Some questions...

- ✓ Why can we smell what's for lunch when we come close to the house?
- ✓ How can we pick out the larger cherries without mixing them in the bowl?
- ✓ Why does an inflated balloon or ball deflate if we leave it for some time?
- ✓ If we add sugar to water, will the volume change, and if so, by how much?

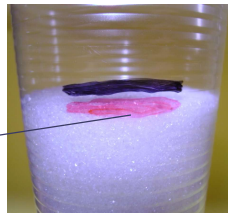
- ✓ Why is water sweet or salty, but we can't see the sugar or salt in it?
- ✓ If we drop oil on the surface of the water, the stain will spread. Can the stain spread infinitely?

A drop of dye was added to a glass of water. Without stirring, it is visible that the color spread through the water. Why?

Građa tvari

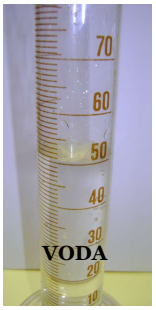
Structure of matter

RAZINA ŠEĆERA PRIJE PROTRESIVANJA

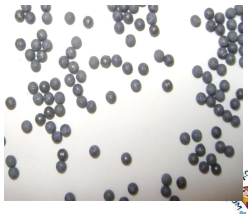


RAZINA ŠEĆERA NAKON...

Koliko je 50 + 50 ?



- Tvari – tijela su građena od čestica između kojih postoje praznine, tj. međuprostori.
- *Matter – bodies are made up of particles, between which there are gaps, i.e., interspaces.*



- *Čestice dodane tvari su popunile praznine-međuprostore u prvoj tvari !*

$$V < V_1 + V_2$$

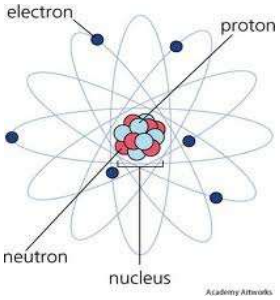
Iz povijesti...

Demokrit, grč. filozof, 4.st. prije Krista, pretpostavio je:

- Tvari su građene od čestica – ATOMA , koji se ne mogu dalje dijeliti.
- Atom – grč. nedjeljiv
  eng.indivisble
- No, Demokrit je bio samo djelomično u pravu....

- **Atom** je najmanji dio tvari koji ima svojstva kemijskog elementa građenog od te tvari.
- *An atom is the smallest part of matter that has the properties of the chemical element made from that matter.*

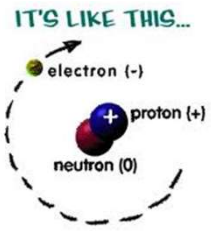
Ali... atom se može dijeliti !!!



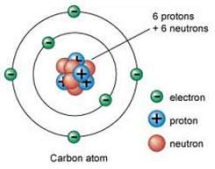
- Svaki atom građen je od **jezgre – nukleon** i **elektronskog omotača.**
- *Each atom is made up of a nucleus – nucleons and an electron shell.*

Subatomske (elementarne) čestice

- Jezgru grade **protoni – p** i **neutroni – n**
- Elektronski omotač čine **elektroni - e** koji se gibaju oko jezgre

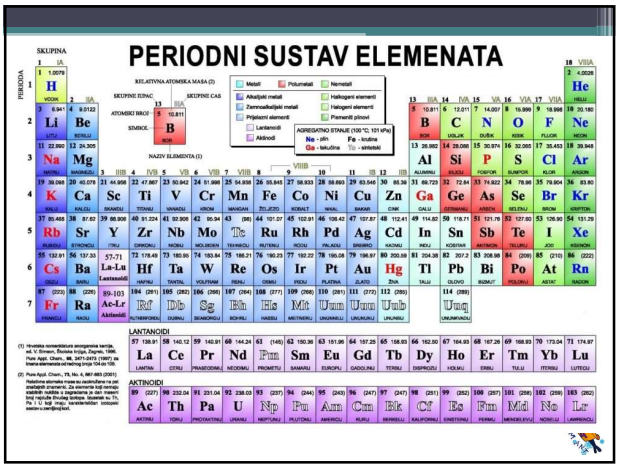


Atom ugljika

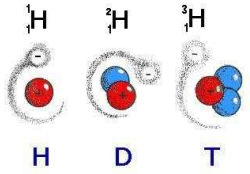


- ✓ U svakom atomu je **jednak** broj elektrona, protona i neutrona.
- ✓ Kemijske elemente razlikujemo prema broju elementarnih čestica u atomu.

