

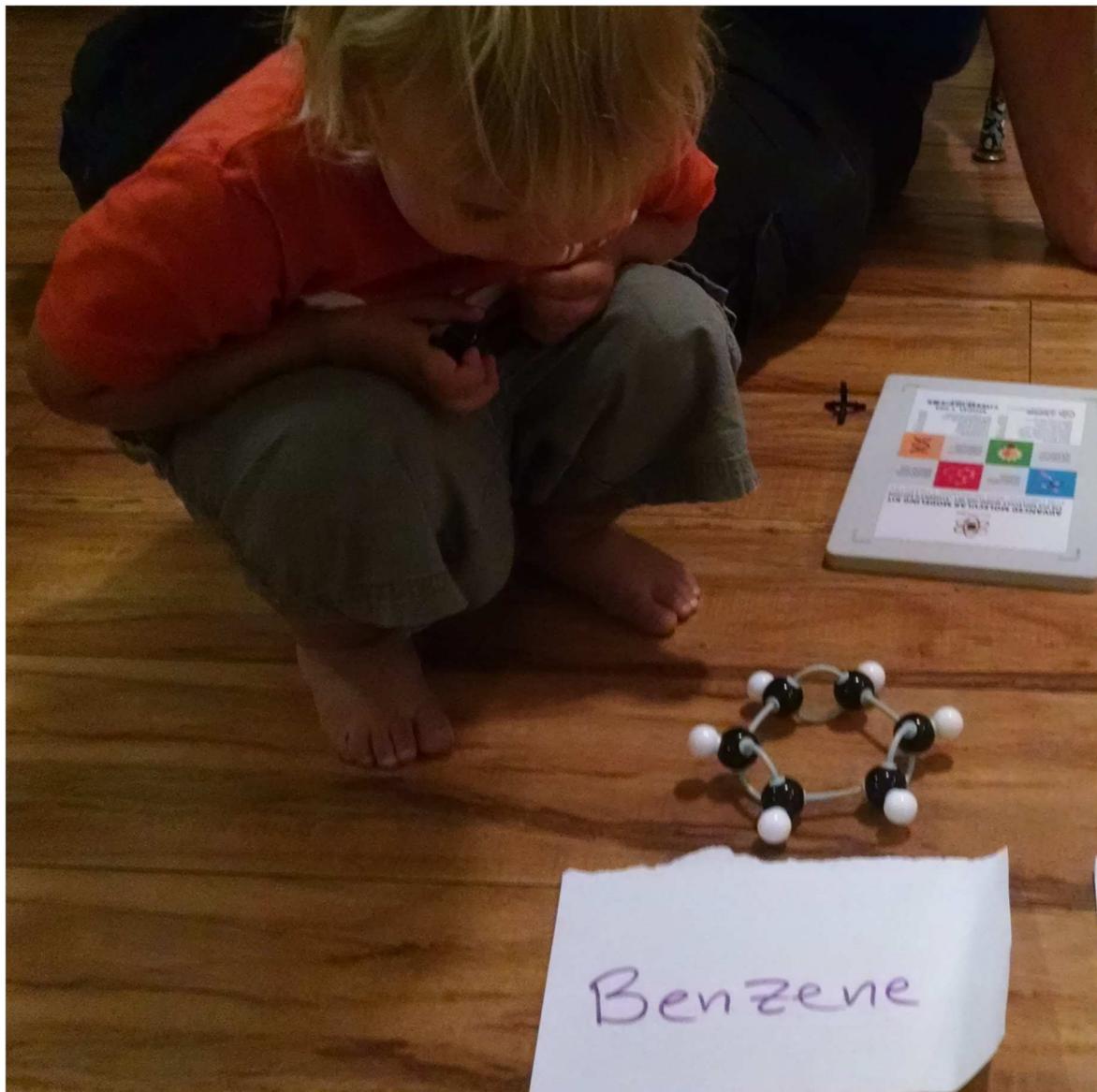


Building with Toy Molecules

By Zev Ulfeldt and Emily Coren



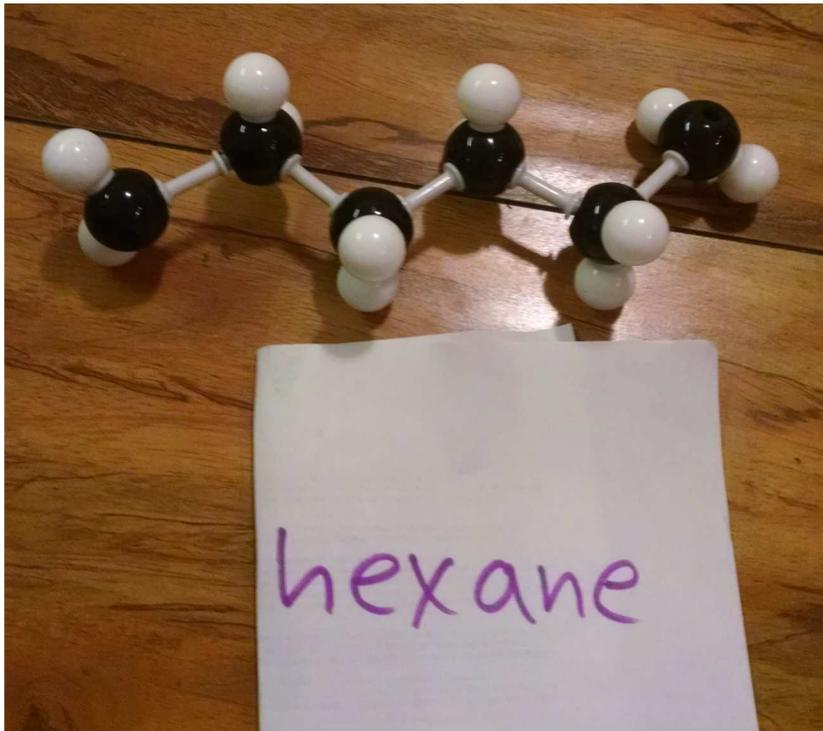
We've been playing with toy molecules.
We build molecules out of atoms.



Benzene

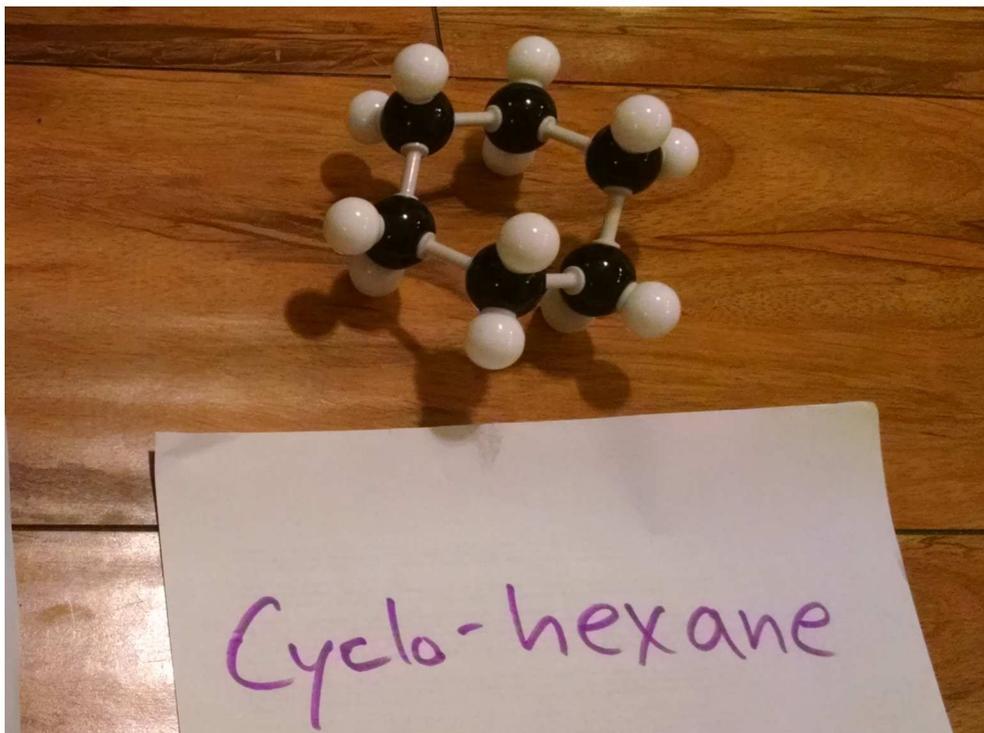
Tonight, Zev and I were comparing different molecules made of six carbon atoms.

Benzene has alternating double bonds and is C_6H_6 . Benzene is flat and is a dangerous organic solvent because it fits between the basepairs of DNA.



Hexane is a straight line, of six carbons. C_6H_{14}

There are hydrogens attached to any empty holes (valence).



