

### 10.3.4.2 Spark emission spectrometry

#### *10.3.4.2.1 Analytical procedures*

Spark sources, because of their relatively high precision and accuracy, are suitable sources for the routine analysis of metals, e.g., for production control purposes.

Metals can be analyzed with the *point-to-point* configuration using two sample electrodes (self-electrodes) of the same material. The most common technique uses the *point-to-plane* configuration, i.e., a plane electrode made from the sample material with a pointed counter electrode made from another material, which does not contain the analytical elements. Various types of samples can be analyzed in the form of solutions with the help of supporting electrodes (e.g., *copper spark* and *graphite spark* supporting electrode techniques), carrier electrodes, rotating disc or rotating platform electrodes, vacuum cup or porous cup electrodes.

Electrically non-conductive samples can also be analyzed with the help of *powder techniques*. Powders are prepared by grinding, sometimes after *fusion (isoformation)* and mixing with a conductive material, e.g., graphite or metal powder. From the mixture pellets are compressed which then serve as self-electrodes for spark excitation. Conductive pellets may be made by pressing metal filings, drillings and shavings.

Small quantities of the sample are removed sequentially from the many burning spots produced by the numerous sparks. Although the removal of material is by *thermal evaporation, matrix effects*, due to the composition and physical properties of the surface, can significantly be reduced by a suitable choice of operating conditions.

The surface is first conditioned during the *prespark period*. This is established with the aid of a *prespark curve*. The terms spark-off, spark-off effects and spark-off curve are discouraged. Optimum spark conditions usually coincide with *sparking equilibrium* and *evaporation equilibrium*.