

## Comparison of Mineral Trioxide Aggregate's Composition with Portland Cements and a New Endodontic Cement

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### Abstract

The aim of this study was to compare the compositions of mineral trioxide aggregates (MTAs), Portland cements (PCs), and a new endodontic cement (NEC). Our study also investigated the surface characteristics of MTA and NEC root-end fillings when immersed in normal saline. For part I, we prepared samples of 9 brands of MTAs, PCs, and NEC. The materials were imaged and analyzed by scanning electron microscopy (SEM) and energy dispersive x-ray analysis (EDXA). In part II, 2-mm-deep root-end preparations were filled with MTA or NEC and stored in normal saline for 1 week. Samples were imaged and analyzed by SEM and electron probe microanalysis (EPMA). EDXA investigations revealed differences in the dominant compounds of NEC, PCs, and MTAs. The major components of MTA and PC are the same except for bismuth. The most significant difference was the presence of higher concentrations of Fe (minor element) in gray MTA and PC when compared with white ones. EPMA results revealed remarkably different elements in MTA compared with surrounding dentin, whereas in the NEC group the distribution patterns of calcium, phosphorus, and oxygen were comparable. NEC differs chemically from MTAs and PCs and demonstrates comparable surface composition with adjacent dentin as a root-end filling material. © 2008 American Association of Endodontists.

### Reaxys Database Information

### Author keywords

Chemical composition; electron probe; MTA; new dental material; Portland cement; x-ray microanalysis

### Indexed Keywords

**EMTREE drug terms:** accelerated Portland cement; bismuth; bismuth oxide; iron; phosphorus; root canal filling material; tooth cement

**EMTREE medical terms:** article; chemistry; comparative study; electron probe microanalysis; endodontics; human; materials testing; scanning electron microscopy; surface property; X ray diffraction

**MeSH:** Bismuth; Dental Cements; Electron Probe Microanalysis; Humans; Iron; Materials Testing; Microscopy, Electron, Scanning; Phosphorus; Retrograde Obturation; Root Canal Filling Materials; Surface Properties; X-Ray Diffraction

*Medline is the source for the MeSH terms of this document.*

**Chemicals and CAS Registry Numbers:** bismuth, 7440-79-9; bismuth oxide, 13274-00-3, 1304-76-3; iron, 7440-00-2, 7439-89-6, 7439-89-6; phosphorus, 7723-14-0; Bismuth, 7440-79-9; Dental Cements; Iron, 7439-89-6; Phosphorus, 7723-14-0; Root Canal Filling Materials; accelerated Portland cement; bismuth oxide, 1304-76-3