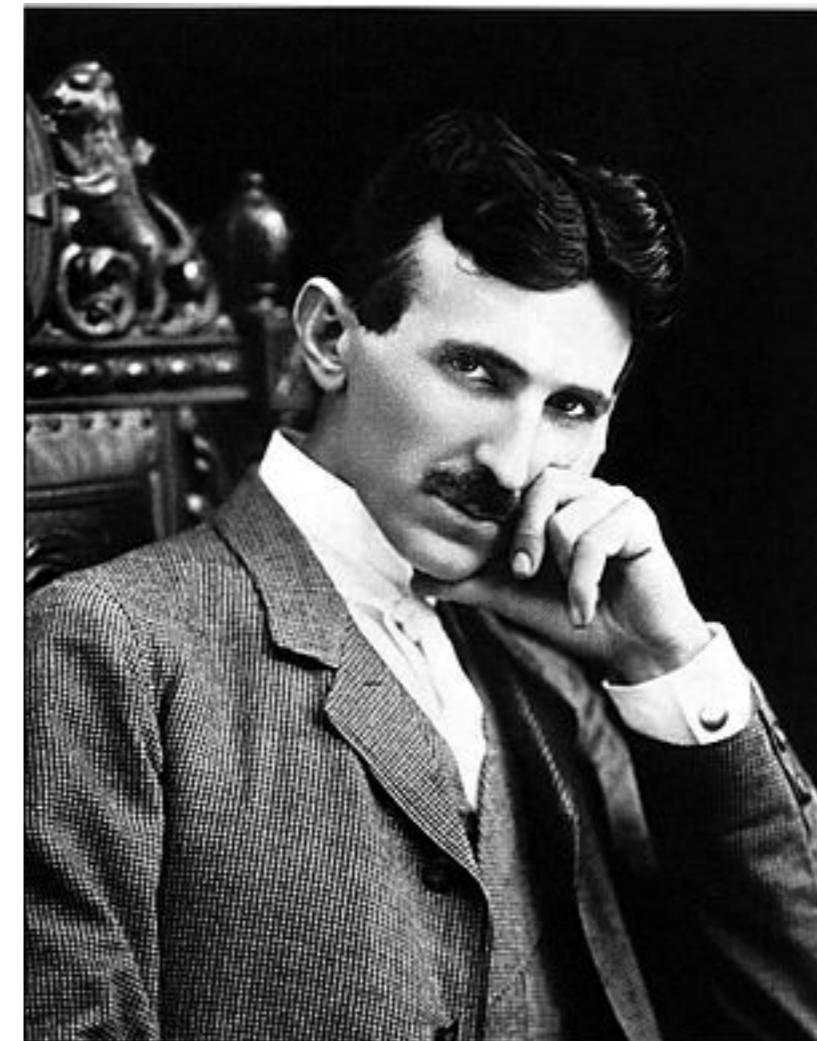


**All people everywhere should have free energy sources -
Electric Power is everywhere present in unlimited quantities
and can drive the world's machinery without the need for
coal, oil or gas.**

