

Ministry of Higher Education
and Scientific Research
Tishk International University
Faculty of education
Department of Biology



Antigen Antibody interactions

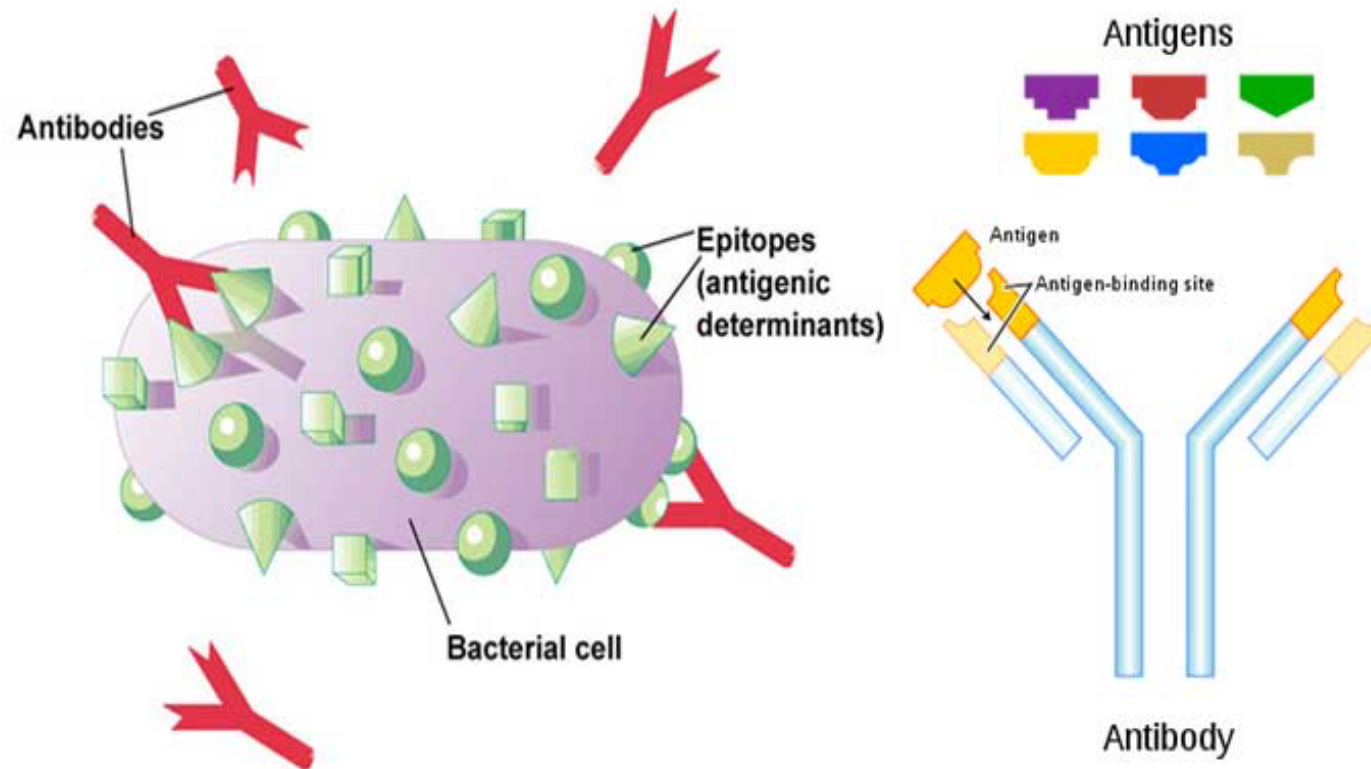
Lecture-8-

By

Harmand Ali

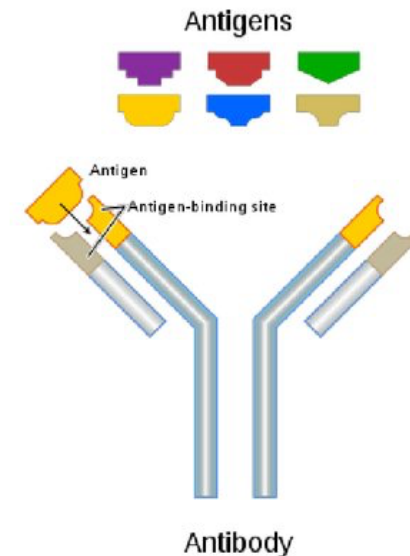
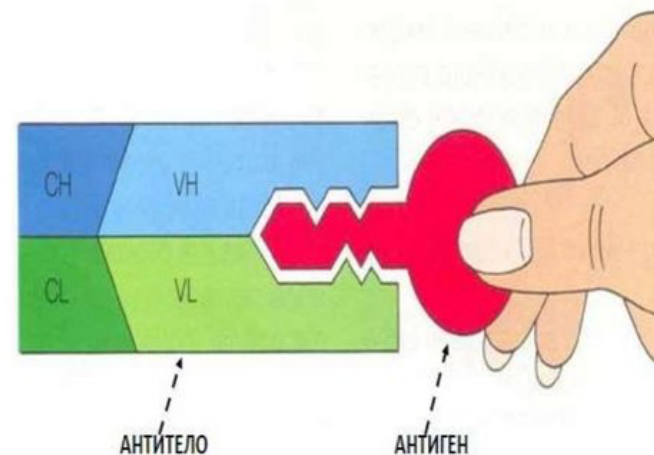
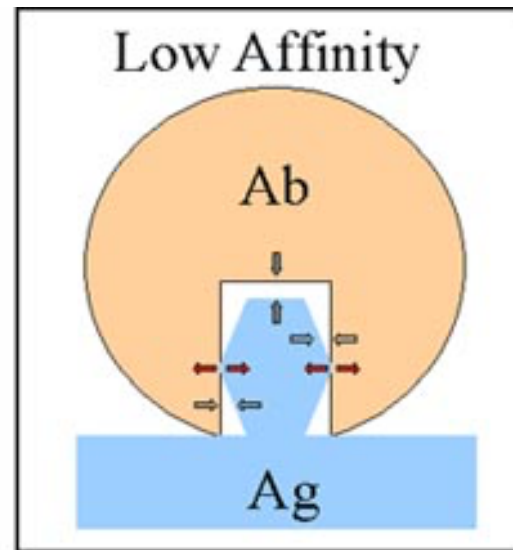
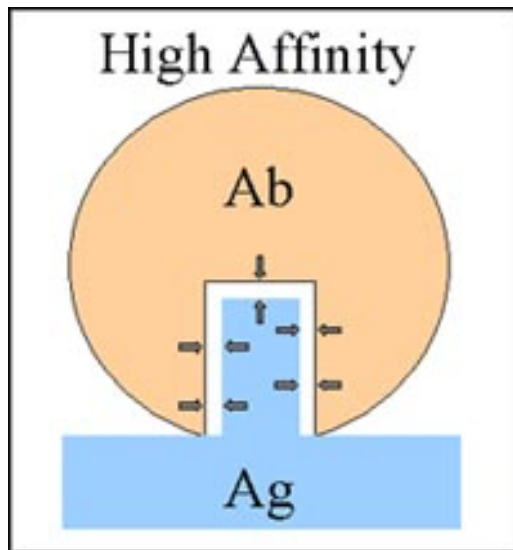
Antigen-Antibody reaction

