(g)} \rightarrow 2\text{CO}_{2(g)}$, $\Delta H^\circ = -566.0 \text{ kJ}$. This indicates that:

A The reaction is endothermic

B 566 kJ of heat is absorbed

C

The reaction is exothermic and releases 566 kJ



D The reaction is reversible

Explanation: The negative sign in ΔH° indicates an exothermic reaction. Therefore, 566 kJ of heat energy is released to the surroundings.

16

If a reaction has a $\Delta H = +50 \text{ kJ mol}^{-1}$, what does the positive sign indicate?

A Heat is released

B The system loses energy

C

Heat is absorbed by the system



D The reaction is spontaneous

Explanation: A positive ΔH always signifies an endothermic process, meaning the system absorbs heat from its surroundings.

17

Why is enthalpy considered an essential part of a system?

A Because it comes and goes

B **Because it depends on the number of molecules and chemical composition**



C Because it is a form of work

D Because it is always constant

Explanation: Enthalpy is a state function dependent on the internal composition, structure, and quantity of molecules in the system, unlike heat which is just transient energy transfer.

18 In the reaction $\text{H}_{2(g)} + \text{I}_{2(s)} \rightarrow 2\text{HI}_{(g)} - 53.08 \text{ kJ}$, the negative sign next to kJ in the equation implies:

A The reaction is exothermic

B The reaction is endothermic ✓

C The products have lower energy than reactants

D The reaction releases heat

Explanation: In thermochemical equations, if heat is written as a *product* (or subtracted), it means heat is absorbed from the surroundings, indicating an endothermic reaction ($\Delta H = +53.08 \text{ kJ}$).

19

Which statement correctly describes the relationship between enthalpy and heat?

A

Heat is the total energy, enthalpy is the transferred energy

B

Enthalpy is the total heat content, heat is the transfer of thermal energy



C

They are exactly the same thing

D

Enthalpy changes only when work is done

Explanation: Enthalpy is a state function representing total heat content, while heat is the mechanism of energy transfer due to a temperature difference.

20

For the formation of Nitric Oxide in the atmosphere: $\text{N}_{2(g)} + \text{O}_{2(g)} \rightarrow 2\text{NO}_{(g)} - 180.6 \text{ kJ}$. The enthalpy change (ΔH) for this reaction is:

A -180.6 kJ

B +180.6 kJ



C -90.3 kJ

D +90.3 kJ

Explanation: The equation shows energy (180.6 kJ) is absorbed (written with a minus sign on the product side to denote absorption). Thus, $\Delta H = +180.6 \text{ kJ}$.

Section 3: Exothermic and Endothermic Reactions

21

Which of the following is an example of an exothermic reaction?

A Melting of ice

B Boiling of water

C Combustion of carbon



D Photosynthesis

Explanation: Combustion (burning) always releases heat energy to the surroundings, making it a classic exothermic reaction. The others require an input of heat.

22

In an endothermic reaction, what happens to the temperature of the surroundings?

A It increases

B It decreases



C It remains the same

D It fluctuates randomly

Explanation: Endothermic reactions absorb heat from the surroundings. This loss of heat from the surrounding environment causes the temperature of the surroundings (and the container) to drop.

23

The reaction $\text{C}_{(s)} + \text{O}_{2(g)} \rightarrow \text{CO}_{2(g)} + 393.5 \text{ kJ}$ is:

A Endothermic

B Exothermic



C Reversible

D Neutral

Explanation: Since 393.5 kJ of heat is written as a product (released), this is an exothermic reaction. The enthalpy change is $\Delta H = -393.5 \text{ kJ mol}^{-1}$.

24

Which of the following processes is endothermic?

A Respiration

B Formation of water from hydrogen and oxygen

C Melting of ice



D Burning of petrol

Explanation: Melting ice requires the absorption of heat energy from the surroundings to break the intermolecular forces holding the solid structure together.

25

When solid carbon burns in oxygen, it produces carbon dioxide and 393.5 kJ of heat. If the reaction is reversed, what happens?

- A 393.5 kJ of heat is released
- B 393.5 kJ of heat is absorbed** ✓
- C No heat change occurs
- D The reaction becomes explosive

Explanation: Reversing an exothermic reaction makes it endothermic. The exact same amount of energy released forward must be absorbed to break the products back down into reactants.

