MHT CET 2026 May 18 Shift 2

Question Paper with Solutions

Conducted by CET Cell, Maharashtra

General Instructions

(i) **Duration:** The total duration of the examination is 3 hours (180 minutes).

(ii) **Total Marks:** The complete paper carries a maximum of 200 marks.

(iii) **Structure:** The paper has 3 Sections:

- **Section A:** 50 Multiple Choice Questions (Physics).
- **Section B:** 50 Multiple Choice Questions (Chemistry).
- **Section B:** 100 Multiple Choice Questions (Biology).

(iv) **Compulsory Questions:** All 200 questions are compulsory.

(v) Each question has four options. Only **one** option is correct.

(vi) Correct Answer: +1 marks.

(vii) **Incorrect Answer:** (No Negative marking).

(viii) **Unanswered/Marked for Review:** 0 marks.

1. If z be a complex number such that $|z| + z = 2 + i$, then find the value of $|z|$.

(A) $\frac{1}{2}$
(B) $\frac{3}{4}$
(C) $\frac{5}{4}$
(D) 1

Correct Answer: (C) $\frac{5}{4}$

Solution:

Step 1: Understanding the Concept:

The fundamental concept behind this problem is the representation of complex numbers and the principle of equality for complex expressions.

A complex number is defined as $z = x + iy$, where x and y are real numbers known as the real and imaginary parts, respectively.

The symbol i represents the imaginary unit, defined as $\sqrt{-1}$.

The modulus of a complex number, $|z|$, is a scalar value representing the magnitude or the distance of the complex number from the origin in the Argand plane.

Crucially, $|z| = \sqrt{x^2 + y^2}$ is always a non-negative real number.

When an equation contains both complex variables and their moduli, we treat the modulus as a real constant part of the equation's real side.

Equality of two complex numbers states that if $a + bi = c + di$, then $a = c$ and $b = d$.

Step 2: Key Formula or Approach:

We substitute the standard form $z = x + iy$ and its modulus formula $|z| = \sqrt{x^2 + y^2}$ into the given equation.

The equation becomes a system of two equations: one for the real parts and one for the imaginary parts.

By solving for the imaginary part first, we simplify the equation for the real part significantly.

Step 3: Detailed Explanation:

Let the complex number be represented by its components, $z = x + iy$.

The given equation is $|z| + z = 2 + i$.

Substituting the definitions into the equation:

$$\sqrt{x^2 + y^2} + (x + iy) = 2 + i$$

Group the real terms and imaginary terms on the left-hand side:

$$(\sqrt{x^2 + y^2} + x) + i(y) = 2 + i$$

Now, equate the imaginary parts on both sides of the equation:

$$y = 1$$

Equate the real parts on both sides of the equation:

$$\sqrt{x^2 + y^2} + x = 2$$

Substitute the value $y = 1$ into the real part equation:

$$\sqrt{x^2 + (1)^2} + x = 2$$

$$\sqrt{x^2 + 1} = 2 - x$$

To eliminate the radical, we square both sides of the equation.
Note: Squaring can introduce extraneous solutions, so we must ensure that the right side $2 - x$ is non-negative, meaning $x \leq 2$.

$$(\sqrt{x^2 + 1})^2 = (2 - x)^2$$

Expand the right side using the identity $(a - b)^2 = a^2 - 2ab + b^2$:

$$x^2 + 1 = 4 - 4x + x^2$$

Subtract x^2 from both sides to isolate the variable x:

$$1 = 4 - 4x$$

$$4x = 4 - 1$$

$$4x = 3$$

$$x = \frac{3}{4}$$

Since $x = 3/4$ is less than 2, the solution is valid.

Now, calculate the value of $|z|$ using the determined values of x and y:

$$|z| = \sqrt{\left(\frac{3}{4}\right)^2 + (1)^2}$$

$$|z| = \sqrt{\frac{9}{16} + 1} = \sqrt{\frac{9+16}{16}}$$

$$|z| = \sqrt{\frac{25}{16}} = \frac{5}{4}$$

Step 4: Final Answer:

The real part of the complex number is $3/4$ and the imaginary part is 1.

Substituting these into the modulus formula gives $|z| = 5/4$.

This confirms that option (3) or (C) is the correct choice.

