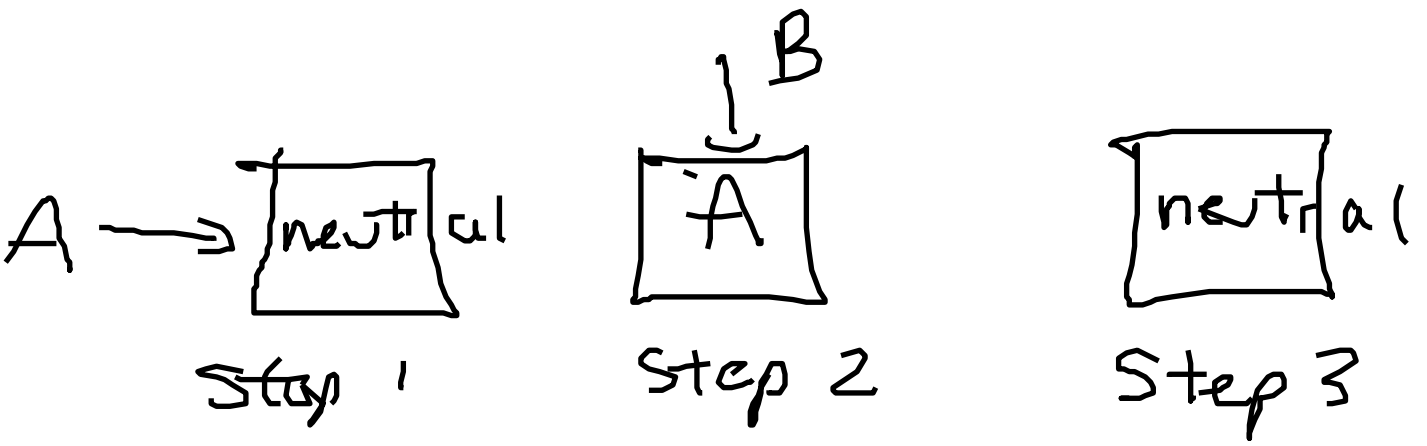
# Static Electricity

## Two types of charge

- both attract neutral objects
- like repel,
- different attract

Franklin: these two types of charge can cancel each other out



Frankla: Positive & negative charge - opposites

He chose one to be positive

Electric Charge

Symbols: $q$ or $Q$

Units: Coulomb (C)

$q = +5\,C$ ← huge!

more / common:

- $1\,mC = 10^{-3}\,C$
- $1\,\mu C = 10^{-6}\,C$
- $1\,nC = 10^{-9}\,C$

$\mu$ = micro

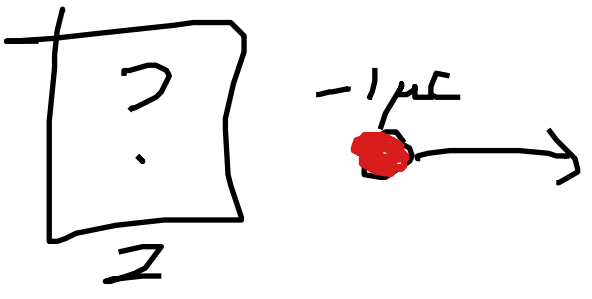
# Law of Conservation of Charge

"Charge cannot be created or destroyed."

Charge of a system can only change if charge flows into or out of the system.


Step 1

If I remove -1μC from the box, what charge is it now?

