# SELF-CLEANING ROTATING DISC GRAPHITE ELECTRODE

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The study offers a construction of a self-cleaning rotating disc graphite electrode (S.C.D.G.E.) applied for voltamperometric determinations and amperometric titrations hampered by passivations of electrode surface.

The application of solid electrodes in voltammetric determinations and amperometric titrations is hampered by passivation of the electrode surface owing to deposition of products from the electrolysis and adsorption of substances from the solutions investigated. This makes the renewal of the surface necessary .The mechanical cleaning offers possibilities for continuous non-screening renewal of electrode surface.

It is known that originally Akimov and Clark[1] and later Tomashov and coworkers[2] offered a continuous renewal of metal electrodes surfaces by means of a rotating corundum disc. Noninsky elaborated a construction of a self-cleaning cone electrode[3].

## RESULTS

Of all the materials used in the manufacture of solid electrodes, graphite is the material that is subjected most easily to continuous renewal and recreation of the surface by mechanical cleaning with a corundum cutter. The graphite used for the manufacture of a self-cleaning disc electrode is vacuum presoaked with polyethylene and paraffin.

This study aims at elaborating a construction of selfcleaning rotating disc graphite electrode (S.C.D.G.E.) for continuous non-screened renewing of surface of the polarized electrode at a stable speed of rotation.

The electrode consists of a static and a rotating part (Fig. 1). The static part includes: a plexiglass body (1); a Teflon cap that is compressed to a bed in the sharpener (2); a Teflon sharpener (3); a cleaning cutter made of corundum and assembled to the Teflon sharpener; the cleaning edge is vertical to the axis of electrode rotation (4); Teflon bearings (5) reduce friction of the electrode to a minimum; a special device (collector) used for a reliable contact between the measuring apparatus and the polarized electrode. The collector (13) consists of graphite brushes, vertical to contact ring (10) and compressed by springs and caps. The caps are thread assembled and allow

to modify the compression of graphite brushes through the springs. All these parts are installed in a polymethyl metacrylate box, which is thread assembled to the main body (1).

The rotating part consists of a graphite rod (6) ($d$ = 3 mm), Teflon insulated. The electrode (6) is screwed on a Teflon insulation and centered in the intermediate plexiglass body (7). There is a corrundum tube (8) in the upper end of this body and a Teflon bushing (9) and a contact ring (10) are attached to it. The wire (11) connects the graphite electrode (6) with the contact ring.

The rotating part of the self-cleaning rotating disc graphite electrode is linked through a flexible connection to a slit joint (12) and coupled to the rotating part of a synchronous motor. The back and forth and circular movement of the electrode is ensured by a spring mounted in a slit joint. Friction is reduced to a minimum due to self-lubricating Teflon bearings. This contributes to a stable electrode rotation.

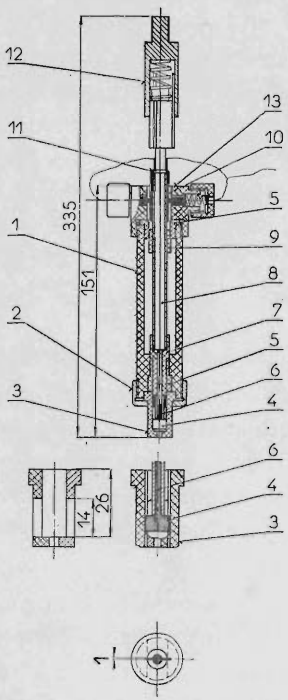


FIG. 1

Self-cleaning rotating disc graphite electrode (S.C.D.G.E.). Static part: 1 body; 2 cap; 3 sharpener; 4 cleaning cutter; 5 teflon bearings. Rotating part: 6 graphite electrode; 7 intermediate body; 8 tube; 9 teflon bushing; 10 contact ring; 11 copper wire; 12 slit joint; 13 collector

S.C.D.G.E. could be used successfully for voltammetric determinations and amperometric titrations which are hampered by the passivation of the electrode surface owing to deposition of products from the electrolysis, adsorption of substances from the solutions investigated *etc.* The results obtained from the investigations will be the subject of another study.

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