complex carbides, and their analogs; electron transfer to the host lattice strengthens the T—T bonds. Band calculations on the basis of OPW and APW methods, and ESCA measurements suggest strong T—X bonds.

Lecture at Krefeld on November 13, 1969   [VB 220 IE]
German version: Angew. Chem. 82, 139 (1970)

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[1] See H. Nowotny and F. Benesovsky, Planseeber. Pulvermetallurgie 16, 204 (1968).

Solid State Reactions with and without Gas Phase at High Temperatures with Special Consideration of High-Frequency Plasma

By Hk. Müller-Buschbaum[*]

In recent years high-frequency plasma torches have found increasing use besides the usual laboratory heat supplies suitable for solid-state reactions. The high frequency energy is transferred to plasmas inductively or via a peak discharge at very high frequencies. Principally, there are two types of plasma torch.

1. High-pressure plasma torch (pressure range: 760 torr)

2. Low-pressure plasma torch (pressure range: 10^{-3} to 10^{-1} torr)

The use of torches opened at one end (high-pressure plasma torches) for the production of large single crystals by a modified Verneuil process has been described by several authors. The main advantage of such torches is that a defined gaseous atmosphere can be set up at a low plasma speed. However, they have disadvantages; for example, the uncontrollable stay period of the sample in the hot zone at unknown reaction temperatures, and a separation of the starting material components by mechanical and electromagnetic forces. A low-pressure plasma inside a closed system developed by our group makes the heating of small amounts of a substance possible and is particularly suitable for the preparation of small single crystals. Compared with high pressure plasma torches there is one disadvantage of this closed type of torch, i.e. the reduced pressure in the plasma which results in poorer reactions as far as thermally moderately decomposing or volatilizing substances are concerned. In a reaction between plasma and solid effects occur that are due to ionization of the gases: highly positively charged atoms of heavy gases (at extremely high temperatures) no longer exhibit the chemical characteristics of the corresponding molecular or atomic gas. This is also the case for ionized hydrogen, which does not have reducing properties. True "Plasma chemistry" (in the plasma state only!) therefore appears to be a difficult and questionable experimental field.

Lecture at Kiel, October 16, 1969   [VB 221 IE]
German version: Angew. Chem. 82, 139 (1970)

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Internal and External Contributions to the Biogenesis of Mitochondrial Proteins

By W. Sebald (lecturer), W. Neupert, and
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The biogenesis of mitochondria involves cooperation of the extramitochondrial protein synthesis with the protein-synthesis system localized within the mitochondria. The capacity of this system for protein synthesis is illustrated inter alia by the finding that growing peptide chains can be detected on the mitochondrial ribosomes after incubation of isolated mitochondria with ^{14}C-amino acids. The ^{14}C-amino acids that are incorporated in vitro are also found in the inner mitochondrial membrane. After separation of the membrane proteins by gel electrophoresis, four to five of the protein bands contain tracer. The highest content of tracer is found in the fourth band from the starting point; this band contains 4% of the total membrane protein and it is found to migrate at about the same rate in the gel electrophoresis of mitochondrial membranes of rat liver, locust flight muscles, and Neurospora crassa. In the corresponding band of cytoplasmic mi-1-mutants of Neurospora crassa, in which only traces of cytochrome aa₃ and b are spectrally detectable, less protein and no radioactivity are found.
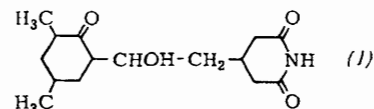
The in vitro results can be confirmed in vivo by an independent method. If the hyphae of Neurospora crassa are preincubated in 3-[2-(3,5-dimethyl-2-oxocyclohexyl)-2-hydroxyethyl]glutarimide [cycloheximide (1)] (0.1 mg/ml), incorporation of ^{14}C-amino acids into the extramitochondrial and soluble mitrochondrial proteins is inhibited to an extent of more than 99%. About 15% of the membrane proteins are formed by cycloheximide-resistant mitochondrial protein synthesis. These membranes, when labeled in vivo, exhibit the same distribution of radioactivity after gel electrophoresis as do those that are labeled in vitro.

Incorporation of ^{14}C-amino acids into the proteins of gradient-purified mitochondrial ribosomes in vivo is completely inhibited by (1). Consequently this part of the mitochondrial protein synthesis apparatus is afforded by the extramitochondrial system. On isolation of enzymically active, spectrally pure cytochrome oxidase from mitochondria labeled in vivo in the presence of (1) by treatment with Triton X-100 followed by fractional ammonium sulfate precipitation and chromatography on DEAE cellulose, the specific activity decreases substantially compared to that of the total membrane proteins. In the chromatographic separation on DEAE cellulose, the protein from band 4, and consequently the activity, accumulates in one fraction which does not contain cytochrome oxidase. This protein can be further purified on CM cellulose, the specific activity being increased to an amount 10 times greater than that of the membranes. It thus serves as a possible means of integrating cytochrome oxidase into the inner mitochondrial membrane (i.e. as an "integrator protein").

Lecture at Göttingen on November 21, 1969   [VB 223 IE]
German version: Angew. Chem. 82, 139 (1970)

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Color by the Action of Mechanical Forces on Organic Molecules

By Hans Weidinger and Reinhard Steinmetz (lecturer)[*]

Dehalogenation of 1,4-bis(9-bromo-9-fluorenyl)benzene (1) leads to the formation of the saturated solvent-containing oligomer (3) and not the expected quinonoid p-xylylene (2)[1]. Osmometric molecular weight determinations in benzene at 37°C, in tetrahydrofuran at 45°C, and in pyridine at 60°C, yield values of about 1600 ($n = 4$) for the molecular weight of (3).

A slight amount of cleavage and blue-violet coloration takes place when compound (3) is subjected to heat or mechanical pressure, both in the solid state and in solution. Although the monomeric fragments occur mainly as quinonoid p-