- Specific reversible non covalent biochemical reaction between antigen and antibody.



Affinity

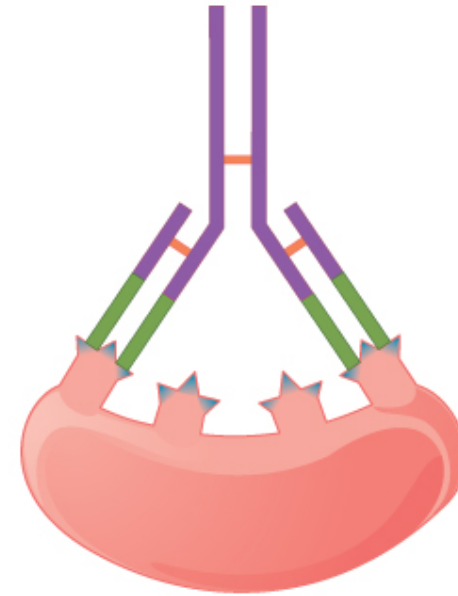
- Is the strength of the reaction between a single antigenic determinant and a single combining site on the antibody (refers to the intensity of attraction between the antigen & antibody molecules).
- It is the equilibrium constant that describes the antigen-antibody reaction. Most antibodies have a high affinity for their antigens.



