2018 Antibody Building (Immunoglobulin IgG1) antigen binding glycoprotein

Task for practical studies: http://aris.gusc.lv/06Daugavpils/Research/ImmunoGlobulASmed.doc

Molecule viewers: ChemScape RasMol MAGE ⁴ISIS Draw \$ FireFox v.3.5.5 at Display conditions: Stick (on Menu Stripe) Ball & Stick Spacefill the **CPK** color scheme 1965 Atom Name Symbol Color Valence Number **USA** patent **Journal** Carbon Gray lightly or Black publication of scientists \mathbf{C} Corey, Pauling, Koltun Hydrogen White \mathbb{H} Oxygen **Red** 2 (donor acceptor ligand up to 4) for atomic modeling 0 Protein **Backbone** is **C**α trace Nitrogen 3 + 1 (donor acceptor ligand up N Bluish to 4) Sulfur **-2**, +6 S **Yellow** Phosphor P **Yellow** Intensive dark 5(&3) Polypeptide of Amino Acids +1 (coordination up to 6) Sodium ion Na^{+} Blue Side chains: Hydrophobic +2 (coordination up to 6) Magnesium ion Green Polar pH=7.36 Calcium ion +2 (coordination up to 6) **Gray** Dark **Acidic-COO** negative Iron ion **Yellow** Gray +2 (coordination up to 6) Basic-NH₃⁺ positive +3 (coordination up to 6) **Yellow** Gray Iron ion

Antigenic determined **A B AB O** blood groups: http://aris.gusc.lv/06Daugavpils/Research/33BloodGroupABO.doc **1. Using HomeWork:** http://aris.gusc.lv/06Daugavpils/Research/Amineac20LS.doc

What 20 amino acids make up proteins call them using three letter and one letter Amino Acid abbreviations? Which are simplest and largest amino acid of 20 write its molar mass g/mol?!

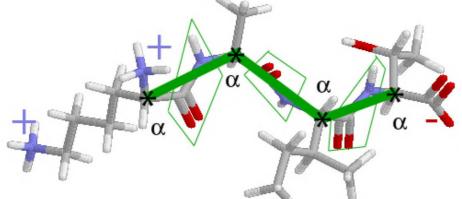
| 1 | Gly - G | 5 | Ile - I | 9 | Met- M | 13 | Gln - Q | 17 | Phe-F |
|---|---------|---|---------|----|---------|----|---------|----|---------|
| 2 | Ala - A | 6 | Ser - S | 10 | Asp- D | 14 | Arg-R | 18 | Tyr - Y |
| 3 | Val - V | 7 | Thr - T | 11 | Asn- N | 15 | Lys - K | 19 | Trp - W |
| 4 | Leu-L | 8 | Cys-C | 12 | Glu - E | 16 | His - H | 20 | Pro - P |

simplest is glycine Gly – G 75,0666 g/mol and tryptophan Trp – W 204,225 g/mol...... In FireFox3.5.5 http://aris.gusc.lv/ChemFiles/ChimAntibodyMarz/INDEX.htm choose of the

molecule AntibodyMarz home page and investigate Immunoglobulin molecule for

Lysozime binding Anti-Body

2. How are made **backbone** of polypeptide sequence chains and which atom of amino acid is responsible for **backbone** trace formation? Point four α Carbons of Amino Acids and draw Backbone trace tetra peptide 3D



molecular model picture! Write the <u>tetra</u>

<u>Peptide</u> chain sequence using <u>three letter</u>

Amino Acid names

starting from <u>N-terminus</u> and

finishing with <u>C-terminus</u>!

H₃N⁺-Lys1-Ala2-Ile3-Thr4-COO⁻......

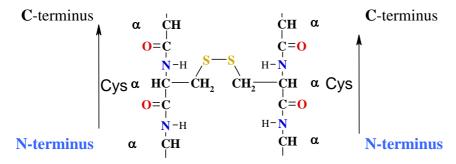
Call terminus

N-terminus & C-terminus amino acid! N-terminus Amino Acid: Lysine 1 C-terminus Amino Acid: Threonine 4

Draw inside frame-boxes three peptide bonds for given tetra peptide molecular model picture!

- 3. What amino acid is N-terminus and C-terminus on Light chains? GLU501......, SER716......
- **4.** What amino acid is **N-terminus** and **C-terminus** on **Heavy** chains? GLU1......, LEU452......
- 5. Haw many amino acids constitute Light and Heavy chains? Light 216=716-501+1......, Heavy 452......
- **6.** What fife 5 intermolecular forces are known in biochemistry of life systems?
- 1. Hydrogen, 2. Hydrophobic, 3. Salt bridge, 4. Sulfur S-S- disulfide bridge, 5. Coordinative donor-acceptor bond

6a. What means **disulfide**, **-S-S-bonds**? Draw its structural presentation on your report notes between two **2** Cys amino acid residues implicated into two **2** neighbor protein chains as **backbone**?!



- 7. What is Immunoglobulin Domain C_L? constant Light CL Chain domain
- **9.** What mean and to what medium faced are oriented laying polar/polar or/and **charged** negative as **charged**positive **amino acid** side chains? to water as electrostatic interaction forces
- 10. Where are oriented hydrophobic side chains? water structure compress interior together......
- 11. Haw many intermolecular forces of five known fold protein chain? Four
- **12.** Call four **4** molecular interaction forces, which fold protein amino acid chains of **Immunoglobulin IgG1 into** globular molecule? 1.**Hydrogen**,.....
- 2. -S-S-disulfide bridge......3 Salt bridge ,......4 Hydrofobic,......
- **13**. Writ foure molecular structure units of inter molecular bonds containing 12 tertiary structure **domains** of immunoglobulin molecule!

1.acceptor>C=0...H—N<donor 2.....Cys--S-S--Cys 3.....— COO^{-} ... $H_3^{+}N$ — 4... $(H_2O)_4 \rightarrow \Diamond \Diamond \leftarrow (H_2O)_4$ 14. What Physiological functions and localization in Cells as Organelles of Lysozime enzyme?

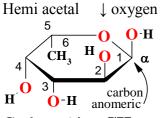
a.... in Lysosomes as enzymes Protein hydrolases - peptidases separate free amino acids

b... which in Lysosomes polypeptides separate into free amino acids

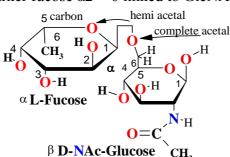
- 15. What are **F(ab')**₂ in **IgG** chains? dimmer of an antigen-binding fragment.....
- **16.** What are two **2** paratopes? with two complimentary antigen-binding sites
- 17. What are **Fc** chains? the constant/crystalline/complement-fixing fragment
- 18. Haw many Light chains and Heavy chains are? two Light and Heavy chains
- 19. How much disulfide bonds has F(ab')₂ structure? 12 disulfide bonds
- 20. What chains are bound with four 4 -S-S-? Light M with Heavy I chains

...two disulfide bonds connect **Heavy H** with **Heavy I**......**Light L** with **Heavy H** chains

- **21.** What structural components compose **glycoproteins**? Carbohydrates + Proteins
- 22. Which amino acid has N-linked glycoside bond? ASN306....
- 23. Write the immunologic marker fucose $\alpha 2 = >6$ linked to GlcNAc Haworth projections::



Carbon 6 is –**CH**₃ rather than –**CH**₂-**OH**



Show in cyclic $\alpha\text{-L-Fucose}$ hemi acetal

oxygen **-O-** atom and

complete acetal-glycoside oxygen-O- atom

linked to β GlcNAc!