molymod® Open model kit showing the atom parts and structures of the four DNA Bases

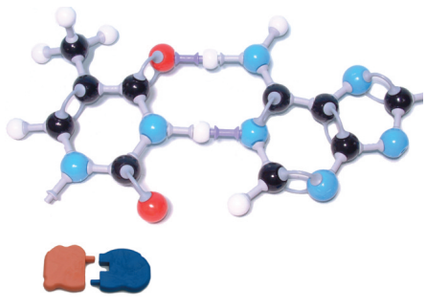
A-Adenine; C-Cytosine; G-Guanine and T-Thymine

Art. Nr. MKO-ACGT-53

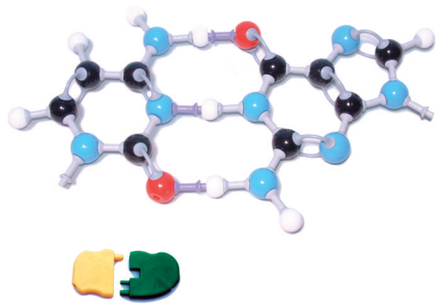
The table below shows the parts required to make one example of each of the four individual bases present in DNA and how the bases connect together using TRIPLE and DOUBLE HYDROGEN bonding:

Contents:

Total Quantity	Atoms - Type	Colour - Holes (angle)	Adenine (A)	Cytosine (C)	Guanine (G)	Thymine (T)
19	Carbon (C) Tetra.	Black - 4 (109)	5	4	5	5
4	Nitrogen (N) Pyramidal	Blue - 3 (120)	2	-	2	-
2	Nitrogen (N) Tetra.	Blue - 4 (109)	1	1	-	-
9	Nitrogen (N) Planar	Blue - 3 (120)	2	2	3	2
3	Oxygen (O) Tetra	Red - 4 (109)	-	1	1	1
1	Oxygen (O) Angular	Red - 2 (105)	-	-	-	1
12	Hydrogen (H)	White - 1	3	3	2	4
5	Hydrogen (H) Linear	White - 2 (180)	1	1	2	1
	Bonds					
28	Double - Covalent	Long grey	8	6	8	6
47	Single - Covalent	Medium grey	12	10	13	12
5	Single - Hydrogen bond	Medium purple	1	2	1	1



T - A



C - G

Community Design Registration No's: 000351325 & 000101621 Patent No. US D617,835 S

Designed and made in England by Spiring Enterprises Ltd.

molymod® advanced miniDNA®

DNA & RNA Model Kits

Self-assembly abstract model kits of D.N.A. (DEOXYRIBONUCLEIC ACID)

(C) (G)

(T) (A)

(deoxyribose) (phosphate)

The advanced miniDNA® system, featuring the major and minor grooves, comprises colour-coded, abstract-shaped parts designed to represent the nitrogenous bases, pentagonal sugar and pyramidal phosphate components needed to make a double-helix model of DNA.

The three hydrogen bonds that connect Cytosine to Guanine and the two that connect Thymine to Adenine are represented by the appropriate number of pegs.

Two DNA kits are available to make either a 12-layer (1 turn) or 22-layer (2 turns) DNA model.

Each DNA kit is supplied with assembly instructions and stand.

This dynamic model can be displayed on its stand or untwisted into a LADDER form.

Scale: 1 cm: 2 Angstroms

Community Design Registration No: 000351325 Patent No. US D617, 835 S

12-layer Advanced miniDNA®

Art. Ref. AMDNA-060-12

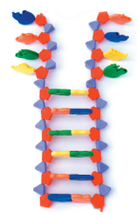
Approx. model dims: H24cm x ø 11cm

Contents:

12 Nitrogenous base pairs:
- 6 Thymine (T) (orange)
- 6 Adenine (A) (blue)
- 6 Guanine (G) (green)
- 6 Cytosine (C) (yellow)

2 Polynucleotide side chains:
- 24 Deoxyribose (red)
- 24 Phosphate (purple)

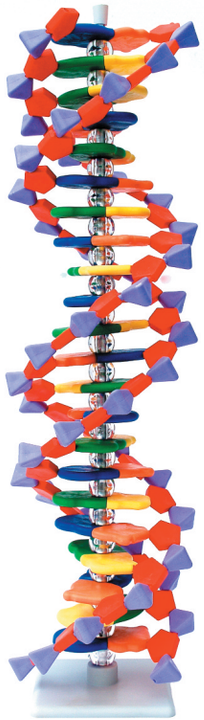
Stand:
- 1 Model stand
- 1 Support rod
- 12 Spacers
- 1 cap
- Self-assembly leaflet
- All packed in a plastic box



When fully assembled on its stand, this model features the major and minor grooves.

This model can also be made in its ladder form and unzipped to demonstrate the process of REPLICATION.

