

Chemical Nature of Antigens

- Antigens are large, complex molecules. Most often, they are proteins.
- However, nucleic acids, lipoproteins, glycoproteins, and certain large polysaccharides may also act as antigens.
- Complete antigens usually have large molecular weights of 10,000 daltons or more, but large molecules that have simple, repeating subunits—for example, cellulose and most plastics—are not usually antigenic.

Heavy Chain:

Each heavy chain is bound to a light (L) chain with a single disulphide bond and many non-covalent interactions such as salt bridges, hydrogen bonds and hydrophobic interactions.

The binding of heavy chains with the light chain creates a heterodimer (HL).

The interaction between two such heterodimers through disulphide bonds, hydrogen bonds and hydrophobic interaction create a tetramer (HL)₂ or H₂L₂.

The H₂L₂ is thus the basic structure of an immunoglobulin.

Heavy chains are structurally distinct for each class (isotypes) of immunoglobulins.

They differ in their size, amino acid sequence, antigenicity, and the carbohydrate content.

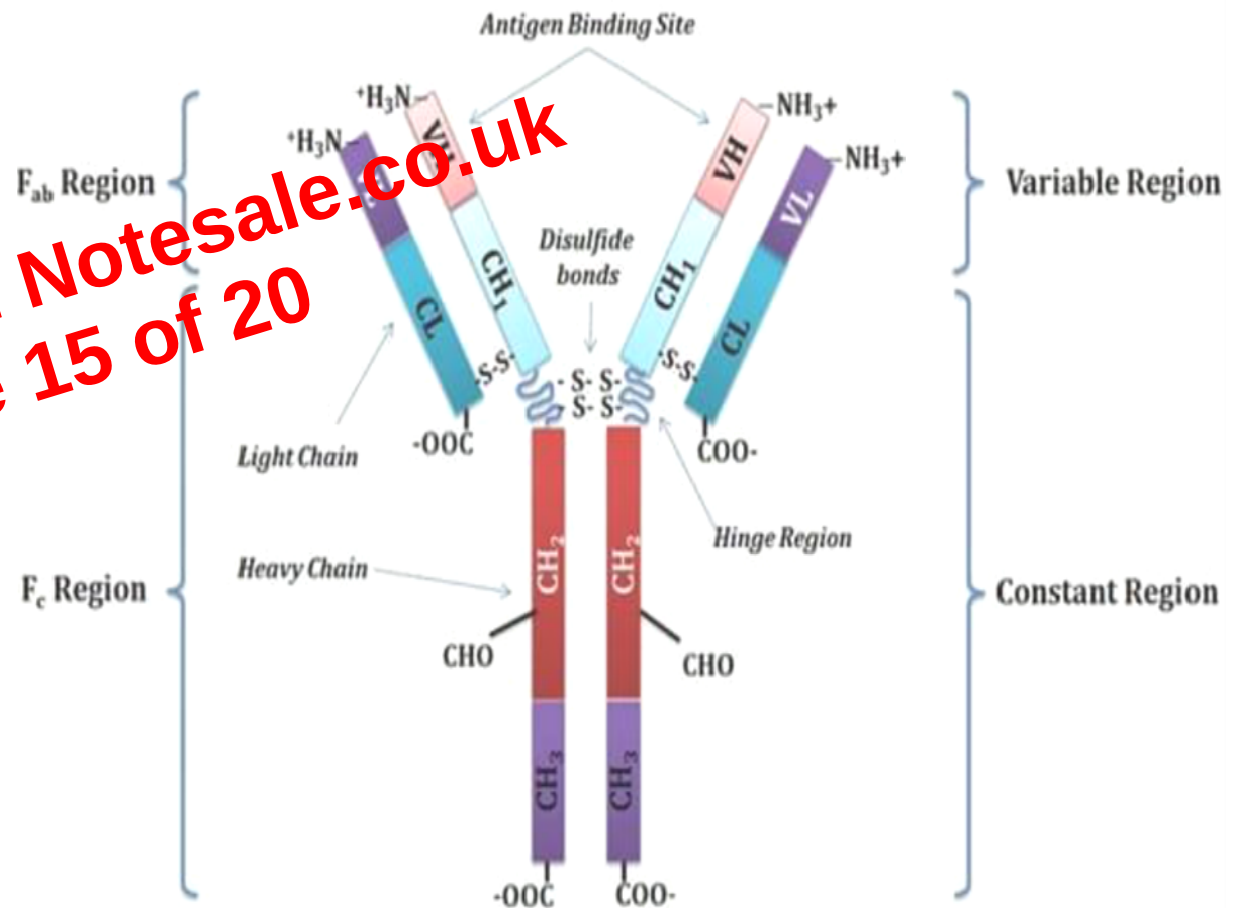
For example, the heavy chains of Immunoglobulin M (IgM) contains mu (μ), IgG contains gamma (γ), IgA contains alpha (α), IgE contains epsilon (ϵ) and IgD contains delta (δ) chains.

The sequencing studies of the variable region of the heavy chains revealed the existence of five different categories of immunoglobulins designated as μ , δ , γ , ϵ and α .

Each of these five different heavy chains is called an isotype.

The sequence of the heavy chain molecule determines the class of that antibody – IgG (γ), IgM (μ), IgA (α), IgE (ϵ) and IgD (δ).

Each heavy chain contains one variable region (VH) and three or four constant (CH) regions.



Variable (V) and Constant (C) Regions of an Antibody

IgG and IgA have three constant regions in the heavy chains, designated as CH1, CH2 and CH3.

The heavy chains IgM and IgE have four constant regions designated as CH1, CH2, CH3 and CH4.