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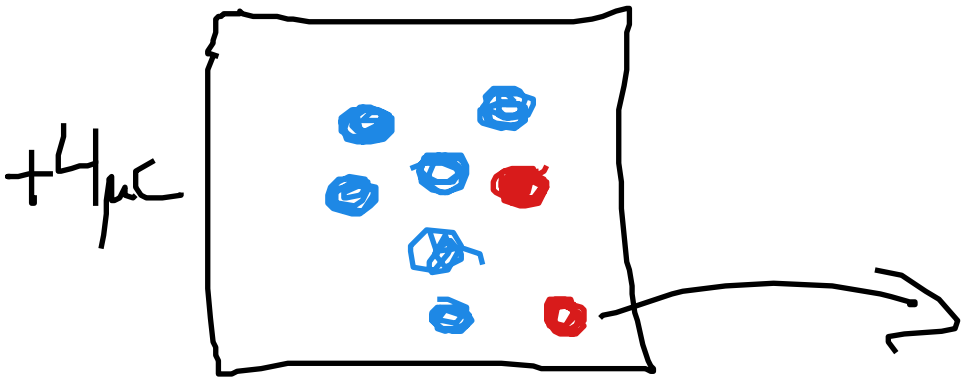
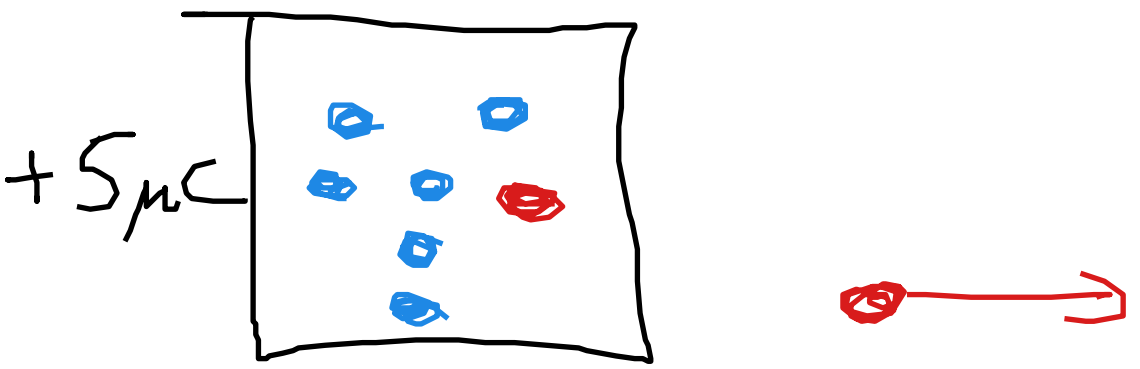
● = $+1\mu C$

