Serology is the branch of science concerned with serum to measure either antigens or antibodies in sera.* Antibodies- Also known as immunoglobulins (Igs).They are a group of serum proteins (globulins), secreted in a " soluble" form by B lymphocyte In response to antigenic stimuli. These antibodies bind with the stimulating antigen and inactivating it. * Antigen-binding site- Hypervariable region of an antibody molecule that is the location where binding a specific antigen takes place. *Epitope- A part of an antigen, also known as an antigen determinate, that bind with a specific antibody. 1- Structure of immunoglobulin: The immunoglobulin molecule has two distinct regions, one of which (Fab) contains an antigens binding site that bind to an antigen, whereas the other (Fc) contain receptor that interact with a complement or phagocytes Figure 1. Figure 1 2- Immunoglobulins: Ag-Ab reactions: 2-1. Natural Of Ag- Ab Reactions: A. Lack and Key concept Antigen - binding sites are located within the hypervariable segments of the variable region (VL and VH) on Fab segment of an antibody molecule. Any change in the hypervariable regions of an antibody may alter its specificity Figure 1. The concept of specificity or" exact fit" of the two molecules has been compared to a " lock and key fit", where the" lock" refers to the antigen binding -site (antibody) and the " key "to the epitope on an antigen.Figure 2 B. Avidity When the antigen consist of several repeating and identical epitopes (multivalent antigen), the avididity between an antigen and an antibody is the sum of the affinities involved(i.e., affinity between antibodies and multivalent antigens, known as avidity).Affinity refer to the strength of binding between a single antigenic determinate and an individual antibody combining site whereas avidity refer to overall strength of binding between multivalent Ag's and Ab's.B. Cross reactivity Cross reactivity refers to ability of an individual antibody combining site to react with more than one antigenic determinant (epitope) or ability of a population of antibody molecules to react with more than one antigen Figure 5, cross reactivity arise because: * The cross reacting antigen shares an epitope in common with antigen.Multiple bonding between the Ag and the Ab ensures that the Ag will be bound tightly to the Ab. C. Reversible Since Ag-Ab reaction occurs via non-covalent bonds they are by their nature reversible.2-2.Affinity&Avidity A. Affinity The term refers to intrinsic forces of attraction or association between an antibody (antigen-binding site) and one epitope on corresponding antigen (univalent antigen).Specificity And Cross Reactivity A.Specificity Specificity refers to the ability of an individual antibody-combining site to react with only one antigenic determinant or ability of population of antibody molecules to react with only one antigen.Ag-Ab ratio - The ratio between the antigen and antibody influences the detection of Ag/Ab complexes because the sizes of the complexes formed in related to the concentration of the antigen and antibody.Figure 5 3- Factors Affecting Measurement Of Antigen - Antibody Reactions: The only way that one knows that an antigen-antibody reaction has occurred is to have some means of directly or indirectly detecting the complexes formed between the antigen and antibody.o isolating antibody-producing cells (B cells) from the spleen of the mouse; o fusing these B cells with a specific type of tumor cell that grows easily in culture and produces antibodies.If the antigen is soluble one generally looks for the precipitation of the antigen after the production of large insoluble Ag/Ab complexes.It is the sum of the attractive and repulsive forces operating between the antigenic determinant and the combining site of the antibody.Avidity - Reaction between multivalent antigens and multivalent antibodies are more stable and those easer to detect.The binding between an antibody and a multivalent

antigen is much stronger (has stronger avidity) than binding between an antibody and single epitope.Formation Of Monoclonal And Polyclonal Antibodies: 4.1– Monoclonal antibodies: Identical antibodies with unique specificity made by single B cell Figure 7.Figure 8 4.3 – Researchers make monoclonal and antibody by: o injecting a specific antigen into a host animal (typically a mouse).o isolating successful hybridomas (fused cells) that produce antibodies specific for the antigen of interest.3.1.3.2.3.3.3.4.