This equation was derived by W. Carter, R. Scott, and M. Magat for natural rubber in toluene (*1*). Since toluene and benzene have similar μ values for natural rubber, the equation was employed for the purpose of estimating molecular weight of the polymer in benzene. The molecular weight of the rubber is low; however, benzene would not extract polymer of high molecular weight—that is, gel rubber—even if it were present. A better method of extraction is needed. Since this is a mixed collection, some species are probably contributing more than the average content of 1.7 percent rubber.

An attempt was made to cure the soft, tacky, low-molecular-weight rubber using the "Peachy" cure and sulfur chloride. The cured products were of low moduli, and elongations did not exceed 200 percent. There was insufficient material for milling to incorporate curing agents.

Rubber extracted from sporophores of *L. deceptiva* was similar to that obtained from the mixed species. It too was *cis*-polyisoprene (Fig. 1). The rubber content was low—0.16 percent on a dry weight basis. It was not characterized further.

The rubber extracted from ascocarps of *Peziza* was much tougher than that from *Lactarius*. Solubility in benzene was very low and deposition of polymer on the salt cakes was not uniform. Satisfactory films were not obtained, but the infrared spectrum (Fig. 1) suggests that this rubber is also *cis*-polyisoprene.

Fungi belonging to two of the major classes of fungi, Ascomycetes and Basidiomycetes, are able to synthesize rubber as *cis*-polyisoprene. Since fungi, phylogenetically, were derived from algae—that is, they are degenerate forms with loss of chlorophyll—the probability of rubber synthesis by species of this phylum is implied.

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1 August 1955

Arsenic Tribromide Immersion Liquids of High Index of Refraction

Immersion liquids of high index of refraction containing arsenic tribromide as the solvent, prepared in recent years (*1, 2*), have proved to be stable. In Table 1 are given the starting materials and their relative proportions by weight used to prepare the liquids, the indices of refraction of the liquids (n_D), the change in index of refraction with time ($\Delta n_D \times 10^{-3}$), and the temperature coefficients (dn/dT) and dispersion of some of the liquids (*3*). The liquids were prepared as described in an earlier paper (*1*). The disadvantages of the arsenic tribromide liquids have been listed in a more recent publication (*2*).

Table 1. Arsenic tribromide immersion liquids. Composition is given in relative proportions by weight. Dispersion is measured by the difference in index between the *e* line of mercury (546 mμ) and the *D* line of sodium (589 mμ).

Composition	n_D	Δn_D ($\times 10^{-3}$)	Time (yr)	dn/dT ($\times 10^{-4}$)	Dispersion ($\times 10^{-4}$)
$6AsBr_3$, 2S, $2As_2S_3$	2.00	−2	1¼	6 (*1*)	174 (*1*)
$6AsBr_3$, 2Se, $2As_2S_3$	2.11	−2	3	6	288
$12AsBr_3$, 1S, $7As_2S_3$	2.07	−1	2½		
$6AsBr_3$, 2Se, $2As_2S_3$	2.04	−2	3		
$14AsBr_3$, 3S, $3As_2S_3$, 2HgS	1.99	−1	3	6	173
$14AsBr_3$, 3S, $3As_2S_3$, 4HgS	2.01	−3	3		
$6AsBr_3$, 2S, 1Se, $2As_2S_3$	2.02	−1	3½	6	195
$6AsBr_3$, 2S, 1Se, $2As_2S_3$	2.00	−5	3		
CH_2I_2	1.74			7 (*4*)	88 (*1*)

The liquid with an index of 2.11 is very viscous and dark red, but a thin film is light yellow. It is possible that even higher indices can be obtained with these mixtures.

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2. R. Meyrowitz, *ibid.* 40, 398 (1955).
3. Data presented before the Division of Analytical Chemistry at the 126th meeting of the American Chemical Society in New York, 12–17 Sept. 1954. See "Abstracts of Papers," p. 4 B.
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22 July 1955

Mechanism of Antibody-Antigen Reaction

Antiserums to yeast crystalline alcohol dehydrogenase (*1*) were produced in rabbits by subcutaneous injections of 10 mg at weekly intervals. The antibody partially inhibited the activity of the enzyme but did not inhibit liver alcohol dehydrogenase. The enzyme (antigen) reacted with the antibody to form a precipitate of antibody-antigen complex that nevertheless possessed enzymatic activity (*2*). Kinetic studies on the inhibition of the enzyme activity with increasing increments of antiserum (*3*) led to the formulation of the following concept.

When an antigen is first introduced into the body, it stimulates the formation of specific antibodies to special sites on its surface that possess the necessary configuration. If it is still present in the body or is again introduced into the animal at a time when antibodies are already present in the circulation, it reacts rapidly with these earlier antibodies to form an antibody-antigen complex (complex I). This complex, in which the configuration of the antigen and antibody are mutually altered, behaves as a new antigen. Specific antibodies are then formed against the new sites of altered configuration. Similarly, if the antigen is still present in the body, or upon the introduction of the antigen for a third time, the earlier antibodies react with it to form complex I, which then reacts with its specific antibody to form complex II, and this in turn behaves as a new antigen with a newly altered antigenic surface. Complexes III and IV, and subsequently others, may be formed in like manner. This process presumably continues with each introduction of the antigen until a stage is reached when the final complex ceases to be antigenic or fails to differ antigenically from the immediately preceding complex.

The concept just developed represents no departure from already accepted principles of immunology and protein chemistry. There are many examples of compounds, termed *adjuvants,* that act on some substances to influence their immunological reactivity (*4*). Furthermore, a staphylococcus toxin reacts with rabbit muscle extract to render it antigenic when it is injected into rabbits (*5*).

Proteins are capable of astonishing structural transformations. They can unfold to expose new groups, hydrophilic or hydrophobic as the case may be, depending on the environment (*6*). It is therefore to be expected that the structural configuration on the surface of the antibody-antigen complex must necessarily differ at certain sites from the original configurations of the individual antigen and antibody. It has already been shown that an antibody molecule does in fact increase in volume upon reacting with the antigen (*7*). Such an increase in volume is interpreted to signify an unfolding of the molecule with a structural modification of its surface configuration. The very fact that a precipitate is formed can readily be explained by the unfolding of both antibody and antigen so as to expose a large number of hydrophobic groups.

In support of this concept, it has been possible to show the following (*8*).

1) The subcutaneous injection of a thoroughly washed antibody-antigen complex into rabbits produced antiserum that reacted more rapidly with the complex than with the enzyme antigen itself. This