

## Question #61116, Chemistry, Other

**Describe in brief the five mechanisms by which antibodies interact with antigens and alter these.**

### **Answer:**

Interaction between antigen and antibody is a bimolecular association and it does not lead to an irreversible chemical alteration in either the antibody or the antigen. The association between an antigen and antibody involves various non-covalent interactions between the antigenic determinant (epitope) of the antigen and the variable-region ( $V_H/V_L$ ) domain of the antibody molecule. The specific association of antigens and antibodies is dependent on hydrogen bonds, hydrophobic interactions, electrostatic forces, and van der Waals interactions, which are all weak and non-covalent in nature.

There are several mechanisms of antibody-antigen interaction:

- Precipitation reactions

Precipitation reactions occur both in solution and in gel phase, where antigen-antibody forms a precipitate. Similar to the precipitation reaction in fluid, visible precipitation occurs in the region of equivalence and no visible precipitate forms in regions of antibody or antigen excess in gel phase.

- Radial immunodiffusion (the Mancini method)

In radial immunodiffusion, an antigen sample is placed in a well and allowed to diffuse into agar containing a suitable dilution of an antiserum. The antigen diffuses in all directions from the well, and accordingly the region of equivalence is established and a ring of precipitation (precipitin ring) forms around the well. The area of the precipitin ring is proportional to the concentration of antigen. The diameter of the area of precipitation (including the well diameter) is measured to determine the concentration of antigen.

- Double immunodiffusion (the Ouchterlony method)

In double immunodiffusion, if antigen to be detected, a known reagent antibody is placed in the center well and the unknown samples are placed in the surrounding well. If antibody is to be detected, unknown antigen is placed in the center.

- Immunoelectrophoresis

Immunoelectrophoresis is a gel electrophoretic technique which uses both electrophoresis and double diffusion. The samples that contain the proteins (the antigen mixture) to be analyzed are added to the wells on the gel plate.

- Agglutination reactions

The interaction between antibody and a particulate antigen results in visible clumping, called agglutination. The general term agglutinin is used to describe antibodies that agglutinate particulate antigens. Agglutination is a serological reaction and is very similar to the precipitation reaction.

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