Quick Tip: Always isolate the square root term before squaring to avoid complicated cross-terms. Additionally, when you find $y = 1$, you can immediately check the options; only $|z| > 1$ is possible since $|z| = \sqrt{x^2 + 1}$.

2. If $\vec{a} = 2\hat{i} + \hat{j} + 3\hat{k}$ and $\vec{b} = p\hat{i} + 2\hat{j} + 2\hat{k}$ are perpendicular to each other, find the value of p.

(A) 4

(B) −4

(C) 2

(D) −2

Correct Answer: (B) −4

Solution:

Step 1: Understanding the Concept:

Vectors are quantities that possess both magnitude and direction. In 3D space, they are represented by components along the X, Y, and Z axes $(\hat{i}, \hat{j}, \hat{k})$.

The dot product (scalar product) of two vectors $\vec{A}$ and $\vec{B}$ is defined as $\vec{A} \cdot \vec{B} = |\vec{A}||\vec{B}| \cos\theta$, where θ is the angle between the vectors.

When two vectors are perpendicular (orthogonal), the angle between them is 90°. Since $\cos 90^\circ = 0$, the dot product of two perpendicular vectors must always be zero.

This property allows us to solve for unknown components in vector equations by setting the sum of the products of corresponding components to zero.

Step 2: Key Formula or Approach:

For vectors $\vec{a} = a_1\hat{i} + a_2\hat{j} + a_3\hat{k}$ and $\vec{b} = b_1\hat{i} + b_2\hat{j} + b_3\hat{k}$, the dot product is calculated as:

$$\vec{a} \cdot \vec{b} = a_1 b_1 + a_2 b_2 + a_3 b_3$$

The condition for perpendicularity is $\vec{a} \cdot \vec{b} = 0$.

Step 3: Detailed Explanation:

The first vector is given as $\vec{a} = 2\hat{i} + 1\hat{j} + 3\hat{k}$.

The second vector is given as $\vec{b} = p\hat{i} + 2\hat{j} + 2\hat{k}$.

Applying the perpendicularity condition, we set their dot product to zero:

$$(2\hat{i} + 1\hat{j} + 3\hat{k}) \cdot (p\hat{i} + 2\hat{j} + 2\hat{k}) = 0$$

Perform the multiplication for each component separately:
- For the $\hat{i}$ components: $2 \times p = 2p$
- For the $\hat{j}$ components: $1 \times 2 = 2$
- For the $\hat{k}$ components: $3 \times 2 = 6$

Summing these products gives the total dot product:

$$2p + 2 + 6 = 0$$

Simplify the linear equation by combining the constant numerical terms:

$$2p + 8 = 0$$

To solve for the variable p, move the constant to the other side of the equation:

$$2p = -8$$

Divide both sides by 2:

$$p = \frac{-8}{2}$$

$$p = -4$$

Step 4: Final Answer:

The dot product calculation results in a simple linear equation.

Solving $2p + 8 = 0$ gives $p = -4$.

Thus, the correct value of the parameter p is -4.

Quick Tip: Remember that $\hat{i} \cdot \hat{i} = 1$ and $\hat{i} \cdot \hat{j} = 0$. This is why the dot product only involves multiplying the same-type components. If a component is missing in a vector, treat it as having a coefficient of 0.

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3. The solubility product of $AgBr$ is 4.9×10^{-13} at a certain temperature. Calculate the molar solubility of $AgBr$.

(A) 4×10^{-6} mol dm^{-3}
(B) 4×10^{-7} mol dm^{-3}
(C) 7×10^{-7} mol dm^{-3}
(D) 3×10^{-8} mol dm^{-3}

Correct Answer: (C) 7×10^{-7} mol dm^{-3}

Solution:

Step 1: Understanding the Concept:
Solubility is defined as the maximum amount of solute that can dissolve in a specific volume of solvent at a given temperature to form a saturated solution.
The solubility product constant (K_{sp}) is an equilibrium constant describing the extent to which a sparingly soluble ionic compound dissociates in water.
For a solid substance AB, the equilibrium established in a saturated solution is:

$$AB(s) \rightleftharpoons A^{+}(aq) + B^{-}(aq)$$

As more solute is added beyond the saturation point, the rate of dissolution equals the rate of precipitation.
Molar solubility (s) is usually expressed in units of mol/L or mol/dm^3.