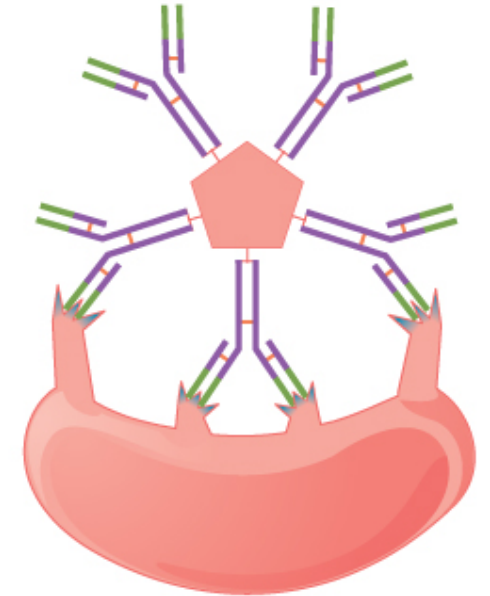
Avidity

- Is a measure of the overall strength of binding of an antigen with many antigenic determinants and multivalent antibodies (refers to the overall strength of binding between multivalent antigens and antibodies)

(a) Affinity versus avidity



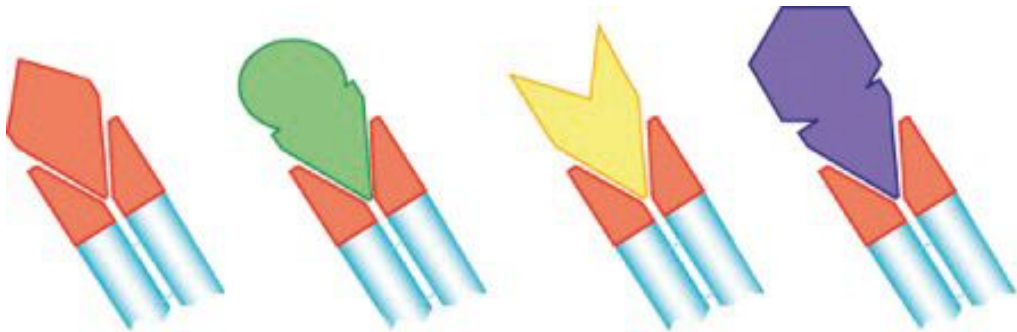
Affinity refers to the strength of a single antibody–antigen interaction. Each IgG antigen binding site typically has high affinity for its target.



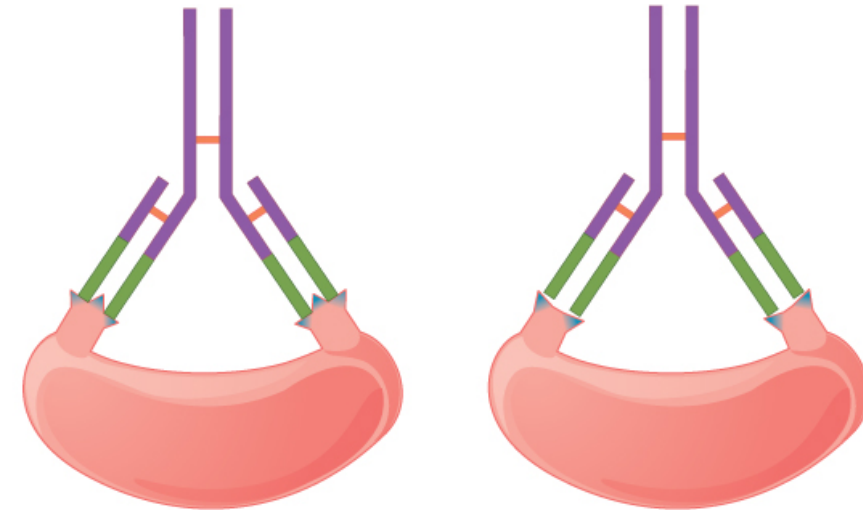
Avidity refers to the strength of all interactions combined. IgM typically has low affinity antigen binding sites, but there are ten of them, so avidity is high.