● = $-1\mu C$




$Q_f = Q_i + \Delta Q$

$5\mu C = +4\mu C - (-1\mu C)$

remove a $-1\mu C$ charge

● : protons $q = +1.6 \times 10^{-19} C$

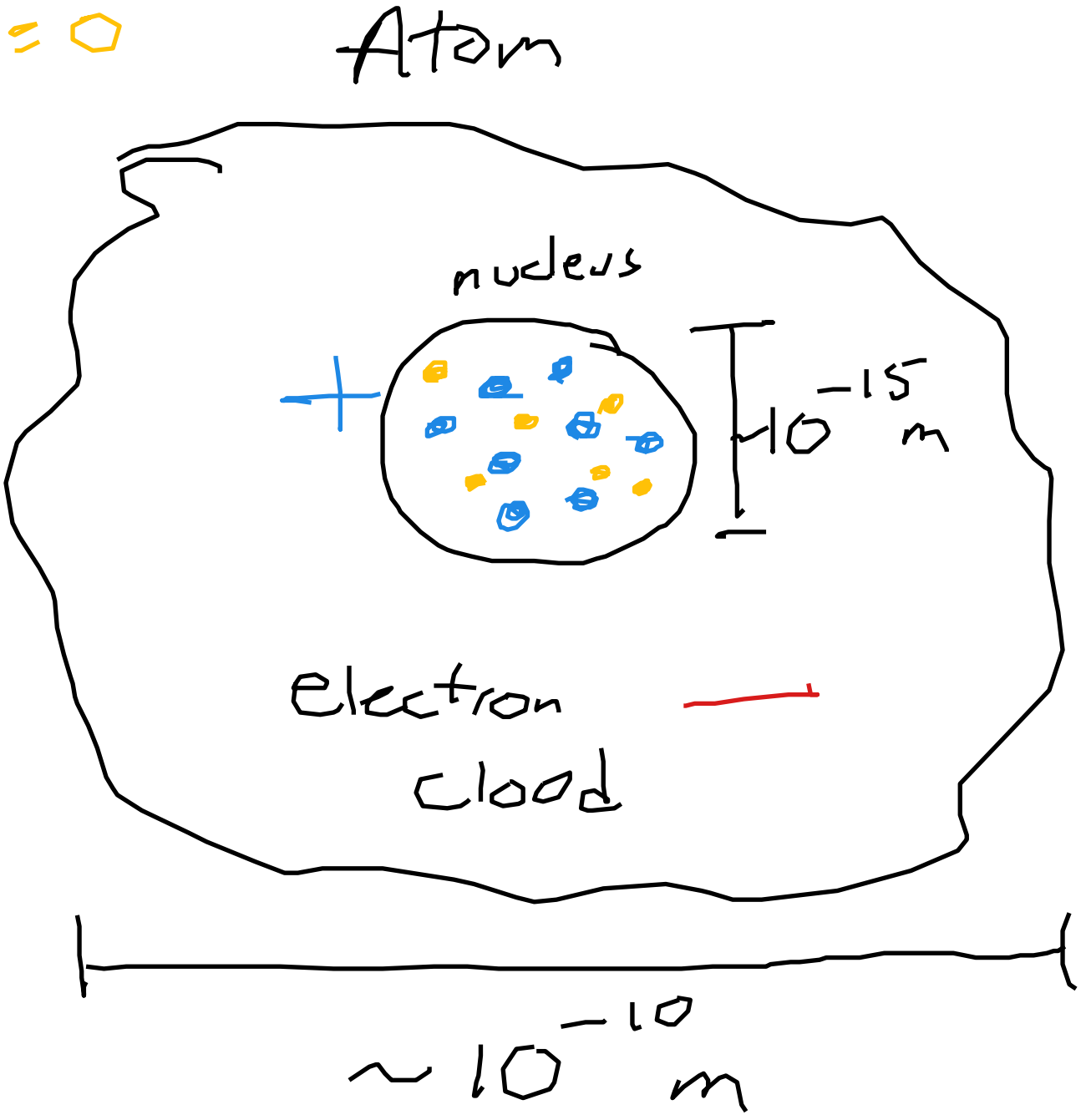
$= +e$

● : electrons $q = -1.6 \times 10^{-19} C$

$= -e$

● neutrons

$q = 0$



Atoms interact via

electrons

Helium atom (He-4) · 2 protons
2 electrons
2 neutrons

$q = e(\#\text{ protons} - \#\text{ electrons})$

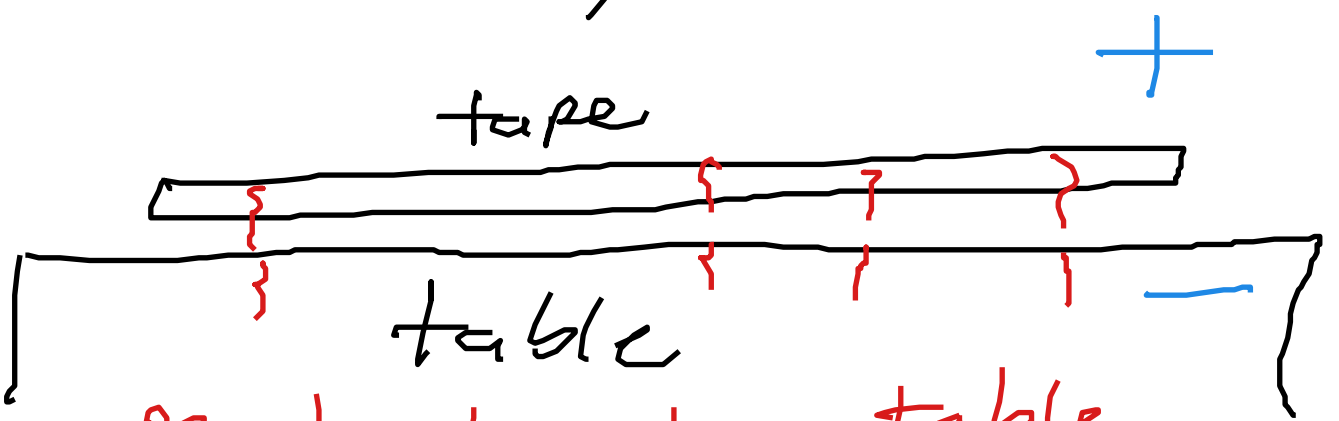
If I remove an electron from a helium atom, what is its charge? +e

2 protons & 1 electron

Ion: charged atom
(imbalanced # of
protons & electrons)

$Na^+$ sodium ion
is Na with
an electron moved.

Why does tape become
charged?




tape bonds to table.
rip it off; electrons end up on
wrong side