

Although the invention has been described with particular reference to steroids, it is not intended to be so limited as it has been used with systems for the determination of polypeptides, thyroid hormones and some viruses. It is clear then, that the invention has broad application to radioimmunoassay procedures.

I claim:

1. In an analytical method for biochemical analysis of an antigen wherein a mass of antibodies specific to a selected antigen is immobilized to form an immunoadsorbent and wherein a solution containing the selected antigen is flowed into and out of contact with the immunoadsorbent whereby at least part of said selected antigen is bound to said mass of antibodies immobilized by said immunoadsorbent and the remainder is not bound to said antibodies, the improvement which comprises the steps of:

- regenerating the immunoadsorbent for reuse by releasing the antigen bound to the antibodies of the immunoadsorbent,
- said regenerating step including contacting said immunoadsorbent with a solvent characterized by the ability to break the bond between the antigen bound to the antibody of the immunoadsorbent to free substantially all of said antigen therefrom without substantially adversely affecting the flow-through quality of said immunoadsorbent and the capacity thereof to bind antigen material subsequently brought into contact therewith,
- utilizing at least one of (1) the said remainder which is not bound to said antibodies or (2) the antigen formerly bound to said immunoadsorbent and released during regeneration thereof, or both, in an analytical assay of said selected antigen, and
- repetitively reusing said regenerated immunoadsorbent for analytical assays of further selected antigen material.

2. In an analytical method as set forth in claim 1 wherein the immunoadsorbent is formed by co-valently bonding the said mass of antibodies to individual solids of a mass of particulate solids, said mass of solids being supported on a porous member, and said solvent is flowed through said mass.

3. In an analytical method as set forth in claim 1 wherein said mass of antibodies is co-valently bonded to a cross-linked dextran polymer.

4. In an analytical method as set forth in claim 1 wherein the antibodies are specific to an antigen selected from the class consisting of steroids, polypeptides and thyroid hormones.

5. In an analytical method as set forth in claim 2 wherein the antibodies are specific to an antigen selected from the class consisting of steroids and thyroid hormones, and said solvent comprising an alcohol.

6. In a radioimmunoassay analytical procedure in which a sample solution containing antigen to be assayed is mixed with a known concentration of labelled antigen, the mixed sample solution being brought into contact with an immunoadsorbent formed by immobilizing a mass of antibodies specific to said antigen thereby to effect binding of part of the labelled and unlabelled antigens in said mixed sample solution to the antibodies immobilized by said immunoadsorbent, the remaining portion of the labelled and unlabelled antigens in said mixed sample solution passing through said

immunoabsorbent and forming an unbound antigen fraction, the improvement which comprises:

regenerating the immunoabsorbent by releasing substantially all of the antigens bound to the immunoabsorbent by rinsing said immunoabsorbent with a solvent to break the bond between the antigens bound to said antibodies which are immobilized by said immunoabsorbent thus forming (1) a released solvent fraction containing formerly bound labelled and unlabelled antigens and, (2) a regenerated immunoabsorbent substantially free of bound antigens,

detecting the labelled antigens in at least one or the other or both of (a) said unbound antigen fraction and (b) said released solvent fraction, as a function of the quantity the antigen to be assayed, and thereafter reusing the said regenerated immunoabsorbent for analytical assays of further sample solutions containing antigen as to which said immobilized antibodies are specific.

7. In a radioimmunoassay procedure as set forth in claim 6 wherein said detecting step includes detecting the percentage of labelled antigens in said unbound fraction, detecting the percentage of labelled antigens in said released solvent fraction, and determining the percentage of unlabelled antigens with reference to the total detected labelled antigens.

8. In a radioimmunoassay procedure as set forth in claim 6 wherein said antibodies are specific to an antigen selected from the class consisting of steroids, polypeptides, thyroid hormones, and viruses, and said solvent being hydrophobic in character.

9. In a radioimmunoassay procedure as set forth in claim 6 in which said mixed sample solution is flowed into contact with and through said immunoadsorbent to effect binding a part of the labelled and unlabelled antigens,

- detecting the labelled antigens in said unbound antigen fraction,
- regenerating said immunoadsorbent and forming said released solvent fraction,
- detecting the labelled antigen in said released solvent fraction, and

reusing said regenerated immunoabsorbent by repeating the steps of flowing another mixed sample solution into contact therewith followed by detecting the labelled antigen in the unbound fraction, regenerating the immunoabsorbent, and detecting the labelled antigen in the released solvent fraction.

10. In a radioimmunoassay procedure as set forth in claim 6 wherein said immunoadsorbent is formed by co-valently bonding said mass of antibodies to polymeric material, and wherein said procedure is continuous and involves repetitively for different samples the recited steps of

- a. bringing a mixed sample solution into contact with the immunoadsorbent to form an unbound antigen fraction while binding a part of the labelled and unlabelled antigens on the immobilized antibodies,
- b. regenerating the immunoadsorbent to form a released solvent fraction and to form a regenerated immunoabsorbent, and
- c. detecting the labelled antigens in at least one or the other or both of the unbound antigen fraction and said released solvent fraction.

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