26

In an exothermic reaction, the enthalpy of the products is:

A Greater than the reactants

B Less than the reactants



C Equal to the reactants

D Zero

Explanation: Because energy is released, the final products possess less chemical potential energy (enthalpy) than the starting reactants. The difference is the heat given off.

27

Which of the following is NOT an exothermic process?

A Condensation of steam

B Freezing of water

C Formation of hydrogen iodide from hydrogen and iodine



D Combustion of natural gas

Explanation: The formation of hydrogen iodide ($\text{H}_2 + \text{I}_2 \rightarrow 2\text{HI}$) is explicitly mentioned as an endothermic process in the text, absorbing 53.08 kJ of heat.

28

Self-heating packs used by campers rely on which type of reaction?

A Endothermic

B Exothermic



C Catalytic

D Reversible

Explanation: Self-heating packs contain chemicals that undergo an exothermic reaction to release heat and warm the user.

29

The reaction $2\text{H}_{2(g)} + \text{O}_{2(g)} \rightarrow 2\text{H}_2\text{O}_{(l)} + 571.6 \text{ kJ}$. The ΔH for this reaction is:

A +571.6 kJ

B -571.6 kJ



C -285.8 kJ

D +285.8 kJ

Explanation: Since heat is released (written as a product), the reaction is exothermic, giving it a negative enthalpy change of -571.6 kJ for the formation of 2 moles of liquid water.

30

What is meant by the term "heat of reaction"?

A The heat required to start a reaction

B The heat evolved or absorbed during a chemical reaction ✓

C The heat required to break bonds only

D The total heat capacity of the products

Explanation: The heat of reaction is simply the standard term for the enthalpy change (ΔH) that occurs when reactants convert to products.

31

Which of the following is an endothermic reaction?

A $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

B $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$

C $\text{N}_2 + \text{O}_2 \rightarrow 2\text{NO}$ ✓

D $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$

Explanation: The formation of nitric oxide requires an input of 180.6 kJ of energy, making it endothermic. It requires high energy (like lightning) to occur.

32

According to the text, why is the reaction between sodium metal and water violent?

A

It is an endothermic reaction that absorbs heat quickly

B

It is a highly exothermic reaction that releases a large amount of heat and hydrogen gas

**C**

It produces a catalyst

D

It forms a transition state instantly

Explanation: Sodium reacts vigorously with water in a highly exothermic manner, releasing enough heat to potentially ignite the hydrogen gas produced.

33

In an endothermic reaction, the surroundings get:

A

Warmer

B

Cooler

**C**

Unchanged

D

Pressurized

Explanation: The system absorbs heat from the surroundings, leaving the surroundings with less thermal energy, thus feeling cooler.

34 What is the enthalpy change when 1 mole of water is formed from hydrogen and oxygen gas?

A -571.6 kJ

B -285.8 kJ



C +571.6 kJ

D +285.8 kJ

Explanation: The given equation produces 2 moles of water and releases 571.6 kJ. Therefore, for 1 mole, the enthalpy change is $-571.6 / 2 = -285.8$ kJ.

35

Which of the following statements about exothermic reactions is true?

A They absorb heat from the surroundings

B The enthalpy of products is greater than reactants

C They are used in self-heating packs ✓

D They have a positive ΔH

Explanation: Self-heating packs rely on exothermic reactions to provide warmth. The other options describe endothermic reactions or incorrect definitions for exothermic.

Section 4: Bond Breaking, Bond Formation, and Calculations

36 What type of process is bond breaking?**A** Exothermic**B** **Endothermic** ✓**C** Neutral**D** Catalytic

Explanation: Energy must be supplied (absorbed) to overcome the attractive forces holding atoms together in a bond. Therefore, breaking bonds is always endothermic.

37 What type of process is bond formation?**A** **Exothermic** ✓**B** Endothermic**C** Isothermal**D** Reversible

Explanation: When new bonds form, atoms reach a lower, more stable energy state, releasing the excess energy as heat. Therefore, bond formation is exothermic.

38

In an exothermic reaction, the energy released during bond formation is:

A

Less than the energy absorbed during bond breaking

B

Greater than the energy absorbed during bond breaking

**C**

Equal to the energy absorbed during bond breaking

D

Zero

Explanation: For the overall reaction to release heat, the energy given out when new (stronger) bonds form must exceed the energy taken in to break the old (weaker) bonds.

39

What is the bond dissociation energy of H_2 ?

A

435 kJ/mol

**B**

498 kJ/mol

C

484 kJ/mol

D

1368 kJ/mol

Explanation: According to the text's calculations, breaking one mole of H-H bonds requires 435 kJ of energy.