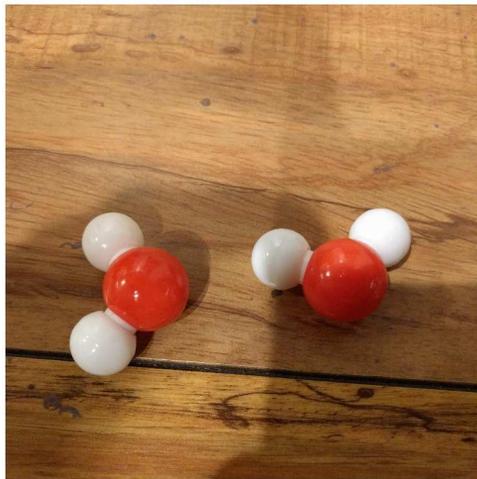
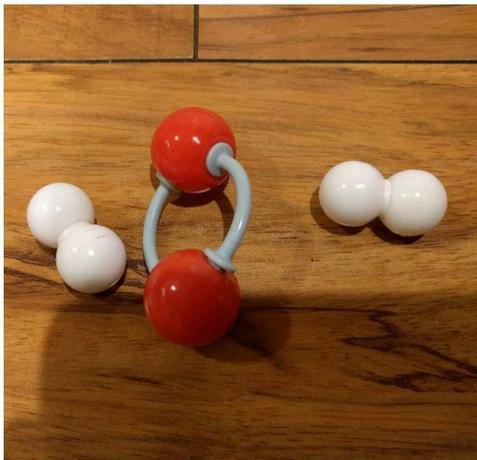
Cyclo-hexane is the same, but made into a loop. When you bond it together into a circle, you lose two hydrogen.



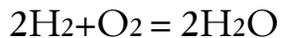
Cyclo-hexane is also a ring of six carbons, like benzene, but it has a woobly-bendy shape.



Zev will teach you combustion.



Two hydrogen molecules and one oxygen molecule mix together and go "BOOM!", then you're left with two water molecules.



We tested the water in the fish tank for ammonia, then we built a molecule of ammonia.

Here, Zev is showing you the test strip that he swished in the fishtank to test for ammonia concentration.



