CONCEPT: QUATERNARY STRUCTURE

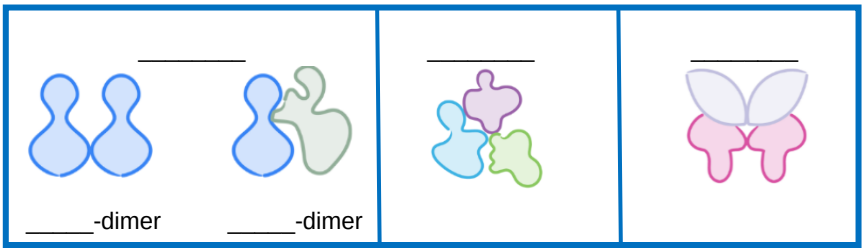
●*Quaternary protein structure*: single protein-complex consisting of _____ polypeptide chains.

□ _____: any polypeptide chain that assembles with other polypeptide chains to form quaternary structure.

□ Subunits can be identical ("_____") or different ("_____").

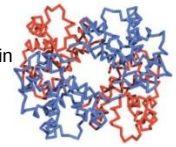
●Dimers, trimers, & tetramers consist of ____, ____, & ____ subunits, respectively.

EXAMPLE: Quaternary structure.



PRACTICE: Hemoglobin, a four-subunit protein, contains only two different types of subunits and is therefore a:

a) Dimer. b) Heterodimer. c) Homotetramer. d) Heterotetramer.

Hemoglobin 

Quaternary Structure Interactions

●Subunits mainly interact with each other via _____ interactions (ex. hydrophobic effect).

□ Disulfide bridges can _____ link subunits, but _____ of subunits are *not* covalently linked.

□ Conformational changes in one subunit can _____ the other subunits.

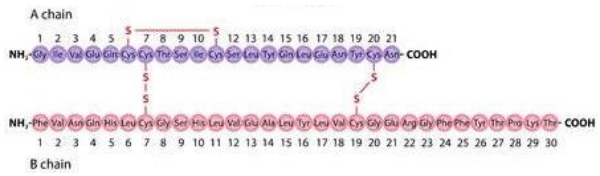
EXAMPLE:

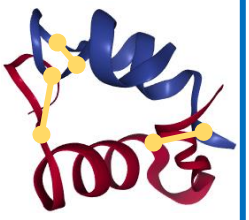
Hemoglobin

-____ subunits.

-____ disulfide bonds.

Insulin





-____ subunits.

-____ disulfide bonds.

PRACTICE: Which of the following statements about protein structure is correct?

a) The α-helix is stabilized primarily by ionic interactions between amino acid R groups.
b) Disulfide bond formation can only form between adjacent cysteine residues in a sequence.
c) The stability of quaternary structure in all proteins is primarily due to covalent bonds between subunits.
d) The denaturation of a protein always leads to irreversible loss of secondary & tertiary structure.
e) Quaternary subunits complex primarily through hydrophobic interactions between chains.

CONCEPT: QUATERNARY STRUCTURE

PRACTICE: Which of the following correctly orders the protein structural terms from lowest to highest complexity?

a) Primary structure < 2 subunits < motif < domain < secondary structure < tetramer < Tertiary structure.
b) Primary structure < Secondary structure < domain < motif < Tertiary structure < 2 subunits < tetramer.
c) Primary structure < Secondary structure < motif < 2 subunits < Tertiary structure < domain < tetramer.
d) Primary structure < Secondary structure < motif < domain < Tertiary structure < 2 subunits < tetramer.
e) Primary structure < motif < secondary structure < domain < 2 subunits < Tertiary structure < tetramer.

PRACTICE: Match each level of protein structure to the appropriate real-world description.

_____ Primary Structure. _____ Secondary structure. _____ Tertiary structure. _____ Quaternary structure.

a) Myoglobin folds so that most its hydrophobic residues are interior & its hydrophilic ones are exterior.
b) The preproinsulin polypeptide is 110 amino acids long.
c) Malate dehydrogenase, a citric acid cycle enzyme, is a homooctamer composed of 8 identical subunits.
d) Proteins that use NADH as a cofactor contain an NADH-binding site comprised of anti-parallel β-sheets.