Step 2: Key Formula or Approach:
For a binary salt like $AgBr$, which dissociates into one cation and one anion (1:1 electrolyte):

The expression for the solubility product is:

$$K_{sp} = [Ag^+][Br^-]$$

If the molar solubility is s, then at equilibrium, the concentration of each ion is s.

$$K_{sp} = (s)(s) = s^2$$

Step 3: Detailed Explanation:

Given the solubility product constant $K_{sp} = 4.9 \times 10^{-13}$.

The formula relating s and K_{sp} for $AgBr$ is:

$$s = \sqrt{K_{sp}}$$

Substituting the numerical value provided:

$$s = \sqrt{4.9 \times 10^{-13}}$$

To simplify the square root calculation, adjust the power of 10 to an even exponent by shifting the decimal point:

$$4.9 \times 10^{-13} = 49 \times 10^{-14}$$

Now, calculate the square root of the coefficient and the power separately:

$$s = \sqrt{49} \times \sqrt{10^{-14}}$$

$$\sqrt{49} = 7$$

$$\sqrt{10^{-14}} = 10^{-7}$$

Thus, the molar solubility is:

$$s = 7 \times 10^{-7} \text{ mol dm}^{-3}$$

Step 4: Final Answer:

The calculation shows that the molar solubility of silver bromide is 7×10^{-7} M.

This matches perfectly with the value given in option (C).

Quick Tip: Always keep an eye on the stoichiometry. If the salt was Ag_2CrO_4, the formula would be $K_{sp} = (2s)^2(s) = 4s^3$. For $AgBr$, the simple square root is sufficient. Converting the power to an even number makes manual square roots much easier.

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4. Find the concentration of sodium acetate when added to 0.1 M solution of acetic acid to form a buffer solution of $pH = 5.5$. (Given: pK_a of $CH_3COOH = 4.5$)

(A) 0.1 M

(B) 0.01 M

(C) 1.0 M

(D) None of these

Correct Answer: (C) 1.0 M

Solution:

Step 1: Understanding the Concept:

A buffer solution is a mixture of a weak acid and its conjugate base (or a weak base and its

conjugate acid) that resists changes in pH when small amounts of acid or base are added.
In this problem, acetic acid (CH_3COOH) is the weak acid and sodium acetate (CH_3COONa) provides the conjugate base (CH_3COO^-).
The common ion effect suppresses the dissociation of the weak acid, allowing for the use of the initial concentrations in equilibrium calculations.
The pH of such an acidic buffer is governed by the Henderson-Hasselbalch equation.

Step 2: Key Formula or Approach:
The Henderson-Hasselbalch equation for an acidic buffer is:

$$pH = pK_a + \log\left(\frac{[\text{Salt}]}{[\text{Acid}]}\right)$$

Where:
- pH is the required acidity level of the buffer.
- pK_a is the negative log of the acid dissociation constant.
- $[\text{Salt}]$ is the molar concentration of the conjugate base.
- $[\text{Acid}]$ is the molar concentration of the weak acid.

Step 3: Detailed Explanation:
From the problem description, we have:
- Target $pH = 5.5$
- pK_a of acetic acid $= 4.5$
- Concentration of acid ($[Acid]$) $= 0.1$ M
Plug these values into the Henderson-Hasselbalch equation:

$$5.5 = 4.5 + \log\left(\frac{[Salt]}{0.1}\right)$$

Isolate the logarithmic term by subtracting 4.5 from both sides:

$$5.5 - 4.5 = \log\left(\frac{[Salt]}{0.1}\right)$$

$$1 = \log_{10}\left(\frac{[Salt]}{0.1}\right)$$

To eliminate the log, take the antilog (base 10) of both sides:

$$10^1 = \frac{[Salt]}{0.1}$$

$$10 = \frac{[Salt]}{0.1}$$

Solve for the salt concentration:

$$[Salt] = 10 \times 0.1$$

$$[Salt] = 1.0 \text{ M}$$

Step 4: Final Answer:

The concentration of sodium acetate required to achieve the desired buffer pH is 1.0 M. Therefore, option (3) is the correct answer.

Quick Tip: A handy exam trick: If $pH = pK_a$, the concentrations are equal (ratio = 1). If $pH = pK_a + 1$, the salt is 10 times more concentrated than the acid. If $pH = pK_a - 1$, the acid is 10 times more concentrated than the salt.

