

Cathode Ray Properties Explained

<https://gemini.google.com/app/562474909fb21dc8>

Response: **Correct Answer: (4)**

Analysis of Statements:

- **(1) Incorrect:** Cathode rays consist of electrons, which carry a negative charge.
 - **(2) Incorrect:** They originate from the cathode and travel toward the anode (cathode to anode).
 - **(3) Incorrect:** The specific charge ($\frac{e}{m}$) of electrons is a universal constant and does not depend on the gas inside the tube or the electrode material (unlike canal rays/positive rays).
 - **(4) Correct:** Because electrons are charged particles, their trajectory is deflected by both electric and magnetic fields via the Lorentz force ($\mathbf{F} = q\mathbf{E} + q\mathbf{v} \times \mathbf{B}$).
 - **(5) Incorrect:** Fast-moving electrons possess sufficient kinetic energy to ionize gas molecules inside the discharge tube upon collision.
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