



DNA: Paper Protein Chains

Directions: Write your first and last name into the boxes below - one letter per row. Choose one of the amino acid **CODONS** for each letter of your name. Write the **color** of the amino acid in the column. Pick up one colored strip for each letter in your name and write one codon on each link. Staple the first link and attach one link at a time in order. Hang up your new protein chain.

First and Last Name	Codon	Link Color

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Sample Name with Codons & Colors

First and Last Name	Codon	Link Color	
R	AGA	LT BLUE	
O	-	BLACK	
S	TCT	PINK	
A	GCC	RED	
L	CTT	RED	
I	ATT	RED	
N	AAT	DK BLUE	
D	GAT	ORANGE	
F	TTT	GREEN	
R	CGT	LT BLUE	
A	GCT	RED	
N	AAT	DK BLUE	
K	AAA	LT BLUE	
L	TTA	RED	
I	ATA	RED	
N	AAT	DK BLUE	

DNA: Paper Protein Chains**Table of Amino Acids, Codons, and link colors**

Letter	Abbrev.	Amino Acid	DNA Codons - choose one per link	Color
A	Ala	Alanine	GCA, GCC, GCG, GCT	Red
C	Cys	Cysteine	TGC, TGT	Yellow
D	Asp	Aspartic acid	GAC, GAT	Orange
E	Glu	Glutamic acid	GAA, GAG	Orange
F	Phe	Phenylalanine	TTC, TTT	Green
G	Gly	Glycine	GGA, GGC, GGG, GGT	Red
H	His	Histidine	CAC, CAT	Lt. Blue
I	Ile	Isoleucine	ATA, ATC, ATT	Red
K	Lys	Lysine	AAA, AAG	Lt. Blue
L	Leu	Leucine	CTA, CTC, CTG, CTT, TTA, TTG	Red
M	Met	Methionine	ATG	Yellow
N	Asn	Asparagine	AAC, AAT	Dk. Blue
P	Pro	Proline	CCA, CCC, CCG, CCT	Red
Q	Gln	Glutamine	CAA, CAG	Dk. Blue
R	Arg	Arginine	AGA, AGG, CGA, CGC, CGG, CGT	Lt. Blue
S	Ser	Serine	AGC, AGT, TCA, TCC, TCG, TCT	Pink
T	Thr	Threonine	ACA, ACC, ACG, ACT	Pink
V	Val	Valine	GTA, GTC, GTG, GTT	Red
W	Trp	Tryptophan	TGG	Green
Y	Tyr	Tyrosine	TAC, TAT	Green

The following letters will use Black: **B, J, O, U, X, Z**

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Use this lesson with the Chemistry Graphic of Amino Acids - Download the following handout from:
<http://www.compoundchem.com/wp-content/uploads/2014/09/20-Common-Amino-Acids-v2.pdf>

A GUIDE TO THE TWENTY COMMON AMINO ACIDS

AMINO ACIDS ARE THE BUILDING BLOCKS OF PROTEINS IN LIVING ORGANISMS. THERE ARE OVER 500 AMINO ACIDS FOUND IN NATURE - HOWEVER, THE HUMAN GENETIC CODE ONLY DIRECTLY ENCODES 20. *ESSENTIAL AMINO ACIDS MUST BE OBTAINED FROM THE DIET, WHILST NON-ESSENTIAL AMINO ACIDS CAN BE SYNTHESISED IN THE BODY.

Chart Key: ● ALIPHATIC ● AROMATIC ● ACIDIC ● BASIC ● HYDROXYLIC ● SULFUR-CONTAINING ● AMIDIC ● NON-ESSENTIAL ○ ESSENTIAL

Chemical Structure single letter code	NAME three letter code DNA codons	CLASSIFICATION	GENETIC CODE
	ALANINE Ala	Aliphatic	GCT, GCC, GCA, GCG
	GLYCINE Gly	Aliphatic	GGT, GGC, GGA, GGG
	ISOLEUCINE Ile	Aliphatic	ATT, ATC, ATA
	LEUCINE Leu	Aliphatic	CTT, CTC, CTA, CTG, TTA, TTG
	PROLINE Pro	Aliphatic	CCT, CCC, CCA, CCG
	VALINE Val	Aliphatic	GTT, GTC, GTA, GTG
	PHENYLALANINE Phe	Aromatic	TTT, TTC
	TRYPTOPHAN Trp	Aromatic	TGG
	TYROSINE Tyr	Hydroxylic	TAT, TAC
	ASPARTIC ACID Asp	Acidic	GAT, GAC
	GLUTAMIC ACID Glu	Acidic	GAA, GAG
	ARGININE Arg	Basic	CGT, CGC, CGA, CGG, AGA, AGG
	HISTIDINE His	Basic	CAT, CAC
	CYSTEINE Cys	Sulfur-containing	TGT, TGC
	METHIONINE Met	Sulfur-containing	AAT, AAC
	ASPARAGINE Asn	Amidic	AAT, AAC
	GLUTAMINE Gln	Amidic	CAA, CAG
	SERINE Ser	Hydroxylic	TCT, TCC, TCA, TCG, AGT, AGC
	THREONINE Thr	Hydroxylic	ACT, ACC, ACA, ACG
	LYSINE Lys	Aliphatic	AAA, AAG

Note: This chart only shows those amino acids for which the human genetic code directly codes for. Selenocysteine is often referred to as the 21st amino acid, but is encoded in a special manner. In some cases, distinguishing between asparagine/aspartic acid and glutamine/glutamic acid is difficult. In these cases, the codes asx (D) and gx (L) are respectively used.