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5. Which of the following equations gives the combined relationship of Boyle's law and Charles's law?

(A) $\frac{P_1V_2}{T_1} = \frac{P_2V_1}{T_2}$

(B) $n = \frac{RT}{PV}$
(C) $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$
(D) $P = \frac{RT}{nV}$

Correct Answer: (C) $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

Solution:

Step 1: Understanding the Concept:
Gas laws define the physical behavior of gases by relating properties such as Pressure (P), Volume (V), and Temperature (T).
- Boyle's Law: For a fixed amount of gas at constant temperature, $P \propto 1/V$ or $PV = k$.
- Charles's Law: For a fixed amount of gas at constant pressure, $V \propto T$ or $V/T = k$.
- Gay-Lussac's Law: For a fixed amount of gas at constant volume, $P \propto T$ or $P/T = k$.
By combining these individual laws for a specific mass of gas where quantity n is constant, we derive the Combined Gas Law.

Step 2: Key Formula or Approach:
The combined gas law states that the ratio of the product of pressure and volume to the absolute temperature is constant for a fixed mass of gas.

$$\frac{PV}{T} = C$$

For comparing two states of the same gas:

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

Step 3: Detailed Explanation:
Let's analyze why option (C) is correct and others are wrong:
- In state 1, the gas has pressure P_1, volume V_1, and temperature T_1.
- In state 2, the gas has pressure P_2, volume V_2, and temperature T_2.
Since the amount of gas does not change, $\frac{P_1V_1}{T_1}$ must equal $\frac{P_2V_2}{T_2}$.

Option (A) is incorrect because it swaps the subscripts of volume, which violates the proportionalities of Boyle's and Charles's laws.
Option (B) is a wrong rearrangement of the Ideal Gas Law $PV = nRT$. The correct form would be $n = PV/RT$.
Option (D) is also a wrong algebraic derivation of the Ideal Gas Law. The correct form is $P = nRT/V$.

Step 4: Final Answer:
The equation $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$ correctly represents the combined behavior of pressure, volume, and temperature as derived from Boyle's and Charles's laws.
Thus, the correct option is (C).

Quick Tip: While using the combined gas law, remember that V and P units only need to be consistent on both sides, but T **must** be in Kelvin. Temperature in Celsius will yield a mathematically incorrect ratio.

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6. Which of the following forces is involved in dinitrogen?

(A) Dipole-dipole interaction
(B) Dipole-induced dipole interaction
(C) London dispersion force
(D) Hydrogen bonding

Correct Answer: (C) London dispersion force

Solution:

Step 1: Understanding the Concept:
Intermolecular forces (IMFs) are the forces of attraction between neighboring molecules. These forces are much weaker than intramolecular forces (covalent/ionic bonds) but determine physical properties like boiling point and state of matter.
- Dipole-dipole forces occur between polar molecules.

- Hydrogen bonding occurs when H is bonded to highly electronegative elements like N, O, or F.
- London dispersion forces (or Van der Waals forces) exist between all molecules and are the **only** forces present in non-polar molecules. They arise from instantaneous, temporary dipoles created by electron motion.

Step 2: Key Formula or Approach:

To identify the force, we must determine the polarity of dinitrogen (N_2).
A molecule is non-polar if there is no net dipole moment. In homonuclear diatomic molecules, the electronegativity difference between atoms is zero.

Step 3: Detailed Explanation:

Dinitrogen is a homonuclear diatomic molecule represented by the formula $N \equiv N$.
Since both nitrogen atoms are identical, they share the bonding electrons equally. There is no permanent separation of partial charges ($\delta+$ or $\delta-$).
As a result, N_2 has zero dipole moment and is non-polar.
- Because it is non-polar, it cannot have dipole-dipole interactions.
- It does not contain a Hydrogen atom bonded to a highly electronegative atom, so hydrogen bonding is ruled out.
- Dipole-induced dipole interactions require at least one polar species to be present.

The only force remaining is the London dispersion force, which is a universal force caused by temporary electronic fluctuations. These weak forces allow N_2 to be liquefied only at extremely low temperatures.

Step 4: Final Answer:

Since N_2 molecules are non-polar, the only intermolecular force acting between them is the London dispersion force.
Therefore, the correct answer is (C).