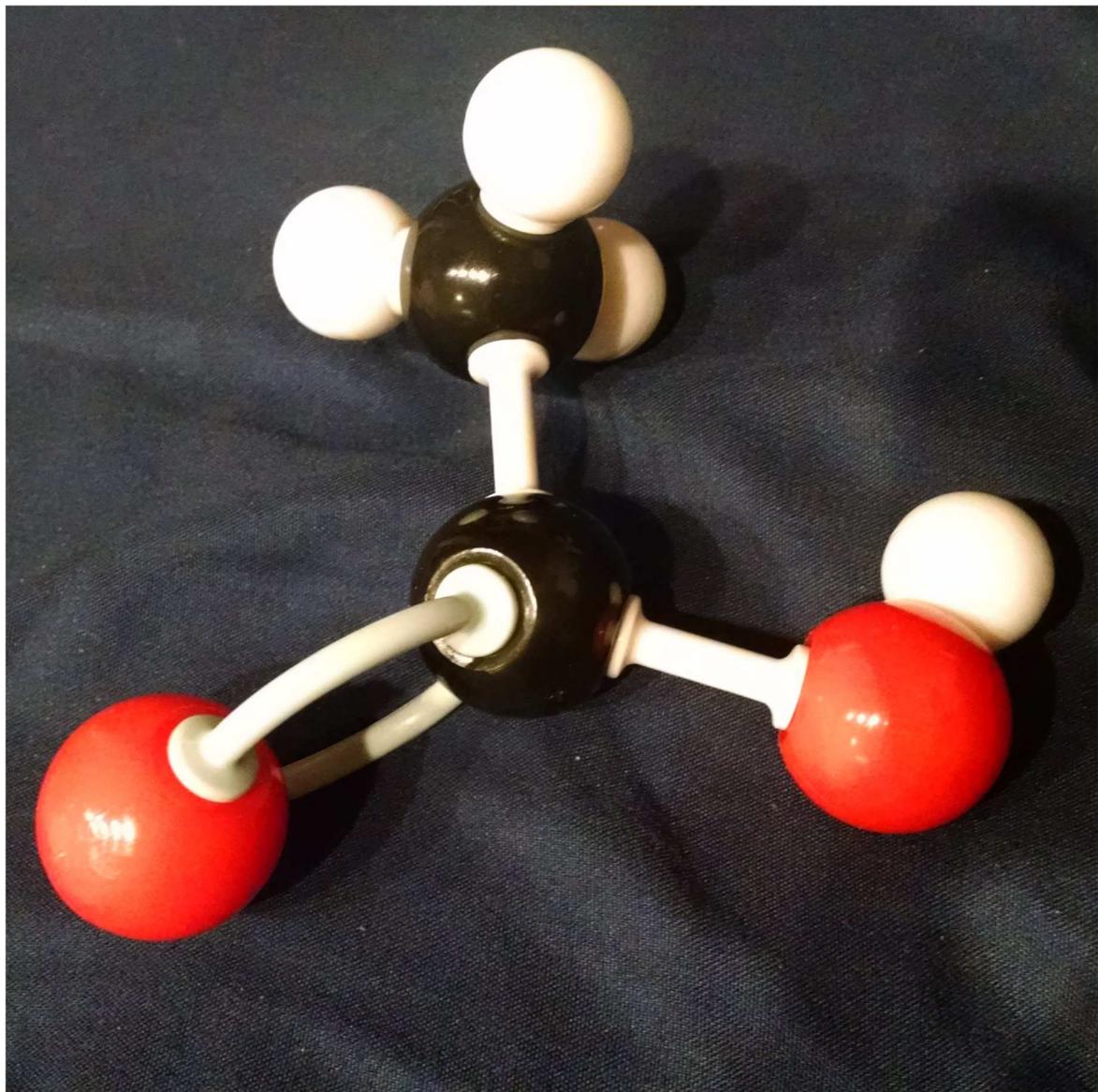


Ammonia

NH_3

One blue nitrogen attached to
three hydrogens.

The ammonia level in the fish
tank is good, but let's change
the water anyways.



Zev saw the man who comes by on a bicycle to collect our compost, clean out the compost bucket with vinegar in a spray bottle.

So, we built a molecule of Acetic acid (vinegar).



The OH off of one of the carbons is what makes it an acid.

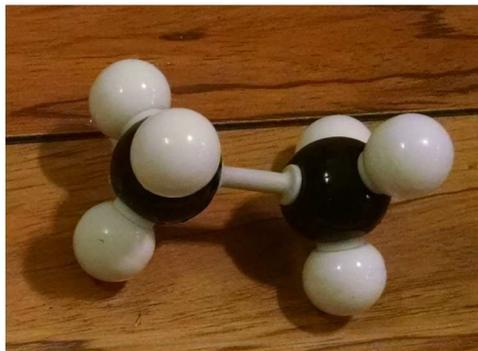
I taught Zev a rhyme "methyl, ethyl, propyl, butyl."
They are prefixes that designate the number of carbons in simple hydrocarbons (molecules made out of just carbon and hydrogen).

The ending 'ane' means all single bonds.

We built methane, ethane, propane, and butane, after dinner.



