

Answer Key - Quantitative Question from Lecture #2

The high $[Mg^{2+}]$ concentration in the *in vitro* translation reaction allows for AUG-independent initiation. A codon is a three-nucleotide sequence. You are given that the synthetic mRNA is composed of equal amounts of A and U. Thus, the total number of possible codons in the artificial transcript is 2^3 (i.e. $2 \times 2 \times 2$) = 8 codons. In a totally random hetero-copolymer of A and U, these codons would be:

AAA = Lys

UAA = Stop

AUA = Ile

AAU = Asn

UUA = Leu

UAU = Tyr

AUU = Ile

UUU = Phe

Because the probability of finding each of these codons in the RNA is equal (because the probabilities of finding A or U at any given position in the RNA are equal), you should get, as the product of *in vitro* translation, a mixture of peptides (because the Stop codon will occur with a frequency as great as that for any of the individual amino acid residues, except Ile) that are composed of the following amino acid residues in the indicated molar ratios:

Asn:Ile:Leu:Lys:Phe:Tyr::1:2:1:1:1:1