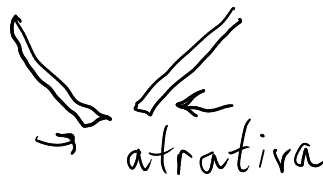
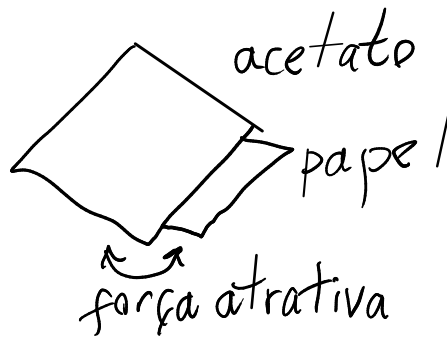
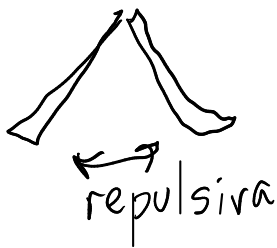


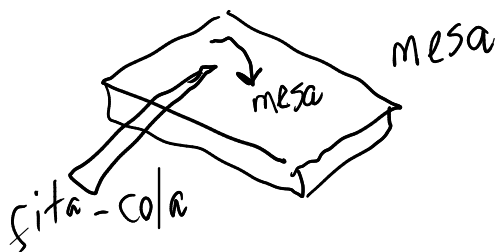
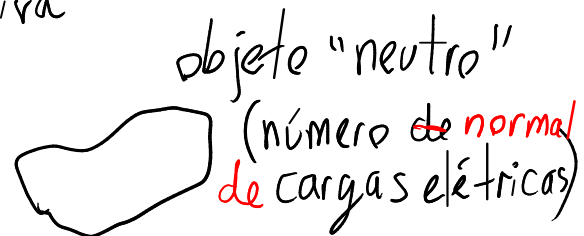
# 1. CAMPO ELÉTRICO

aula 1 . 2020-09-21

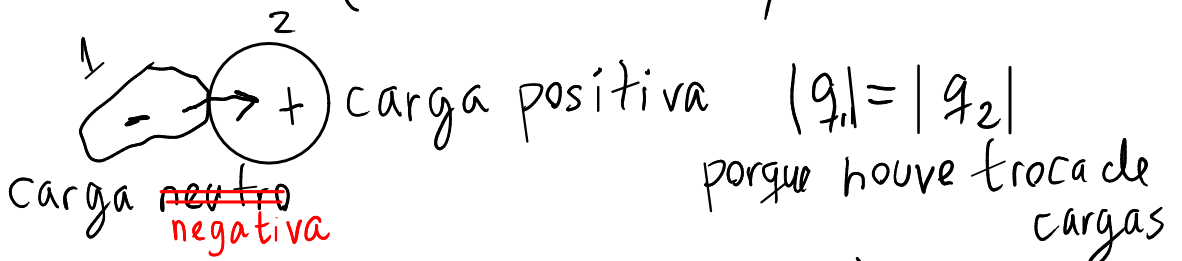
Força elétrica



séc. XVIII : B. Franklin



série triboelétrica (tabela 1.1 do livro)



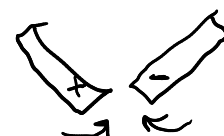
UNIDADE SI DE CARGA  $\rightarrow$  1C (coulomb)

exemplos:  $q_1 = +3.5C$   $q_2 = -2.8C$

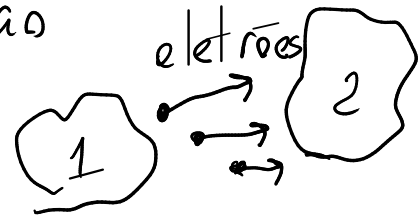
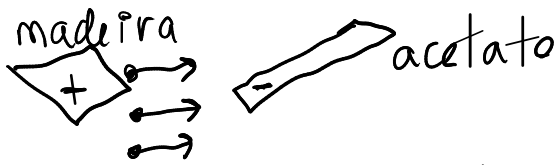
cargas do mesmo sinal  
 $\Downarrow$   
força repulsiva