Cross reactivity

- Refers to the ability of an **individual** antibody combining site to react with **more than one** antigenic determinant or the ability of a **population of antibody** molecules to react with **more than one antigen**.
- It occurs when two or more than two Ag share common epitopes which make the Ab to react with them and gives us false positive results



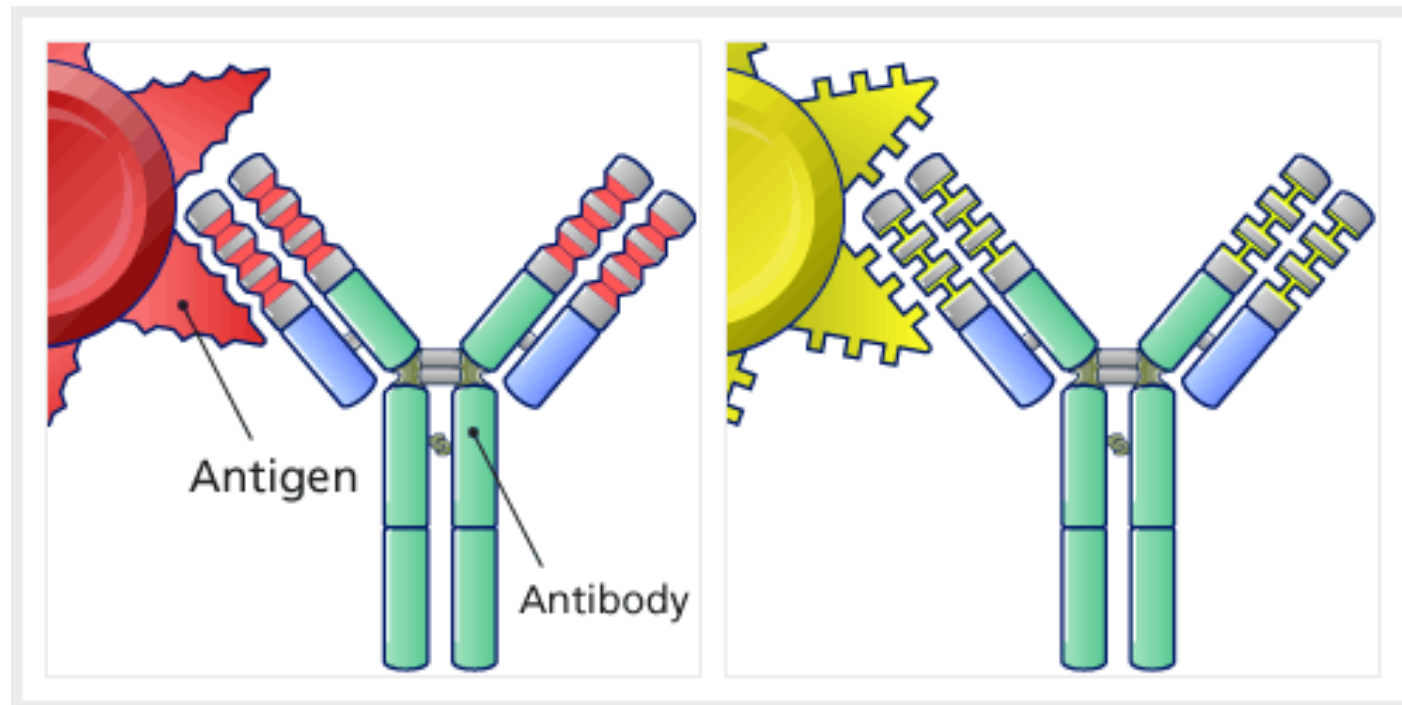
(b) Cross reactivity



An antibody may react with two different epitopes.