Quick Tip: For any homonuclear diatomic molecule (like O_2, H_2, Cl_2, F_2), always select London Dispersion forces. The strength of these forces increases with the size of the electron cloud (molecular mass).

7. Which of the following is a correct set of four quantum numbers for a 4d orbital?

(A) $(4, 3, 2, 1/2)$

(B) $(4, 2, 1, 1/2)$

(C) $(4, 1, 2, 1/2)$

(D) None of these

Correct Answer: (B) $(4, 2, 1, 1/2)$

Solution:

Step 1: Understanding the Concept:

Quantum numbers provide a unique "address" for every electron in an atom.

1. Principal Quantum Number (n): Specifies the shell or energy level ($n = 1, 2, 3, \ldots$).

2. Azimuthal Quantum Number (l): Defines the shape of the subshell (l ranges from 0 to $n - 1$).

- $l = 0(s), l = 1(p), l = 2(d), l = 3(f)$.

3. Magnetic Quantum Number (m_l): Defines the orientation of the orbital in space (m_l ranges from $-l$ to $+l$).

4. Spin Quantum Number (m_s): Defines the direction of electron spin ($+1/2$ or $-1/2$).

Step 2: Key Formula or Approach:

For a $4d$ orbital, we extract the values of n and l from the notation:

- The digit "4" gives the principal quantum number, so $n = 4$.

- The letter "d" signifies the azimuthal quantum number $l = 2$.

- Based on $l = 2$, m_l must be one of the values in the set $\{-2, -1, 0, 1, 2\}$.

Step 3: Detailed Explanation:

Let's analyze the given options based on these constraints:

- Option (1): $(4, 3, 2, 1/2)$. Here $n = 4$ and $l = 3$. Since $l = 3$ refers to an f subshell, this describes a $4f$ orbital, not a $4d$. Incorrect.

- Option (2): $(4, 2, 1, 1/2)$. Here $n = 4$ and $l = 2$, which is consistent with the $4d$ subshell. Additionally, $m_l = 1$ is within the valid range of -2 to $+2$. Correct.

- Option (3): $(4, 1, 2, 1/2)$. Here $n = 4$ and $l = 1$, which describes a $4p$ subshell. Furthermore, $m_l = 2$ is impossible for $l = 1$ because $|m_l|$ cannot exceed l. Incorrect.

Step 4: Final Answer:
By evaluating the allowed ranges for all four quantum numbers, we conclude that only option (B) satisfies the requirements for an electron in a $4d$ orbital.

Quick Tip: Remember the code: s=0, p=1, d=2, f=3. Also, check the relationship $|m_l| \leq l$. If m_l is greater than l, the set is invalid regardless of the other numbers.

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8. Which of the following mixtures of gases represent water gas?

(A) $CO + H_2$
(B) $CO_2 + H_2$
(C) $H_2O + CH_4$
(D) $H_2 + O_2$

Correct Answer: (A) $CO + H_2$

Solution:

Step 1: Understanding the Concept:
Water gas is an important industrial synthesis gas used for producing methanol and other hydrocarbons. It is a combustible gas mixture.
It is produced through the gasification of coal or coke. When steam is passed over incandescent (red-hot) coke at high temperatures (around 1270 K), a redox reaction occurs.

Step 2: Key Formula or Approach:
The reaction for the formation of water gas is:

$$C(s) + H_2O(g) \xrightarrow{1270K} CO(g) + H_2(g)$$

Since the mixture consists of carbon monoxide and hydrogen, it is referred to as "water gas" because the hydrogen comes from the water (steam) molecules.

Step 3: Detailed Explanation:

- Option (1): $CO + H_2$. This is the correct chemical composition of water gas. It is also sometimes called "synthesis gas" or "syngas" because of its role in synthetic chemical manufacturing.
- Option (2): $CO_2 + H_2$. This mixture is produced in the water-gas shift reaction, but it is not called water gas.
- Option (3): $H_2O + CH_4$. These are the reactants used in the "steam reforming of methane" to produce syngas, not the product mixture itself.
- Option (4): $H_2 + O_2$. This is an explosive mixture used in fuel cells or rocket propellants, unrelated to water gas.

Step 4: Final Answer:

Water gas is composed of Carbon Monoxide (CO) and Hydrogen (H_2).