Community Design Registration No: 000351325 Patent No. US D617, 835 S



22-layer Advanced miniDNA®

Art. Ref. AMDNA-060-22

Approx. model dims: H44cm x ø 11cm

Contents:

22 Nitrogenous base pairs:
11 Thymine (T) (orange)
11 Adenine (A) (blue)
11 Guanine (G) (green)
11 Cytosine (C) (yellow)
2 Polynucleotide side chains:
44 Deoxyribose (red)
44 Phosphate (purple)

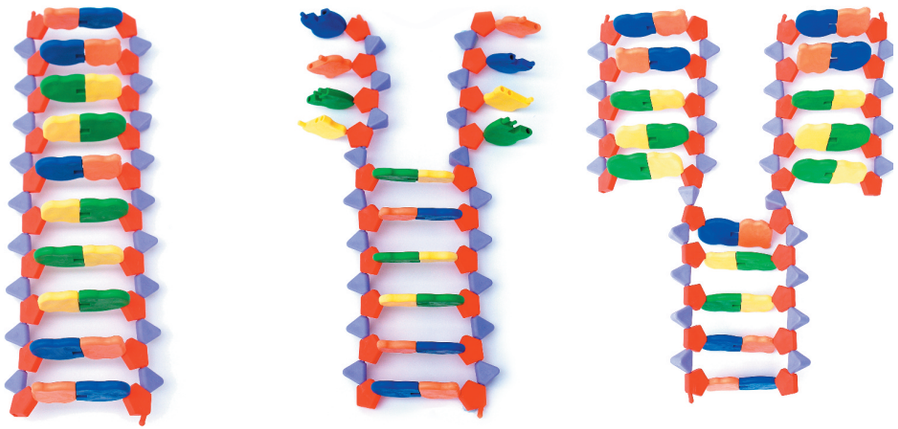
Stand:
1 Model stand
1 Support rod
24 Spacers
1 cap
Self-assembly leaflet
All packed in a plastic box

A self-assembly abstract model of a 22-layer (2 turns) double-helix of Deoxyribonucleic acid.

When fully assembled on its stand, this model features the major and minor grooves.

REPLICATION of D.N.A. using the 22-layer kit

Make the ladder form of a 10-layer DNA model: Unzip five layers of the model and fold back the deoxyribose/phosphate, then add the complementary bases to complete the second DNA.



A similar approach can be used with the RNA kit to model the process of **TRANSCRIPTION**, i.e. the creation of Messenger RNA.

R.N.A. (RIBONUCLEIC ACID)

RNA consists of the three bases: **C**, **G**, **A** as in DNA, and **Uracil** (**U**), which replaces **Thymine** (**T**) in DNA.

The sugar group in RNA is **RIBOSE** compared with deoxyribose in DNA. Ribose has more oxygen in the form of an OH group. This is represented by a darker red model piece. RNA is responsible for controlling the process of amino acid sequencing during protein synthesis.

(ribose) (uracil)

RNA / Protein Synthesis Kits

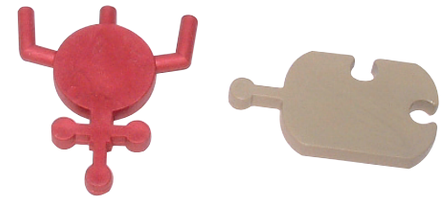
Art. Ref. AMRNA-12.p.s. & AMRNA-24.p.s.

There are two kits available: 12 base AMRNA-12.p.s. or 24 base AMRNA-24.p.s.

These two kits contain 12 or 24 bases respectively.

Each can be used to make a single strand model of messenger RNA carrying the genetic code (CODONS) and component parts to represent TRANSFER RNA and an amino acid.

These can be used to demonstrate the process of protein synthesis known as TRANSLATION.



tRNA amino acid

Contents of the two kits are as follows:

Community Design Registration No: 000101621

AMRNA-12.p.s.
3 Uracil (U) light blue
3 Adenine (A) blue
3 Guanine (G) green
3 Cytosine (C) yellow
6 Ribose - dark red
6 Phosphate - purple
2 Amino acid part
2 Transfer RNA part

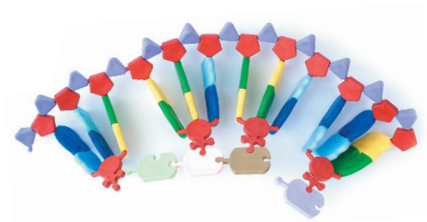
AMRNA-24.p.s.
6 Uracil (U) light blue
6 Adenine (A) blue
6 Guanine (G) green
6 Cytosine (C) yellow
12 Ribose - dark red
12 Phosphate - purple
4 Amino acid part
4 Transfer RNA part

Translation and Protein Synthesis

Messenger mRNA carries the triplet code.

A 12 base model consists of four Codons.

The strand moves to the Ribosome where it reacts with another type of RNA called transfer tRNA. Transfer RNA has a “cloverleaf”-shaped structure which is represented by a 3-prong unit.



Transfer RNA carries an amino acid specific to the three bases of the anti-codon. During the process of TRANSLATION the mRNA temporarily forms base pairs between the codons and anticodons. The attached amino acid forms a peptide link with the adjacent amino acid to form a PROTEIN.