- ✓ *Each atom has an **equal** number of electrons, protons, and neutrons.*
- ✓ *Chemical elements are distinguished by the number of elementary particles in the atom.*



- ✓ Atom s manjkom ili viškom elektrona jest ION.
- ✓ Atom s većim brojem neutrona u odnosu na protone jest IZOTOP → veća masa jezgre.



Izotopi vodika
→ deuterij i tricij

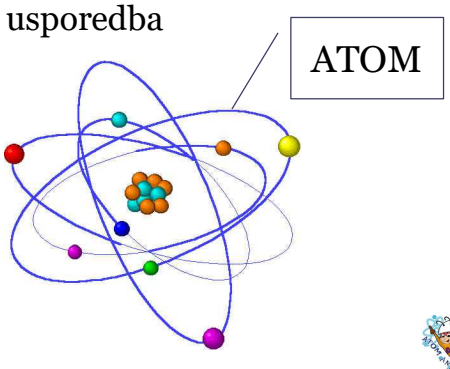
O veličini atoma – *a size of an atom*

- ✓ Na duljini od 1 cm, ako bismo gusto slagali atome, stalo bi ih oko 100 000 000 !!
- ✓ Promjer jednog atoma jest 10^{-8} cm ili 10^{-10} m
- ✓ Proton ima promjer oko 10^{-15} m, a elektron je još manji.
- ✓ Između jezgre i elektrona je većinom prazan prostor!

Masa atoma

- ✓ Masa elektrona je oko 10^{-31} kg, a protona oko 10^{-27} kg.
- ✓ Masa elektrona je oko 1800 puta manja od mase protona!

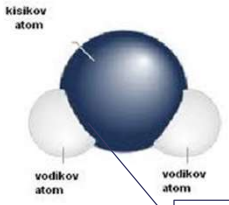
Jedna usporedba



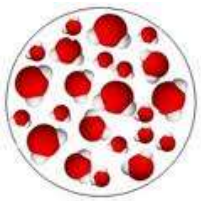
SUNČEV SUSTAV

Molekula

- ✓ Više povezanih atoma čini jednu molekulu.
- ✓ *Several connected atoms make up a molecule.*



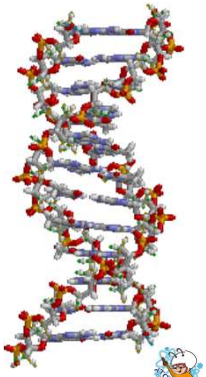
Molekula vode, H_2O



Molekula DNK

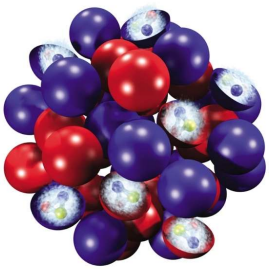
- ✓ Sredinom 20. stoljeća otkriveno je da bitnu ulogu pri nasljeđivanju ima jedna molekula u jezgri svake žive stanice – molekula deoksiribonukleinske kiseline, DNK.
- ✓ U građi molekule DNK su pohranjene informacije o nasljednim osobinama.
- ✓ Osnovnu građu molekule DNK otkrili su dvojica fizičara i jedan biolog.

- ✓ Molekula DNK je vrlo tanka – milijuntinka milimetra, ali vrlo duga – kada bi se rastegnula, dosegla bi duljinu oko 2 m!!
- ✓ Ako bi se sve molekule DNK u tijelu jednog čovjeka rastegnuli i nadovezali jednu na drugu → ukupna duljina bila bi veća nego udaljenost Zemlja –Sunce (150 000 000 km)



Noooo...

- ✓... dijeljenju nije kraj!
- ✓ Neutroni i protoni mogu se podijeliti!
- ✓ Svaki neutron, tj. proton građen je od KVARKOVA!



Može li se i kvark dijeliti?!!