Specificity

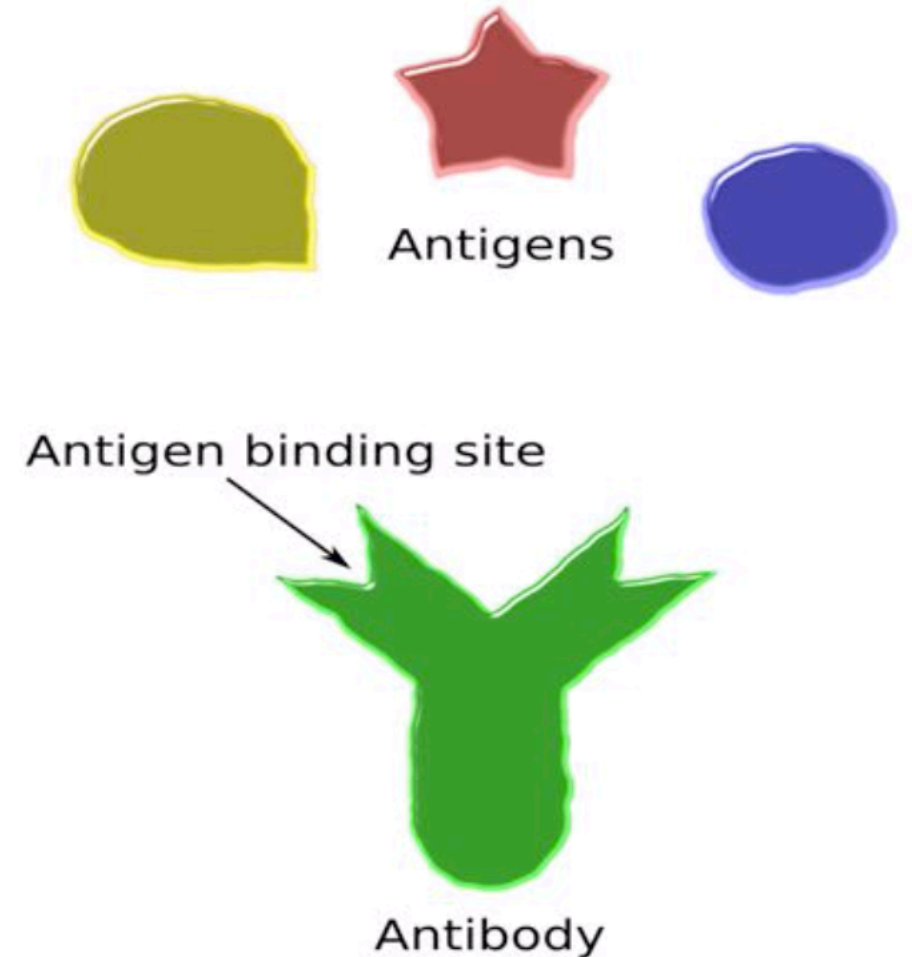
Refers to the ability of an individual antibody combining site to react with only **one** antigenic determinant or the ability of a **population** of antibody molecules to react with only **one** antigen.