Nikola Tesla



Arizona State University
SES 194

Energy in Everyday Life

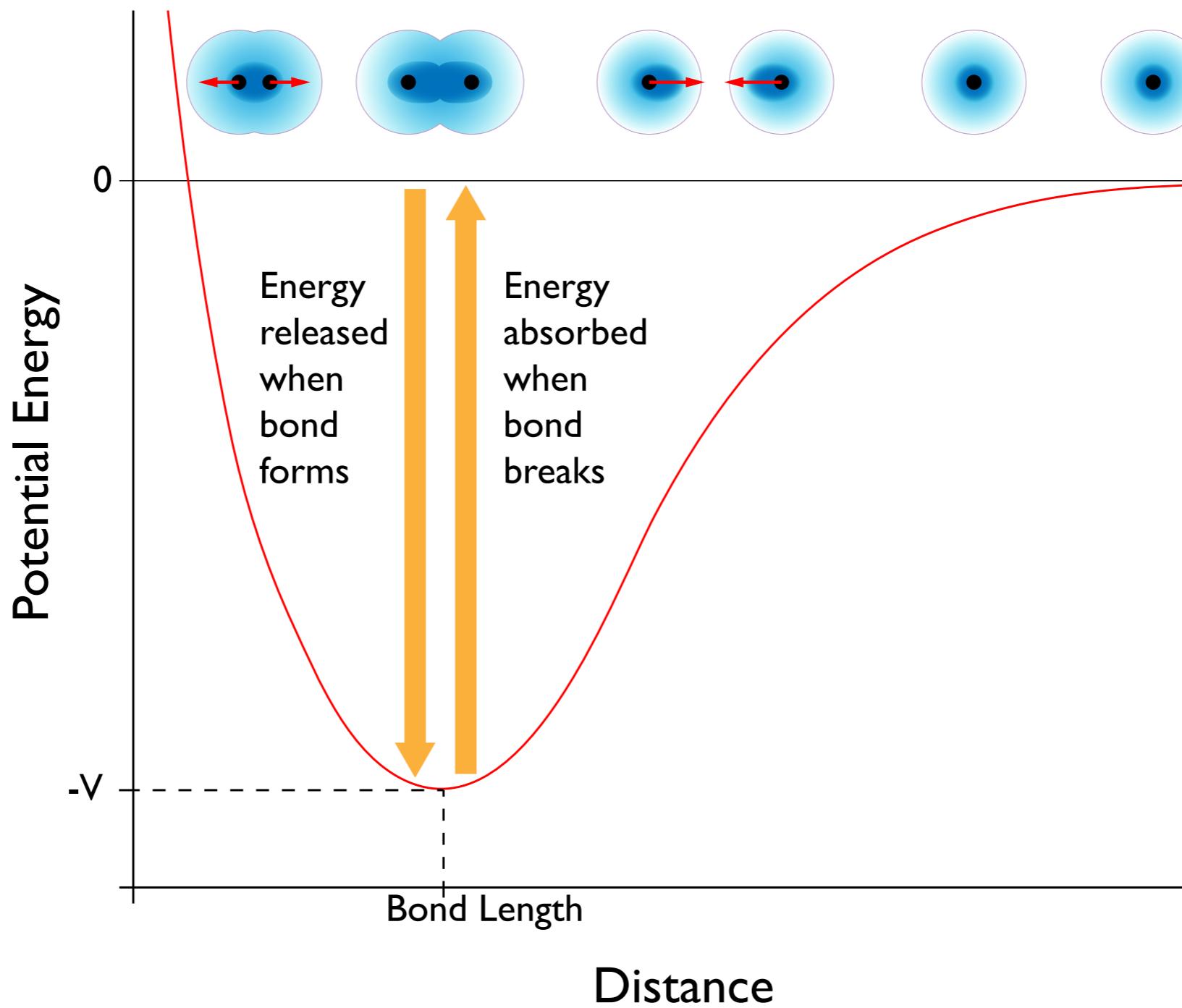
Bond Energetics

Frank Timmes

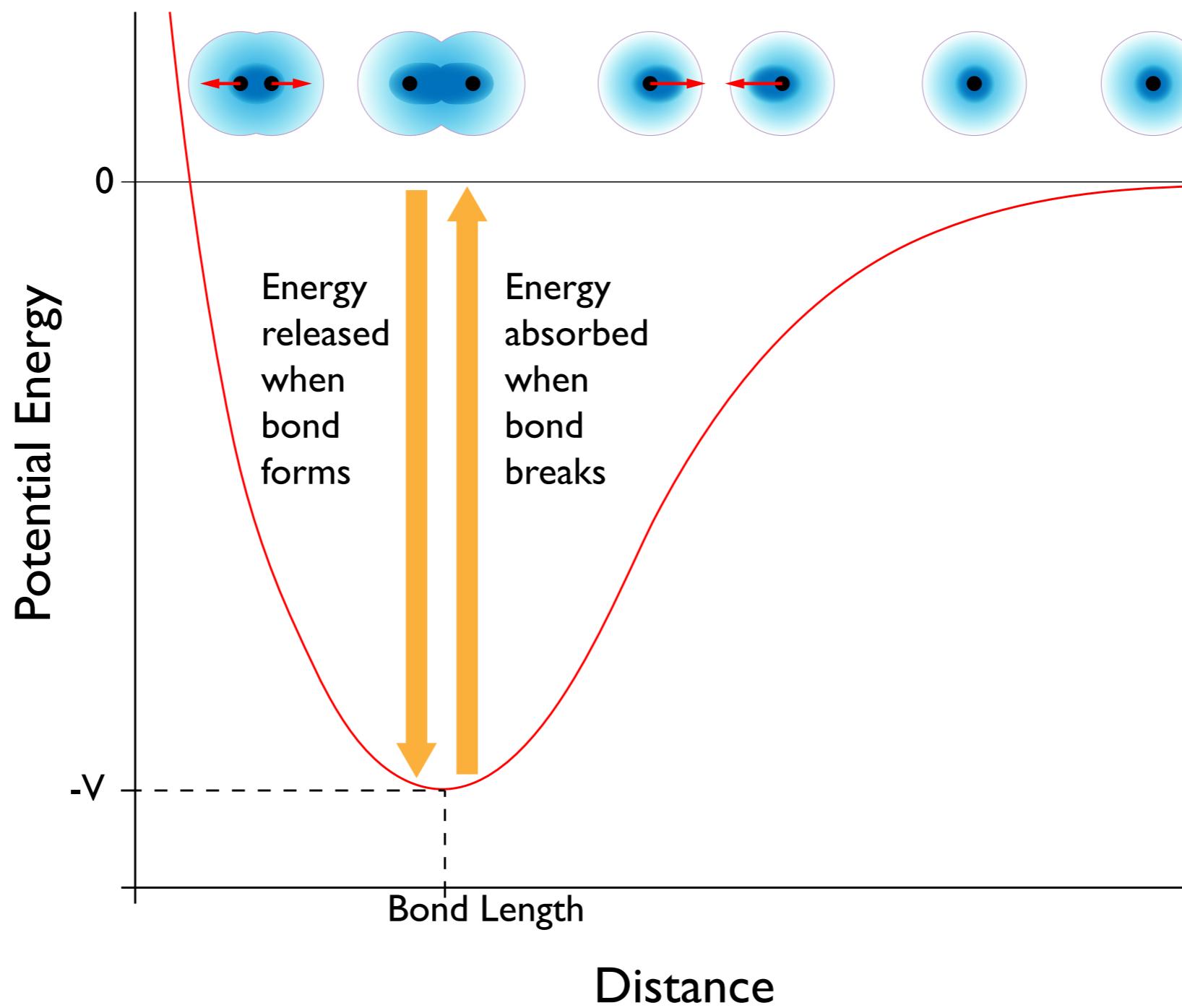
ftimmes@asu.edu

Compounds form from atoms when the atoms can find a lower energy state than when the atoms were alone.

The atoms reach a lower energy state by giving up some of their energy to make a bond.



Chemical reactions which give off energy as they proceed are called exothermic. Chemical reactions involving burning (oxidation reduction) are exothermic.