40 Calculate the total energy absorbed when 2 moles of H_2 and 1 mole of O_2 completely break their bonds to form atoms.

A 933 kJ

B 1368 kJ



C 1936 kJ

D 568 kJ

Explanation: Breaking 2 moles of H-H bonds = $2 \times 435 = 870$ kJ. Breaking 1 mole of O=O bonds = $1 \times 498 = 498$ kJ. Total absorbed = $870 + 498 = 1368$ kJ.

41 What is the bond formation energy of one O-H bond?

A 435 kJ/mol

B 498 kJ/mol

C -484 kJ/mol (or 484 kJ/mol released)



D -299 kJ/mol

Explanation: The text states the bond formation energy of one O-H bond is 484 kJ/mol (released, hence negative in enthalpy terms).

42

When 2 moles of water are formed from 4 H atoms and 2 O atoms, the total energy evolved is:

A 1368 kJ

B 1936 kJ



C 568 kJ

D 968 kJ

Explanation: 4 O-H bonds are formed. Energy evolved = $4 \times 484 = 1936$ kJ.

43

What is the net enthalpy change (ΔH) for the reaction $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$ based on bond energies?

A -568 kJ



B +568 kJ

C -284 kJ

D +284 kJ

Explanation: $\Delta H = \text{Energy Absorbed} - \text{Energy Evolved} = 1368 \text{ kJ} - 1936 \text{ kJ} = -568 \text{ kJ}$.

44

If the overall reaction releases more energy than it absorbs, the reaction is:

A Endothermic

B Exothermic



C At equilibrium

D Catalyzed

Explanation: A net release of energy means the system loses heat to the surroundings, which defines an exothermic reaction.

45

Calculate the enthalpy change for $\text{H}_{2(g)} + \text{I}_{2(g)} \rightarrow 2\text{HI}_{(g)}$ given bond energies: $\text{H-H} = 436$, $\text{I-I} = 151$, $\text{H-I} = -299$ kJ/mol.

A -11 kJ/mol



B +11 kJ/mol

C -22 kJ/mol

D +22 kJ/mol

Explanation: Energy absorbed = $436 + 151 = 587$ kJ.
Energy released = $2 \times (-299) = -598$ kJ. $\Delta H = 587 - 598 = -11$ kJ.

46

The experimental value for the formation of gaseous water is -284.3 kJ. The calculated value from bond energies is -284 kJ. Why is there a slight difference?

A Calculation error

B

Bond energies are average values, not exact for specific molecules



C The reaction was incomplete

D The temperature was different

Explanation: Bond energies used in calculations are average values across different compounds, so they don't perfectly match the exact energy for a specific reaction, leading to slight discrepancies.

47

Which of the following requires an input of energy?

- A Formation of a H-H bond
- B Formation of an O-H bond
- C Breaking of an O=O bond** ✓
- D Condensation of water

Explanation: Breaking bonds always requires energy (endothermic). Forming bonds releases energy (exothermic).

48

In the reaction $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$, what is the total energy evolved from bond formation?

- A 1368 kJ
- B 1936 kJ** ✓
- C 568 kJ
- D 484 kJ

Explanation: 4 moles of O-H bonds are formed. $4 \times 484 \text{ kJ/mol} = 1936 \text{ kJ}$ released.

49

If a reaction has a ΔH of -568 kJ for 2 moles of water, what is the ΔH for 1 mole of water?

A -568 kJ

B -284 kJ



C -1136 kJ

D +284 kJ

Explanation: Enthalpy change is an extensive property. For half the reaction (1 mole), the enthalpy change is halved: $-568 / 2 = -284 \text{ kJ mol}^{-1}$.

50

Which bond is stronger based on the bond energies provided: O=O (498 kJ/mol) or H-H (435 kJ/mol)?

A H-H

B O=O



C They are equal

D Cannot be determined

Explanation: A higher bond dissociation energy means a stronger bond. Since O=O requires 498 kJ/mol to break compared to H-H's 435 kJ/mol, O=O is stronger.

Section 5: Reaction Mechanism, Activation Energy, and Catalysts

51

According to collision theory, a reaction takes place when reactant molecules:

A Break apart spontaneously

B Collide with sufficient energy to form a transition state ✓

C Absorb light

D Are heated to boiling point

Explanation: Not all collisions result in a reaction. Only those collisions with enough kinetic energy (activation energy) to form the high-energy transition state will proceed to products.