cargas de sinais opostos  
 $\Downarrow$   
força atrativa

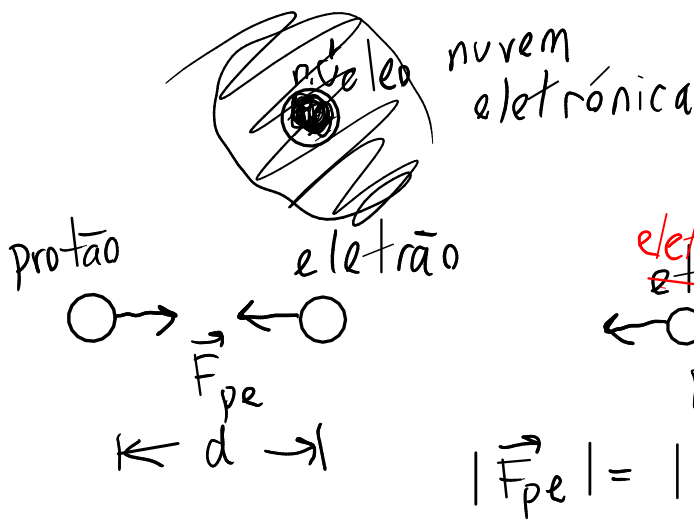


1897 → descoberta do elétron



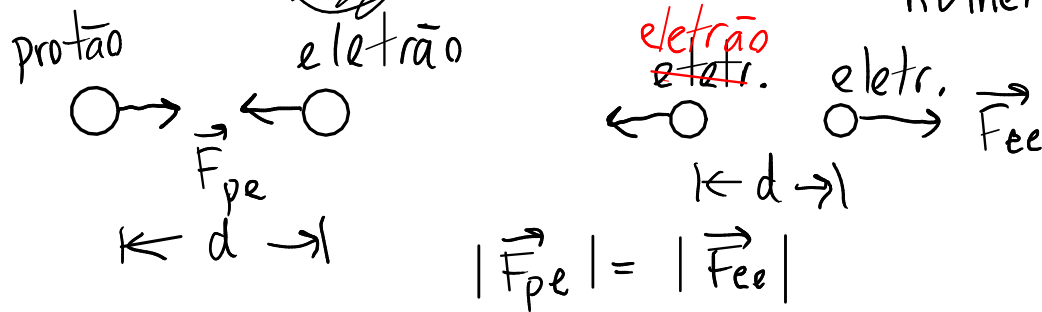
⇒ elétron é negativa

## MODELO ATÓMICO



átomo neutro

↓  
 $n_{\text{prótons}} (\text{núcleo}) =$   
 $n_{\text{elétrões}}$



⇒  $q_{\text{próton}} > 0$        $q_{\text{elétron}} < 0$        $|q_{\text{prot.}}| = |q_{\text{elétron}}|$   
 $= \text{carga elementar}$   
 $(e)$

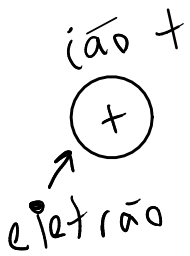
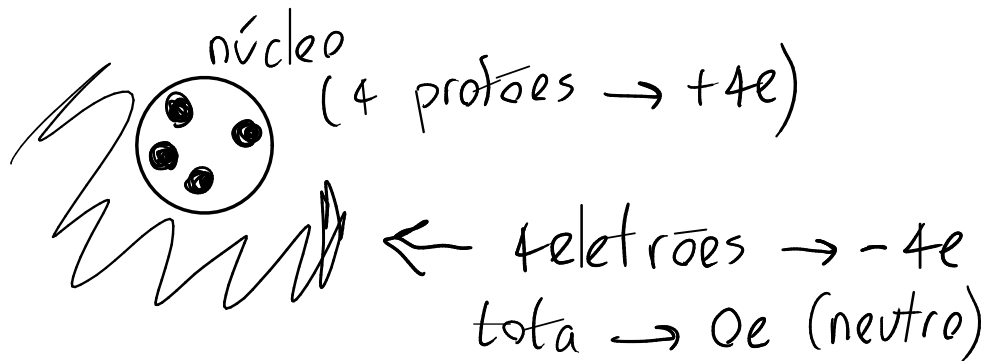
$e = 1.602 \times 10^{-19} \text{ C}$

