

A Dictionary of
Chemistry

SIXTH EDITION

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7

1969), who pioneered techniques for the safe industrial use of acetylene.

reptation A motion describing the dynamics of a polymer in a highly entangled state, such as a network. Regarding the entangled state as a set of chains between crosslinks it is possible to regard the chain as being in a 'tube', with the tube being formed by topological constraints. The chain is longer than the tube so that the 'slack' of the chain moves through the tube, which causes the tube itself to change with time. This motion was called **reptation** (from the Latin *reptare*, to creep), by the French physicist P. G. de Gennes, who postulated it in 1971. Many experiments indicate that reptation dominates the dynamics of polymer chains when they are entangled.

resin A synthetic or naturally occurring *polymer. Synthetic resins are used in making *plastics. Natural resins are acidic chemicals secreted by many trees (especially conifers) into ducts or canals. They are found either as brittle glassy substances or dissolved in essential oils. Their functions are probably similar to those of gums and mucilages.

resolution The process of separating a racemic mixture into its optically active constituents. In some cases the crystals of the two forms have a different appearance, and the separation can be done by hand. In general, however, physical methods (distillation, crystallization, etc.) cannot be used because the optical isomers have identical physical properties. The most common technique is to react the mixture with a compound that is itself optically active, and then separate the two. For instance, a racemic mixture of *l*-A and *d*-A reacted with *l*-B, gives two compounds AB that are not optical isomers but diastereoisomers and can

be separated and reconverted into the pure *l*-A and *d*-A. Biological techniques using bacteria that convert one form but not the other can also be used.

resonance The representation of the structure of a molecule by two or more conventional formulae. For example, the formula of methanal can be represented by a covalent structure $\text{H}_2\text{C}=\text{O}$, in which there is a double bond in the carbonyl group. It is known that in such compounds the oxygen has some negative charge and the carbon some positive charge. The true bonding in the molecule is somewhere between $\text{H}_2\text{C}=\text{O}$ and the ionic compound $\text{H}_2\text{C}^+\text{O}^-$. It is said to be a **resonance hybrid** of the two, indicated by



The two possible structures are called **canonical forms**, and they need not contribute equally to the actual form. Note that the double-headed arrow does not imply that the two forms are in equilibrium.

resonance effect See ELECTRONIC EFFECTS.

resonance ionization spectroscopy (RIS) A spectroscopic technique in which single atoms in a gas are detected using a laser to ionize that atom. A sample containing the atoms to be excited is subjected to light from a laser, tuned so that only that type of atom is excited by the light. If the frequency of light at which the atom is excited is ν , the atoms in the excited state can be ionized if the ionization potential of the atom is less than 2ν . In contrast to other techniques of ionization, this type of ionization only occurs for atoms that are 'in tune' with the frequency of light. Because RIS is very selective in determining which atom