

Dental Impression Materials and Techniques



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KEYWORDS

- Dental impressions • Digital impressions • Conventional impressions
- Dental materials

KEY POINTS

- Dental impressions are an integral part of patient management from diagnosis to treatment and understanding their properties and manipulation is vital to practicing clinicians.
- Digital dentistry is well established and rapidly evolving, and therefore it is incumbent on dentists to familiarize themselves with this technology and adopt it in contemporary practice.
- Conventional impression techniques are still being widely used in many practices and reviewing current materials and procedures enhances clinicians' confidence and improves patient outcomes.

INTRODUCTION

Imagine fabricating a fixed or removable dental prosthesis directly in the patient's mouth and subjecting it to extreme temperatures and harsh chemicals, and working in a confined cavity. Although the oral structures have evolved to be highly resilient, they are severely challenged when facing the abnormal forces required to construct an indirect dental restoration. Impression making is the first part of this process by creating a negative form of the teeth and tissues into which gypsum or other die materials can be processed to create the working analogues. This process is as much an art as it is a science. Painters and sculptors who create beautiful works of art cannot achieve this without understanding the properties and handling characteristics of the paint or clay that they use. Similarly, dental practitioners should understand the properties of the materials and methods to manipulate these materials safely and effectively to capture the exact form of the oral tissues.

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HISTORICAL PERSPECTIVE

In the mid-seventeenth century, early references to making impressions in wax to reproduce parts of jaws and teeth were recorded by a German military surgeon, Gottfried Purman. Then, in the eighteenth century, there were reports of an impression technique that involved pressing a piece of bone or ivory on the oral tissues that were painted with a coloring material and then carving out the fitting surface at the chairside.¹ Philip Pfaff in 1756 was the first to make an impression of an edentulous jaw with 2 pieces of wax and then join them and making a cast using plaster of Paris.¹ Other impression materials used were zinc oxide eugenol impression paste and compound, although their applications were limited by their inability to surpass undercuts without distorting or fracturing.² Reversible hydrocolloids were introduced in 1925, followed by the irreversible hydrocolloids becoming available in 1941.³ The disadvantage of the hydrocolloids is shrinkage caused by the loss of water, leading to inaccuracy. In 1953, polysulfide was used as an impression material along with condensation reaction silicones, but they both show significant shrinkage over a period of several hours, mainly because of the evaporation of low-molecular-weight by-products.^{3,4} In the late 1960s, polyether was proposed as an alternative polymer because of its improved mechanical properties and low shrinkage.⁴ In the 1970s, polyvinyl siloxane (PVS) appeared on the market and became very popular, in part because of its high dimensional stability.

CLASSIFICATION OF IMPRESSION MATERIALS

Impression materials can be classified according to their composition, setting reaction, and setting properties, but a commonly used system is based on the properties after the material has set (Fig. 1).

At present, the most popular types of impression materials for removable, fixed, and implant prosthodontics are irreversible hydrocolloids, polyethers, and PVSs. A summary of the properties of elastomeric impression materials is shown in (Table 1).

IRREVERSIBLE HYDROCOLLOIDS (ALGINATE)

Alginate impression materials are used for full-arch impressions because of their low cost and good wetting properties,² making them a popular choice to fabricate diagnostic casts. They can also be used for impression of partial removable dental prosthesis frameworks and for the fabrication of immediate/interim complete or partial

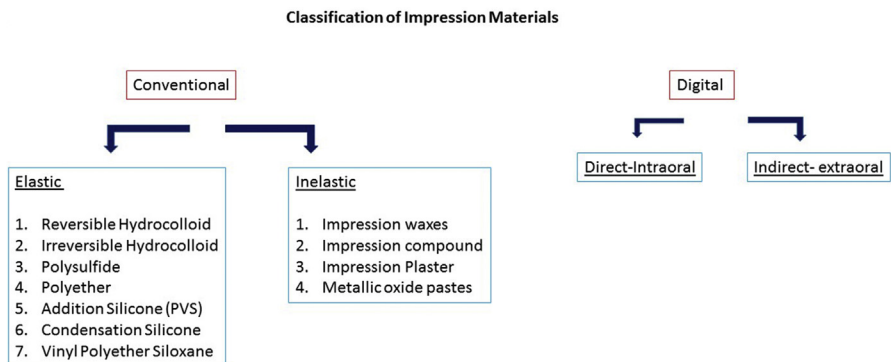


Fig. 1. Classification of impression materials.

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