act somewhat like liquids. That is, they "wet" the graphite surface — they spread themselves in a thin film over it. Wetting could promote highly efficient catalysis, and if it does, it could be important in devising industrial processes that demand swift completion of wholesale lots.

The experiments are done in a special cell placed inside an electron microscope so that a continuous video record of the process can be made. In the cell metal pieces of about 100 angstroms in size are placed on the surface of the graphite. The atmosphere in the cell is the gas appropriate to either an oxidizing or a reducing reaction, that is, either oxygen or hydrogen. The temperature is near 1,000° C. This is called controlled atmosphere electron microscopy (CAEM).

There are two kinds of catalytic processes: pitting and channeling. Pitting goes perpendicular to the basal plane of the graphite crystal. A metal particle happens to lie on the surface at some defect in the crystal. The metal chews its way down, excavating a hexagonal pit that gradually turns circular. Channeling goes in from the side, making a tunnel through the crystal parallel to the basal plane. Channeling is the faster, and one aim of the research is to see how to encourage it. Here, too, the wetting phenomenon can be observed especially strikingly. Baker showed films in which the metal particles wet their tunnels as they went.

Baker stresses that this liquid-like behavior occurs although the temperature in the chamber is well below the bulk melting point of the metal in question. It is not a well understood kind of physical behavior. Baker suggests that a search for good catalysts for graphite or coal gasification might use their behavior on the graphite or coal surface — whether they wet might be a criterion.

There are two kinds of gasification reaction under study here: one, oxygen plus graphite yields oxides of carbon; two, hydrogen plus graphite yields methane. Comparison showed that the two reactions go at different rates with the same catalyst. Reducing reaction, the one with hydrogen, particularly seems to go at a rate that depends on the size of the catalyst particles.

From all of this comes the suggestion that the reducing reaction depends on the surface area of the metal particle, that the metal surface traps hydrogen and introduces it to the carbon. The oxygen-aiding reaction, on the other hand, would go by diffusion of carbon atoms through the bulk of the metal — again this liquid-like behavior of metal. This model is very tentative, but Baker concludes, "Although we are not yet in a position to make any definite conclusions with respect to the mechanisms of catalyzed gasification of graphite, the CAEM data is certainly providing some interesting leads into novel methods of both inhibiting and promoting the reaction rates." □

DSDP explores the Gulf of Mexico

In figuring out the puzzle of global tectonics, fitting in the small pieces is often the hardest part. It's obvious, for example, how South America and Africa fit together, how the Mid-Atlantic Ridge is the geologic zipper along which the ocean opened. But it's not so obvious, as the crew of the Deep Sea Drilling Project's Leg 77 recently found, how the small ocean basins, such as the Gulf of Mexico, opened up.

There are a lot of different explanations for how the Gulf of Mexico formed, but little physical evidence has actually been gathered, explains Wolfgang Schlager of the University of Miami, who was co-chief scientist on the cruise. Leg 77 aimed to fill in that data gap.

According to Schlager, some geologists believe that the Gulf of Mexico is not an ocean basin at all, but part of a continent that was gradually melted and transformed into basalt, the volcanic rock that characterizes ocean basins. Others, he says, suggest that the Gulf is what is called a back arc basin, an ocean that forms behind a line of volcanic islands, such as the Sea of Japan. Some believe that the Gulf is the oldest ocean on earth, possibly 230 million years old.

Schlager favors a model that sees the Gulf as about 150 million to 170 million years old. In this theory, the central North Atlantic and the Gulf of Mexico were part of the same spreading system and were "like twin brothers, doing everything at the same time," until about 140 million years ago when they parted ways. After that, according to the theory, the North Atlantic kept on spreading while the Gulf cooled and subsided. Because of this early halt in its growth, says Schlager, there is no active spreading ridge in the Gulf; it is "just a big open spot with margins that record that it subsided."

It was with all these possibilities that the DSDP's drilling vessel, the *Glomar Challenger,* dug into the sediments beneath the Gulf of Mexico. And while the data are not conclusive evidence for any of the theories, says Schlager, the results give geologists something substantial to consider for future models.

Among other results, the researchers found that the edges, or margins, of the Gulf consist of what is known as "transitional crust" — a combination of continental and oceanic material. Transitional crust is believed to have formed as the continental rock gave way to the spreading ridge that was erupting beneath it; the volcanic rock that welled up from the ridge intruded into the cracks and fractures of the weakening continental rock. While geologists have suspected that this sort of rock would form in the early stages of ocean development, such rocks have not been recovered before, says Schlager, because the margins of most oceans lie too deeply buried beneath sediments. This means, he continues, that similar rock is likely to be found at great depths along the east coast of North America. This find and other evidence, such as rocks that document the transition from terrestrial to marine sediments, tend to support the view of the Gulf as an ocean basin, he says. Most of the competing models, however, depend on different timescales of events, he adds, and only further analysis of the microfossils used to date the rocks will determine when the transitional crust formed, when the ocean stopped spreading and when marine sediments began to be deposited. "We have just taken the first tentative steps toward exploring the Gulf," Schlager says, " ... we have to carefully work into the jungle and make sure we don't throw out any hypotheses before we're sure." □

Federal rules change for autistics

A recent change in the definition of autistic children under the federal handicapped education law appears to be more than a semantic flip-flop. The Department of Education announced in the Jan. 16 FEDERAL REGISTER that these children are no longer categorized as "seriously emotionally disturbed." They now make up a subgroup of the "other health impaired" category because, says the department, "not all autistic children are seriously emotionally disturbed."

Infantile autism is a condition marked by severe communication and other developmental and educational problems (SN: 3/7/81, p. 154). The National Society for Autistic Children in Washington has worked for the definitional change since 1975. Its view is that the shift will increase the chances of providing instruction aimed at the special needs of autistic children in public schools. Not all children with autism will automatically be placed in special classes, but state and local school systems must begin to adapt their educational programs to the needs of these children.

Change will not come quickly, though. School systems were slow to adopt the original handicapped education law in 1977, and the NSAC does not expect them to be any faster this time around. But the rules change will serve more immediately as an aid in informing the public that autism is primarily a neurological, not an emotional, disorder. It also will boost efforts to train and certify more teachers with appropriate skills to educate autistic youngsters. Such instructors are in short supply. The NSAC plans to monitor progress in teacher certification and state compliance to the new regulations. □