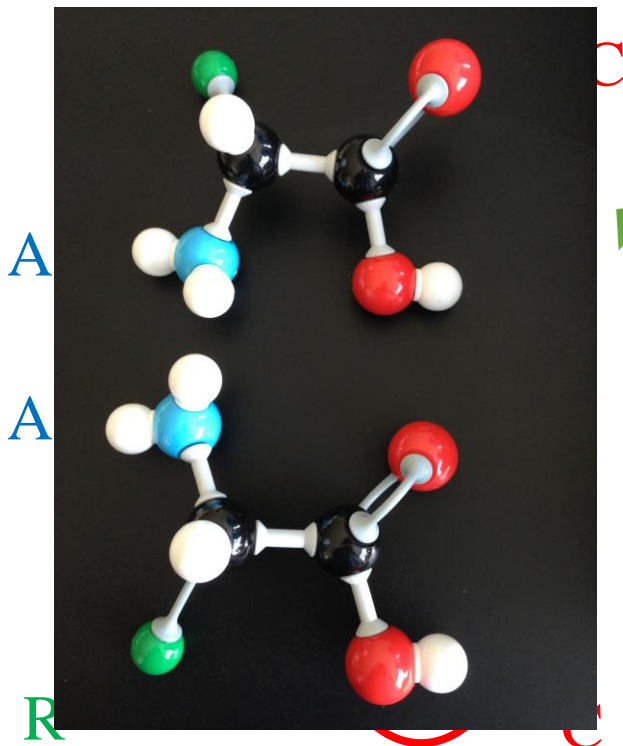


# L-form vs. D-form Amino Acids

Orient the amino acid models by holding the H (white) on the central carbon, and placing the carboxyl group (COOH = red & white) on your right.

L-form



## L-form

*\*This is the form that makes polymers in living organisms\**

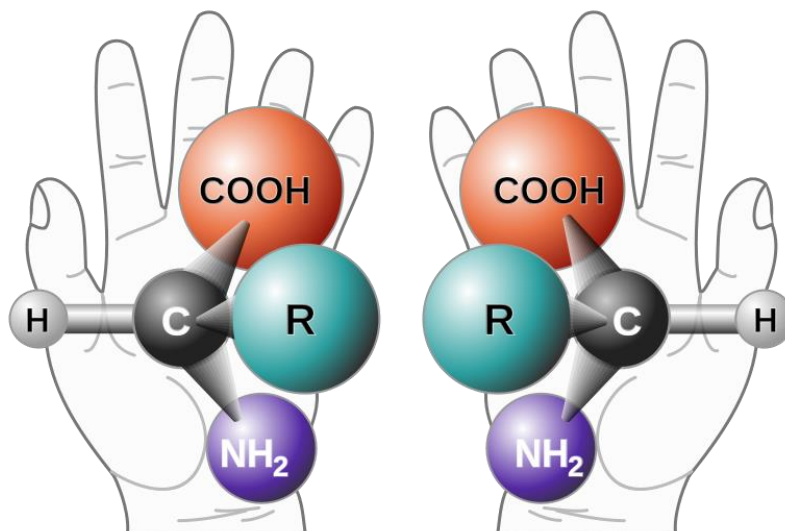
Going clockwise, we see C-A-R;  
carboxyl group (red/white), amine  
(blue/white), R-chain (green)

## D-form

*\*Does not form polymers in living organisms\**

Going clockwise, we see C-R-A;  
carboxyl group (red/white), R-side  
chain (green), amine (blue/white)

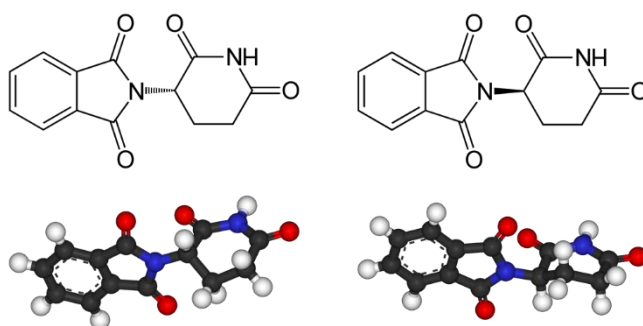
D-form



- Molecules are **chiral** if they are mirror images of each other – they cannot be superimposed upon each other
- Molecules that are chiral are referred to as **enantiomers** (the older term is stereoisomers, but this is no longer in use)
- The best example of chirality are your hands – your right hand cannot be superimposed on top of the left, but they are mirror images of each other. Snail shells are also chiral; some spiral to the left, others to the right

2 of the better-known instances of chirality:

- **Thalidomide** – given to pregnant women to combat morning sickness around 1960, one of the enantiomers of thalidomide is a teratogen (inhibits limb bud formation). As a result, thousands of infants were born with missing or malformed limbs. Even if a pure enantiomer form was manufactured, studies show that racemization occurs in vivo – in other words, given one enantiomer, the body is able to produce the other. Thalidomide is thought to inhibit angiogenesis (formation of blood vessels), and in 2006 the FDA approved the use of thalidomide to treat cancer.



The two enantiomers of thalidomide:  
Left: (*S*)-thalidomide Right: (*R*)-thalidomide

- Murchison meteorite – fell to earth in Australia in 1969, and was found to be rich in organic compounds. Over 15 amino acids were found in the meteorite, including glycine, alanine, glutamic acid, and isovaline. Both L- and D-forms of amino acids were found in the meteorite, whereas only L forms are used in protein synthesis.