

Building a hadron*

date: , class: , student:

Quarks are the building blocks of bigger particles, the hadrons. The nucleons, neutrons and protons, are the main examples of hadrons.

Here there are the rules to build such particles. Hadrons can be classified into two main categories:

- Baryons, which are formed by 3 quarks qqq or by 3 antiquarks $\bar{q}\bar{q}\bar{q}$;
- Mesons, which are formed by one quark and one anti-quark $q\bar{q}$.

Therefore you can build particles using 2 or 3 quarks. You also have to follow some other rule:

1. The baryon number B must be 0 or 1 (or -1 for antiparticles). Remember that the baryon number is defined as

$$B = \frac{1}{3}(n_q - n_{\bar{q}}).$$

2. The charge has to be an integer number. It can be $q = -1, 0, 1, 2$. Remember that when you build a meson you can have to invert the charge of the antiquark that you are using.

Some famous particles? Complete the table below with some particles that you think could exist. In the next activity you will find out if they actually exist!

Particle name	Symbol	Quark composition	Type
proton	p	uud	baryon
neutron	n	uud	baryon

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