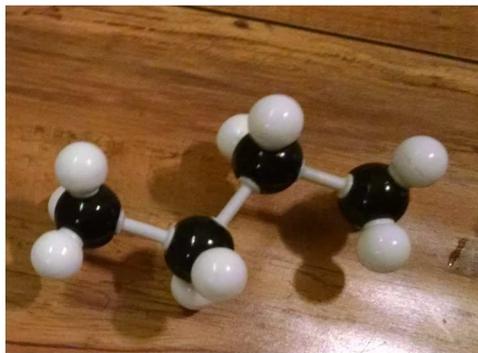
Methane



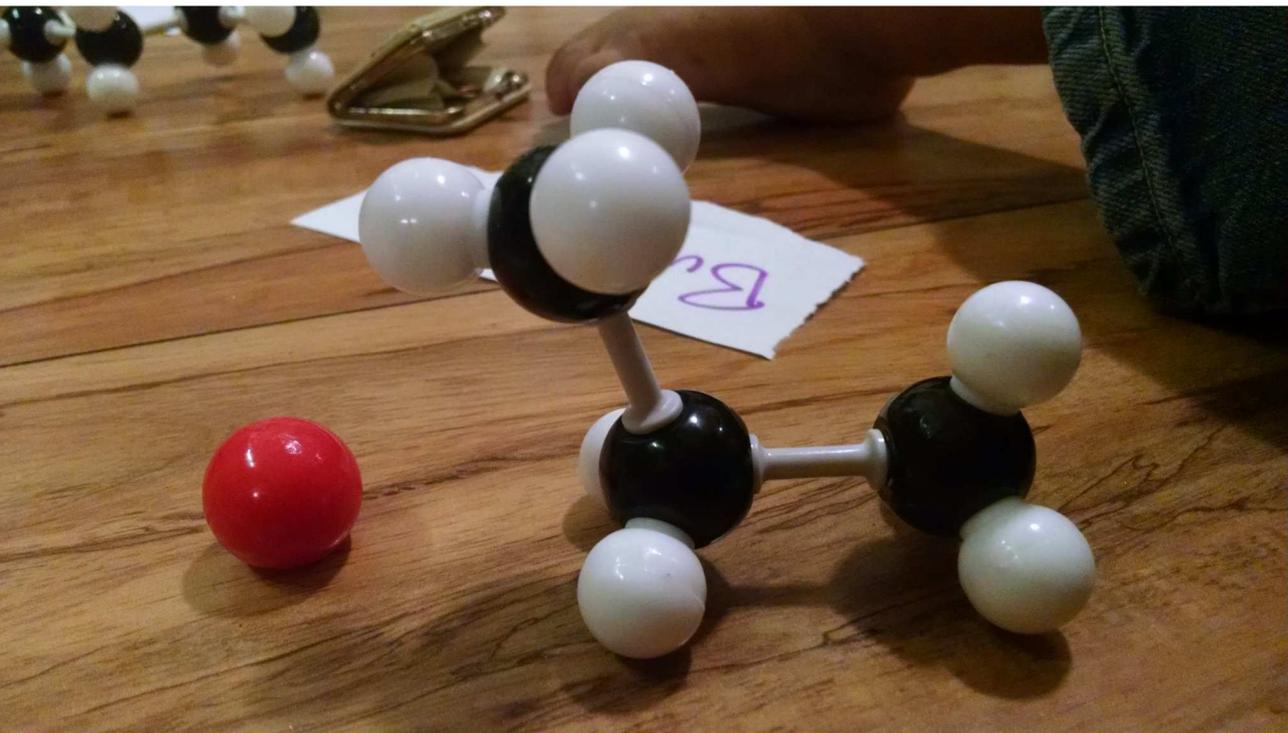
Ethane



Propane



Butane



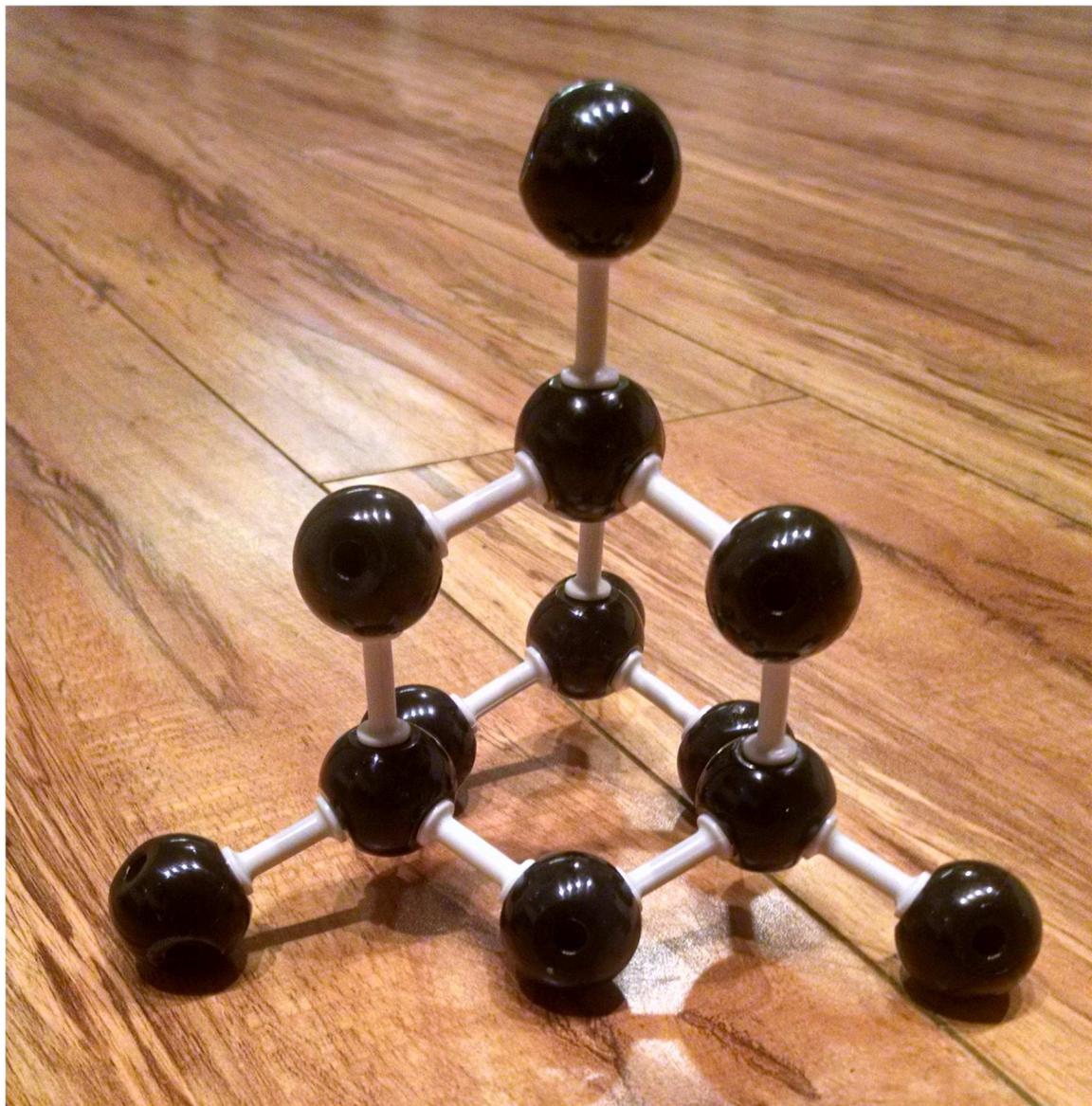
He thinks propane looks like a puppy.