52 What is the transition state?

- A** The final products
- B** The initial reactants

C **A temporary, high-energy arrangement of atoms at the peak of the reaction pathway** ✓

- D** An intermediate that is easily isolated

Explanation: The transition state is the fleeting, unstable arrangement where old bonds are breaking and new bonds are forming simultaneously. It exists at the peak of the energy diagram.

53 What is activation energy (E_a)?

- A** The energy of the products
- B** The energy of the reactants

C **The minimum energy colliding particles must have for a successful collision** ✓

- D** The energy released during the reaction

Explanation: Activation energy is the energy barrier that must be overcome for reactants to transform into the transition state and ultimately products.

54 On an energy profile diagram, the activation energy is represented by the difference in energy between:

A Reactants and Products

B Reactants and the Transition State ✓

C Products and the Transition State

D The two transition states

Explanation: The height of the "hill" from the reactant level to the peak (transition state) represents the activation energy required.

55 In an energy profile diagram for an exothermic reaction, the energy of the products is:

A Higher than the reactants

B Lower than the reactants ✓

C Equal to the reactants

D At the peak of the curve

Explanation: Exothermic reactions release energy, meaning the final products have lower potential energy than the starting reactants, resulting in a net drop on the y-axis.

56

What does ΔH represent on an energy profile diagram?

A The height from reactants to the peak

B

The difference in energy between reactants and products



C The total energy of the system

D The energy of the transition state

Explanation: ΔH (enthalpy change) is the net energy difference between the starting reactants and the final products, regardless of the pathway taken.

57

How does a catalyst increase the rate of a chemical reaction?

- A** By increasing the temperature
- B** By increasing the activation energy
- C** **By lowering the activation energy and changing the reaction pathway** ✓
- D** By being consumed in the reaction

Explanation: A catalyst provides an alternative pathway with a lower activation energy. This allows more reactant molecules to have sufficient energy to collide successfully, speeding up the reaction.

58

Which of the following is TRUE about a catalyst?

A It is permanently changed by the reaction

B It lowers the activation energy



C It changes the enthalpy change (ΔH) of the reaction

D It is always a solid

Explanation: A catalyst participates in the reaction but is regenerated at the end (not permanently changed). It lowers E_a but does not affect the overall energy difference between reactants and products (ΔH).

59

Which of the following acts as a catalyst in the hydrogenation of oil to make banaspati ghee?

A Platinum

B Nickel



C Chlorine

D Iron

Explanation: The text explicitly states that Nickel (Ni) acts as a catalyst in the hydrogenation of oil to make banaspati ghee.

60

In the presence of a catalyst, the transition state energy is:

A Higher than without a catalyst

B **Lower than without a catalyst**



C The same as without a catalyst

D Zero

Explanation: The catalyst provides an alternative pathway where the transition state has a lower energy, reducing the activation energy required.

61

What is the primary factor that determines whether a collision between reactant molecules will result in a reaction?

A The color of the molecules

B

The kinetic energy of the colliding molecules



C The size of the container

D The pressure of the system

Explanation: Molecules must possess a certain minimum kinetic energy (activation energy) upon collision to overcome the repulsive forces and form the transition state.

62

Which of the following statements about the energy profile diagram for an endothermic reaction is correct?

A

The products have lower energy than the reactants

B

The products have higher energy than the reactants



C

ΔH is negative

D

No activation energy is required

Explanation: In endothermic reactions, the system absorbs energy, so the final products store more energy than the starting reactants. ΔH is positive.

63

What happens to the rate of reaction if the activation energy is very high?

A

The reaction is very fast

B

The reaction is very slow



C

The reaction is explosive

D

The reaction is exothermic

Explanation: A high activation energy means very few molecules have enough kinetic energy to successfully react, resulting in a slow reaction rate.

64 The difference between the energy of the transition state and the energy of the reactants is called:

A Enthalpy change

B **Activation energy** ✓

C Bond energy

D Kinetic energy

Explanation: This specific energy difference represents the barrier that must be overcome, known as the activation energy (E_a).

65 Platinum acts as a catalyst in the production of:

A H_2SO_4 ✓

B NH_3

C H_2O

D CO_2

Explanation: According to the text, Platinum acts as a catalyst in the production of sulfuric acid (H_2SO_4).

