

Unit III - Atomic Physics

Chapter 27-1

Early Models of the Atom

Democritus - ατομος

Dalton - Billiard Ball

Thompson - Raisin Bun

Rutherford - Planetary Model

Bohr - Quantum Model

Looking forward...

Cathode Ray Tube and Charge to Mass Ratio

$F = eE$   
 $F = evB$   
 $eE = evB$   
 $v = \frac{E}{B}$

$F = evB = \frac{mv^2}{r}$   
 $= \frac{e}{m} = \frac{v}{Br} \Rightarrow \frac{e}{m} = \frac{E}{B^2 r}$   
 $\frac{e}{m} = 1.76 \times 10^{11} \frac{C}{kg}$

Millikan and the Mass of an Electron

$F_e = F_g$   
 $F_e = qE$

$q$  was found to be a multiple of  $1.6 \times 10^{-19} C$

$\frac{e}{m} = 1.76 \times 10^{11} \frac{C}{kg}$   
 $m_e = 9.11 \times 10^{-31} kg$

Blackbody Radiation

$\lambda_p T = 2.9 \times 10^{-3} mK$

$E(\lambda, T) = \frac{2hc^2}{\lambda^5} \frac{1}{e^{\frac{hc}{\lambda kT}} - 1}$

$c = 2.99 \times 10^8 \frac{m}{s}$   
 $k = 1.38 \times 10^{-23} \frac{J}{K}$   
 $h = 6.626 \times 10^{-34} \frac{J \cdot s}{s}$