Properties of Ag-Ab reaction

1. Lock and key concept:

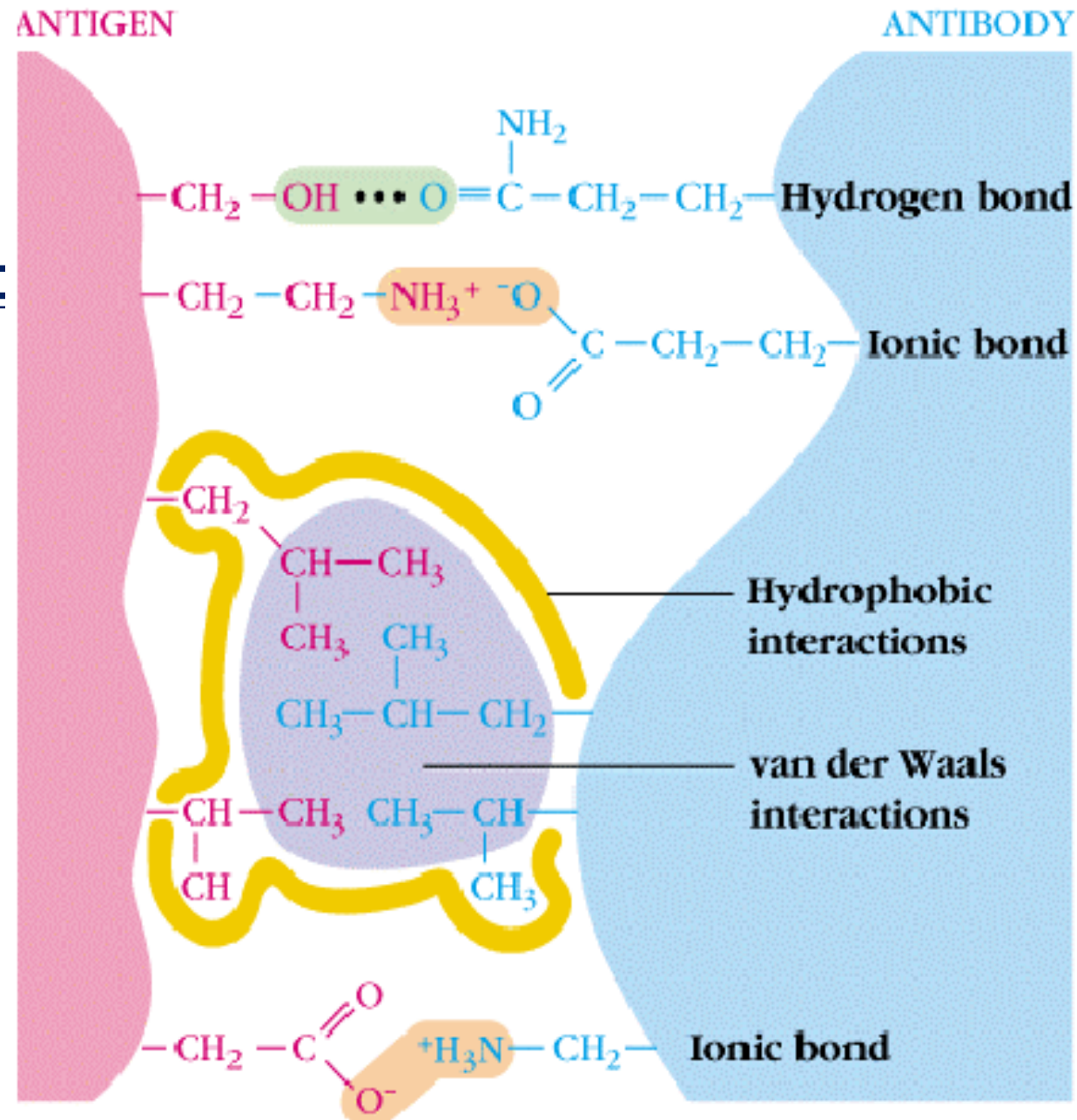
The antigenic determinant (Epitope) recognized by antibody binding site (Paratope), one of them as a key another one as a lock.



2. Non-Covalent bonding:

The Ag and Ab interact is due to lots on noncovalent bonding such as:

- Hydrophobic bond.
- Hydrogenic bond.
- Electrostatic bond.
- Van der Waal interaction.
- Ionic bond.



3. Reversible

The antigen antibody reaction considered as reversible because the reactions are non-covalent reactions.



Factors affecting of antigen-antibody reactions

1. Affinity

The higher the affinity of the antibody for the antigen, the more stable will be the interaction.

2. Avidity

Reactions between multivalent antigens and multivalent antibodies are more stable and thus easier to detect.

3. Antigen to antibody ratio

The ratio between the antigen and antibody influences the detection of antigen-antibody complexes because the size of the complexes formed is related to the concentration of the antigen and antibody.

4. Physical form of the antigen

The physical form of the antigen influences how one detects its reaction with an antibody. If the antigen is a particulate, one generally looks for agglutination of the antigen by the antibody. If the antigen is soluble one generally looks for the precipitation of the antigen after the production of large insoluble antigen-antibody complex.

Types of Antigen – Antibody Reactions

- Precipitation reaction
- **Agglutination reaction**
- Neutralization reaction
- Complement fixation test
- **Immobilization test**
- Opsonization
- **Immunofluorescence**
- **Radioimmune assay**
- **Enzyme immunoassay**