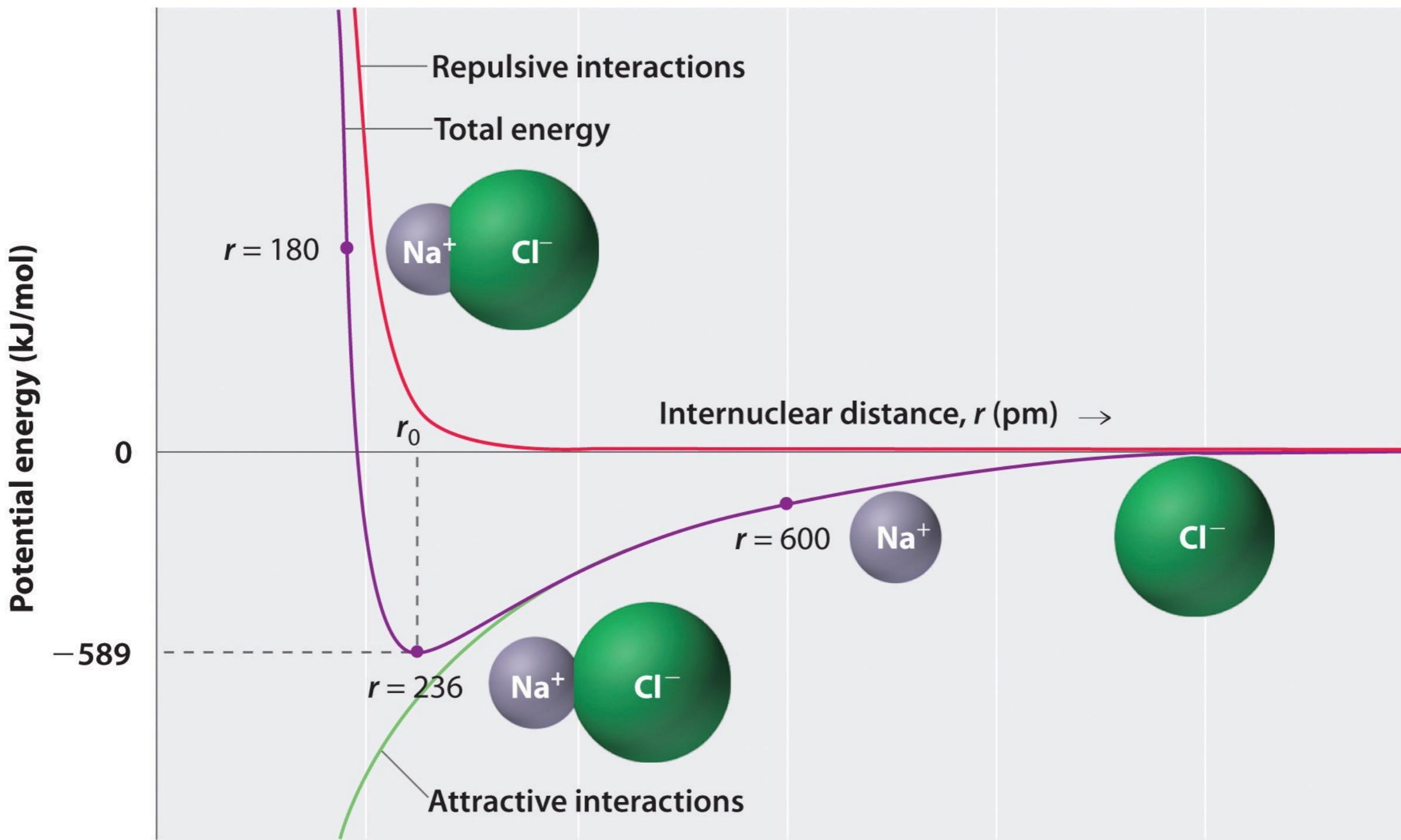


As an analogy, consider billiard balls on a pool table. It is easy for the balls to roll into holes and fall below the surface, where they can mix with other balls.



To unmix the balls, we have to give them back the gravitational energy they gave up in falling down the hole, by doing work as we lift them back onto the table.

The atoms may be separated, and bond broken, only if energy is added to the system. Chemical reactions which absorb energy as they proceed are called endothermic.



**Breaking bonds absorbs energy.
Forming bonds releases energy.**