3.6 Preparing Carbon Paste Electrodes

The nice thing about carbon paste is that you don't actually polish it. Instead, you make an entirely new electrode every time. The disadvantage of paste is that it will permanently stain any piece of cloth it encounters. This provides a good excuse for wearing a shirt with a wild pattern that is complementary to abstract, black stains.

Carbon paste offers several interesting possibilities when studying compounds that are soluble in aqueous media. The electron transfer kinetics of carbon paste are markedly different than those of glassy carbon, and some users feel that the electrode offers slightly better sensitivity in some cases. It cannot be used with a high concentration of organic solvents in the mobile phase since this will erode the surface of the paste. Carbon paste compositions vary widely, including combinations of polyethylene or Kel-F powders pressed with carbon. This discussion is limited to handling of pastes currently manufactured by BAS.

Keep the vial of carbon paste closed when it is not in use. Like other forms of graphite, it can absorb contaminants from the laboratory environment. Refer to Figure 3.4 when following these instructions.

1. With a new electrode block (not previously filled with paste), begin by scooping some paste from the vial and dropping it into the open well(s) in the electrode block. In a thin-layer electrode, each well is attached to a gold connector. In a voltammetry electrode, there is an open hole at the end of the electrode rod.

2. Use the end of a glass rod to tamp down the paste evenly into the well eliminating air spaces. Keep filling and tamping it down until the well is filled with carbon paste and is mounded up slightly above the surface of the plastic block. Don't tamp too hard. You should not be squeezing the paste to the point where it begins to ooze oil.

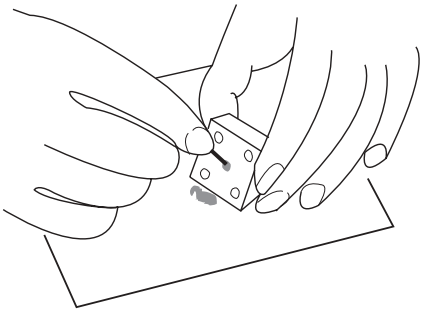
3. Obtain a smooth, CLEAN card. Large index cards work well. Place the card on a flat, hard surface like a large piece of thick, clear glass or a seamless benchtop.

4. Turn the electrode over and draw it gently across the card, leaving a line of carbon on the paper. Then go to a clean section of the card and move the electrode in tiny, continuous circles on the surface of the card. Move to another section and repeat this until little or no paste is left on the paper surface by this action.

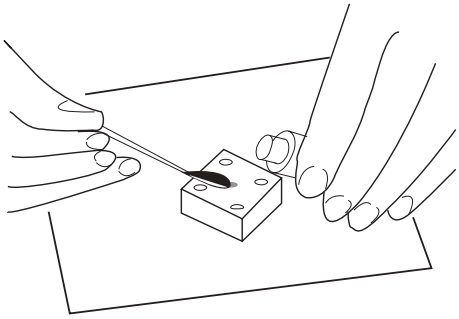
5. Turn the electrode over and inspect it. The surface should be even and smooth with no cracks apparent in the surface. Small dark speckles are normal parts of the paste. If any crack or obvious discontinuity is present, return the electrode to a section of the card marked with paste and continue rubbing it in this section to help fill up the cracks and smooth out the surface.

6. If you have been using an electrode and wish to resurface the paste, simply remove about a millimeter of the paste by wiping it away with a lab tissue. Then proceed by dropping a little lump of paste onto a card, pressing the electrode down onto this lump and proceeding as in steps 4 and 5.

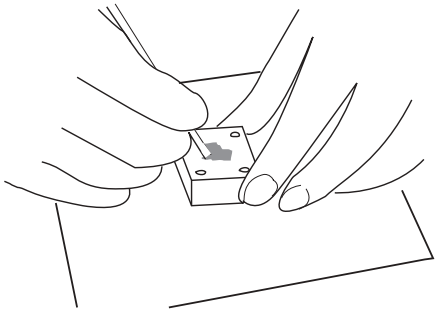
Figure 3.4. Polishing carbon paste electrodes. (See Section 3.6.)



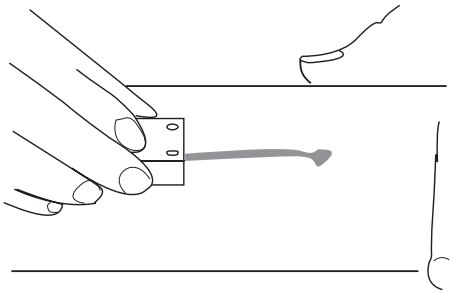
Carefully remove old paste from electrode well.



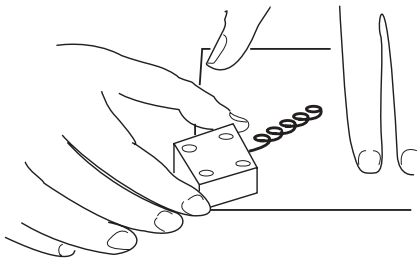
Add a small scoop of new paste to well.



Tamp into well with a small glass rod,
leaving a slight mound of paste on electrode.



Rub off excess paste on a clean index card.



Keep moving to a clean area of card and use
circular motion to finish polishing the paste surface.