

# Robert Millikan's Oil Drop Experiment

Weight due to gravity  $F_g = mg$   
was balanced by the electric  
field  $F_e = qE$ .

Thus, the oil droplet was  
suspended in mid-air.

# Robert Millikan's Oil Drop Experiment

- Tiny droplets of mineral oil carrying an electric charge were allowed to fall freely between two parallel plates.
- The Weight ( $F_g = mg$ ) was balanced by the Electrostatic Force ( $F_e = qE$ ).
- $q = mg/E$

# Millikan's Conclusion

- Any electric charge was an integral multiple of a smallest charge,  $e$ , that was given to an electron.
- $e = 1.6 \times 10^{-19} \text{ C}$

# Example

- In Robert Millikan's Oil Drop Experiment an oil droplet is found to have a charge of  $-4.8 \times 10^{-19}$  C. How many excess electrons does the oil droplet have?
- $Q = ne$
- $-4.8 \times 10^{-19}$  C =  $n(1.6 \times 10^{-19})$
- $n = -4.8 \times 10^{-19} / 1.6 \times 10^{-19} = 3$  electrons