Zev says, "Propane Puppy chases a red oxygen atom."

These are stinky
yellow sulfur, they
smell like rotten
eggs.

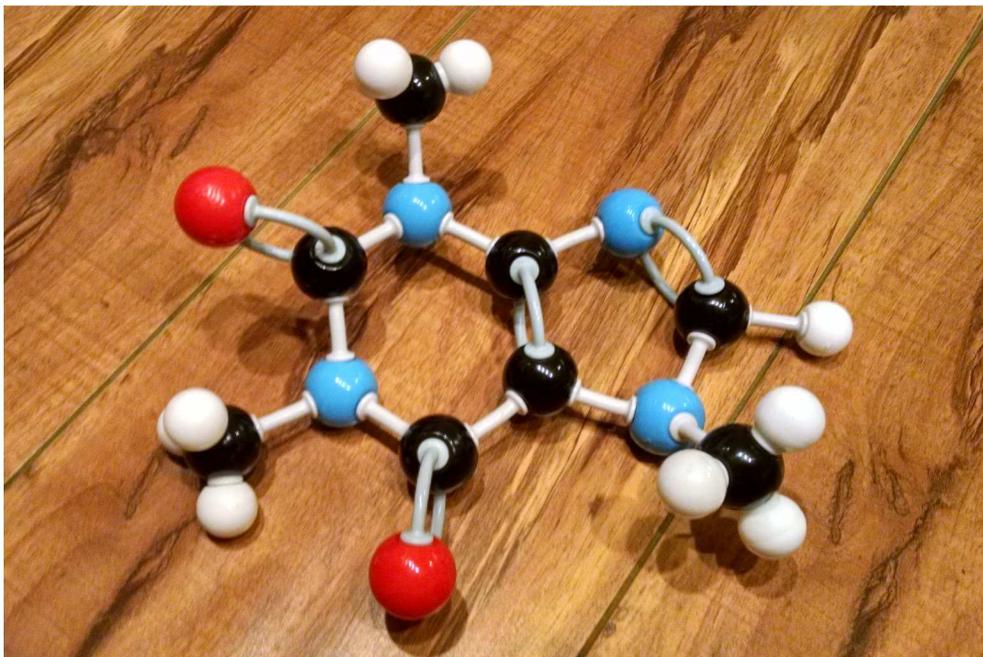


Zev and Daddy work together to make a special gift for Mommy. A diamond, all made out of carbons.



In the morning,
Mommy wants to
drink a cup of
coffee. Zev likes
playing 'barista' to
make drinks for
Mommy. The
molecule, in coffee,
that makes
Mommy feel more
awake is caffeine.





This is a molecule of caffeine, a central nervous system stimulant. 1,3,7-Trimethylpurine-2,6-dione



