

Protein Synthesis and Codons Practice

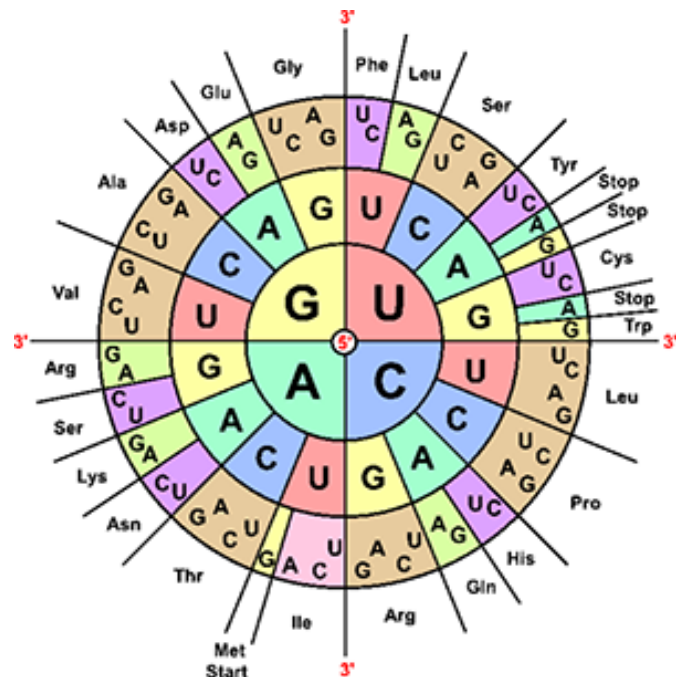
Protein synthesis is the process where a sequence of DNA is used to build a protein from individual amino acids. The first step in this process is called **TRANSCRIPTION**, where a coding region of DNA is converted to messenger RNA (mRNA). During transcription, mRNA is made from the DNA sequence following the base pair rule, except RNA does not contain the base **Thymine**, but instead has **Uracil**. The mRNA then leaves the nucleus and goes to a ribosome in the cell's cytoplasm. The ribosome reads the message three bases at a time, called a **CODON**. Each codon will specify a single amino acid. The amino acids are joined together and folded into a protein, a process called **TRANSLATION**

Key Points

- DNA is used to make a copy of mRNA (transcription)
- mRNA leaves the nucleus and goes to ribosomes
- 3 bases = codon
- 1 codon = a single amino acid
- A chain of amino acids = a protein
- Protein synthesis is also called translation

Biologists use a codon chart or a codon wheel to determine the amino acids. Amino acids are usually abbreviated on these charts as three letter words, like Cys and Ser.

		Second base in codon			
		U	C	A	G
First base in codon	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } UCC } Ser UCA } UCG }	UAU } Tyr UAC } UAA Stop UAG Stop	UGU } Cys UGC } UGA Stop UGG Trp
	C	CUU } CUC } Leu CUA } CUG }	CCU } CCC } Pro CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } CGC } Arg CGA } CGG }
	A	AUU } AUC } Ile AUA } AUG Met or start	ACU } ACC } Thr ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }
	G	GUU } GUC } Val GUA } GUG }	GCU } GCC } Ala GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } GGC } Gly GGA } GGG }
		Third base in codon			
		U	C	A	G



1. Use the codon chart to write the amino acid that corresponds to each codon found in mRNA:

CCC _____	AGU _____
CAG _____	UAC _____
GAA _____	CGU _____
UUU _____	CCA _____

2. Write the CODON that corresponds with each amino acid. There may be more than one. The full names are written, but the codon chart only shows the first three letters.

proline _____	glycine _____
valine _____	phenylalanine _____
histidine _____	arginine _____

3. A single codon is used to signal the beginning of protein synthesis. It is commonly called the START CODON.

Locate the start codon on the chart. What are the three bases of this codon? _____

4. There are three codons that signal the end of synthesis, these are called STOP codons.

What are the three stop codons? _____

5. For each sequence of DNA is shown. Write the complementary RNA sequence underneath the letters, then use the codon chart to determine the amino acid sequence:

DNA → **T A C C A T G G A A T T A C T**

RNA →

Amino Acids →

DNA → **T T C A A T G G T C T A G G G**

RNA →

Amino Acids →

DNA → **A C A T T T C A G A C C G T C**

RNA →

Amino Acids →