

* Charge Quantization and Conservation

Charge Quantization

All the known particles have charges that are some integers multiple of the fundamental charge that is, the charges are always $0, \pm e, \pm 2e, \dots$ etc.

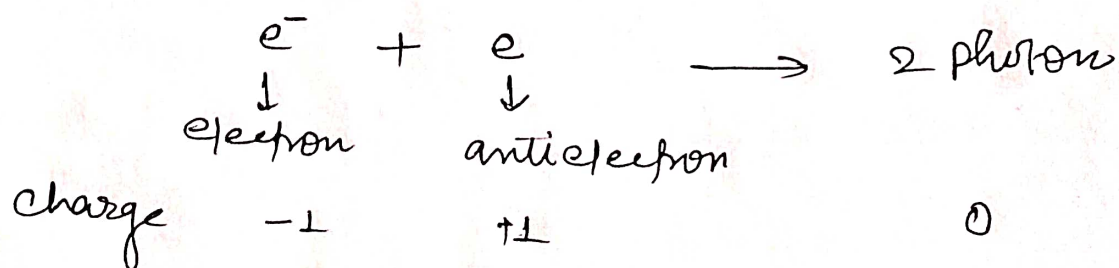
Since charges exist in discrete packets, we say that charge is quantized - the fundamental charge e is called quantum of charge.

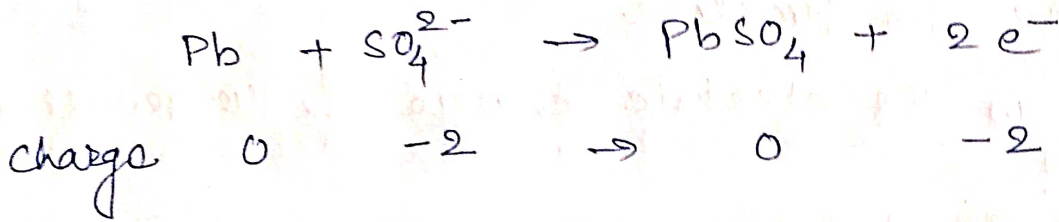
Charge Conservation

The electric charge is conserved because it can neither be created nor be destroyed.

We can see that in any reaction involving charged particles, the total charges before and after the reaction are always the same.

For instance.





Electric charges of some particles

Table 1

Particle	charge
Electron e	$-e$
Muon μ	$-e$
Pion π^0	0 0
Pion π^+	$+e$
Pion π^-	$-e$
Proton P	$+e$
Neutron n	0
Neutrino ν	0
photon γ	0
Delta Δ^+	$+e$
Delta Δ^{++}	$+2e$

Question for practice

Q1. What is the electric charge of the resulting ion?

- (a) If an atom loses two electrons.
- (b) If an atom loses three electrons.

Q2. Is it possible for a body to have an electric charge $2.0 \times 10^{-19} \text{ C}$?