Section 6: Respiration and Biological Energy

66

The process of respiration in human beings is:

A**Exothermic****B**

Endothermic

C

Neutral

D

Physical change

Explanation: Respiration breaks down food molecules (like glucose) to release energy. Since energy is released for the body to use, it is an exothermic process.

67

What is the primary form of energy produced during respiration that cells use for metabolic activities?

A Heat

B **ATP (Adenosine Triphosphate)**



C Glucose

D Lipids

Explanation: The text states that respiration produces ATP, which cells break down to get the required energy for metabolic activities.

68

Aerobic respiration occurs in the presence of:

A Carbon dioxide

B Nitrogen

C **Oxygen**



D Water

Explanation: "Aerobic" literally means "with air/oxygen." This type of respiration requires oxygen to completely break down glucose.

69 Where in the cell does aerobic respiration primarily occur (specifically the later stages)?

A Cytoplasm

B Mitochondria



C Nucleus

D Ribosomes

Explanation: The text diagram shows glucose converting to pyruvate in the cytoplasm, and then pyruvate entering the mitochondria (with oxygen) to produce CO_2 , H_2O , and energy.

70 What is the net production of ATP during glycolysis?

A 1 ATP

B 2 ATP



C 4 ATP

D 36 ATP

Explanation: The text explicitly mentions that glycolysis involves a net production of 2 ATP molecules.

71

Anaerobic respiration in yeast converts glucose into:

- A** Lactic acid and water
- B** Carbon dioxide and water
- C Ethanol and carbon dioxide** ✓
- D** Pyruvate only

Explanation: In the absence of oxygen, yeast undergoes anaerobic respiration, converting glucose into ethanol, carbon dioxide, and energy.

72

Which of the following organisms primarily rely on anaerobic respiration?

- A** Humans
- B Bacteria and algae** ✓
- C** Plants
- D** Mammals

Explanation: The text specifically states that in certain organisms like bacteria and algae, respiration occurs in the absence of oxygen (anaerobic).

73

What is the primary storage form of glucose in the human body?

A Starch

B **Glycogen**



C Cellulose

D Lipids

Explanation: Glycogen is the primary storage form of glucose, stored in the liver and muscles for quick energy release.

74

Lipids serve as an energy reserve in our body. They are stored in:

A Liver cells

B Muscle cells

C **Adipose cells**



D Red blood cells

Explanation: The text mentions that excess food is stored as lipids in adipose cells (fat cells) to be used as an energy reserve between meals or during exercise.

75

Which of the following is an example of an exothermic reaction used in everyday life for cooking?

A Melting ice

B Combustion of fuels like gas and oil



C Dissolving salt in water

D Evaporation of water

Explanation: Combustion (burning) of fuels like gas, oil, and coal releases a large amount of heat energy, which is extensively used for cooking and heating.

76

During metabolism, the chemical energy present in food is converted into:

A Light energy

B Mechanical energy only

C Heat to keep us warm



D Electrical energy

Explanation: The text explains that during metabolism, the chemical energy in food is converted into heat to maintain body temperature.

77

Which process involves the breakdown of glucose into pyruvate?

A

Glycolysis



B

Krebs cycle

C

Electron transport chain

D

Photosynthesis

Explanation: Glycolysis is the specific process where one molecule of glucose is split into two molecules of pyruvate.

78

In the reaction for aerobic respiration, what are the final products?

A

Ethanol and CO_2

B

CO_2 , H_2O , and Energy



C

Pyruvate and Energy

D

Glucose and O_2

Explanation: Aerobic respiration completely oxidizes glucose in the presence of oxygen to produce carbon dioxide, water, and a large amount of energy.

79

Why do we feel warm after doing heavy exercise?

A

Because our body absorbs heat from the environment

B

Because exothermic respiration reactions increase, releasing more heat

**C**

Because our body stops respiration

D

Because of anaerobic respiration producing ethanol

Explanation: During exercise, the rate of aerobic respiration increases to meet energy demands. Since respiration is exothermic, more heat is generated, making us feel warm.

80

In the absence of oxygen, yeast converts pyruvate into ethanol and which gas?

A Oxygen

B Carbon dioxide



C Nitrogen

D Hydrogen

Explanation: The text clearly shows the anaerobic respiration of yeast: $\text{Pyruvate} + \text{Yeast} \rightarrow \text{Ethanol} + \text{CO}_2 + \text{Energy}$.



Well Done!

Chapter 5: Energetics completed

Revise the explanations once more,
practise the bond-energy calculations,
and you are ready to ace your exam!

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