The correct answer is therefore option (A).

Quick Tip: Common trap: Do not confuse Water Gas ($CO+H_2$) with Producer Gas ($CO+N_2$). Producer gas is formed by passing air (not steam) over hot coal.

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9. Which of the following electrolytic solutions of the same electrolyte has maximum electrolytic conductivity at the same temperature?

(A) 0.2 mole of solute is dissolved in 250 ml

(B) 0.3 mol in 600 ml

(C) 0.6 mol in 1000 ml

(D) 0.8 mole in 2000 ml

Correct Answer: (A) 0.2 mole of solute is dissolved in 250 ml

Solution:

Step 1: Understanding the Concept:

Electrolytic conductivity (κ), also known as specific conductance, is the measure of a solution's ability to conduct electricity per unit volume.

Electricity in solutions is carried by ions. Therefore, the conductivity depends directly on the concentration of ions (number of ions per unit volume).

As a solution is diluted (volume increases for a fixed amount of solute), the number of ions per unit volume decreases, and hence the specific conductivity (κ) decreases.

To find the maximum conductivity, we must find the solution with the highest molarity (concentration).

Step 2: Key Formula or Approach:

The concentration or Molarity (M) is given by:

$$M = \frac{\text{moles of solute}}{\text{volume in Liters}}$$

We will calculate M for all four options.

Step 3: Detailed Explanation:

Let's compute the molarities:

1. Solution (1): $0.2 \text{ mol}/0.250 \text{ L} = 0.8 \text{ M}$
2. Solution (2): $0.3 \text{ mol}/0.600 \text{ L} = 0.5 \text{ M}$
3. Solution (3): $0.6 \text{ mol}/1.000 \text{ L} = 0.6 \text{ M}$
4. Solution (4): $0.8 \text{ mol}/2.000 \text{ L} = 0.4 \text{ M}$

Comparing these values: $0.8 \text{ M} > 0.6 \text{ M} > 0.5 \text{ M} > 0.4 \text{ M}$.

Solution (1) is the most concentrated, meaning it has the highest density of ions available to carry charge per unit volume.

Step 4: Final Answer:

Since conductivity is directly proportional to the concentration of ions for a given electrolyte, the solution with 0.8 M concentration will have the maximum conductivity.

The correct option is (A).

Quick Tip: Specific Conductance (κ) increases with **concentration**. Molar Conductance (Λ_m) increases with **dilution**. Make sure you don't confuse the two!

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10. In an isothermal expansion of an ideal gas, the heat supplied to the gas is:

(A) entirely used to increase internal energy
(B) entirely used to do work
(C) partly used to do work and partly to increase internal energy
(D) none of the above

Correct Answer: (B) entirely used to do work

Solution:

Step 1: Understanding the Concept:
An isothermal process is a thermodynamic process in which the temperature of the system remains constant throughout ($\Delta T = 0$).
For an ideal gas, the internal energy (U) is a function of temperature only. This is because ideal gas molecules have no intermolecular forces, so their internal energy consists only of kinetic energy, which depends on temperature.
Therefore, if temperature does not change, internal energy does not change.

Step 2: Key Formula or Approach:
We use the First Law of Thermodynamics:

$$\Delta U = q - w$$

Where:
- ΔU is the change in internal energy.
- q is the heat added to the system.
- w is the work done by the system on the surroundings.

Step 3: Detailed Explanation:

1. Since the process is isothermal (T = constant), then $\Delta T = 0$.
2. For an ideal gas, $\Delta U = nC_v\Delta T$. Since $\Delta T = 0$, then $\Delta U = 0$.
3. Substituting $\Delta U = 0$ into the First Law:

$$0 = q - w \implies q = w$$

This mathematical equality means that every bit of thermal energy (heat) supplied to the gas from the surroundings is converted into mechanical energy (work) performed by the gas as it expands.

The gas cannot use this heat to increase its internal energy because doing so would raise its temperature, violating the isothermal condition.

Step 4: Final Answer:

In an isothermal expansion, the heat supplied is equivalent to the work done.

The correct answer is option (B).

Quick Tip: In an adiabatic process, $q = 0$, so work is done at the expense of internal energy (cooling the gas). In an isothermal process, the "infinite reservoir" supplies heat to maintain the temperature while work is being done.