( $1.6 \times 10^{-19}$  com 3 algarismos)

## Propriedades da carga elétrica

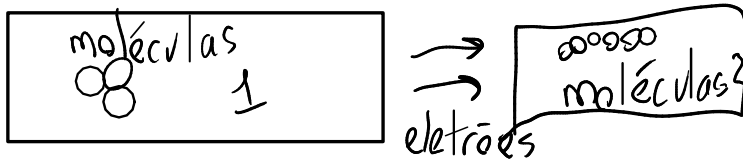
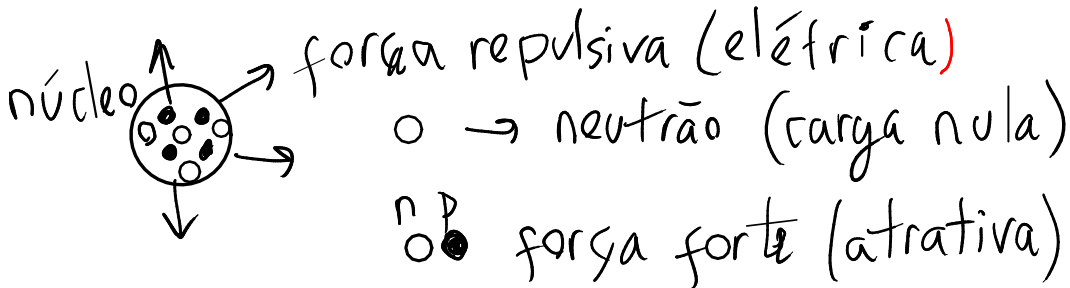
- ① Quantização<sup>a</sup>. Todas as cargas que podem existir, são múltiplos inteiros de  $e$   
 exemplos:  $-3e$ ,  $+5e$  (não  $5.2e$ )
- ② Conservação. As cargas não podem ser modificadas (totais)  
 exemplos  $+2e$   $\xrightarrow{\text{desintegração}}$   $+5e$   $-e$   $-2e$  total  $+2e$

Átomo



$$q_{total} = -e \rightarrow (5 \text{ elétrons})$$

$$q_{total} = +e \rightarrow (\text{apenas } 3 \text{ elétrons})$$

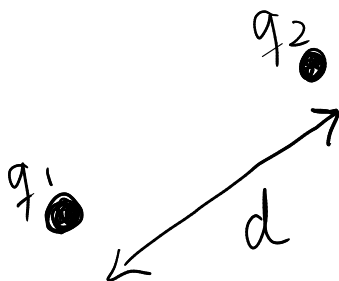


a massa do elétron é que é 2000 menor que a do próton ou neutrão

(a carga do elétron tem o mesmo valor absoluto da do próton)

## LEI DE COULOMB

2 cargas "pontuais"  $q_1$  e  $q_2$ , a uma distância  $d$



força elétrica de módulo  $F_{12}$

$$F_{12} = k \frac{|q_1| |q_2|}{d^2}$$

em unidades SI:  $k = 8.998 \times 10^9 \frac{\text{N} \cdot \text{m}^2}{\text{C}^2}$  ↙ constante de Coulomb  
( $k = 9 \times 10^9$ , com 3 algarismos)  
cargas típicas  $\rightarrow n\text{C} = 10^{-9} \text{C} \approx 10^{10}$  elétrões

3.5678... nC  
3.5678 em vez de  $n e$   
↑ inteiro