

# To Study the Microhardness of Different Tooth Material



**Sandeep Kumar**

Assistant Professor,  
Deptt.of P.G. Studies and  
Research in Physics,  
J.V Jain College,  
Saharanpur, U.P.

**Vakul Bansal**

Associate Professor,  
Deptt.of P.G. Studies and  
Research in Physics,  
J.V Jain College,  
Saharanpur, U.P.

## Abstract

The teeth are important hard biological tissues. It is the one of most useful part of the body. Premature loss of any tooth may cause a collapse of dental arch and movement of individual teeth and hence dentists are in search of better treatment techniques for dental diseases. Micro hardness is very important technique for determination of structure and distinguish in deferent type of teeth such as central incisor. lateral incisor, canine, Ist molar and IInd molar. Due to law of nature teeth are not free from diseases and still better techniques and required for dental treatment. The investigation is useful for the dental doctors to identify a particular tooth for a particular abnormality as compared to normal one after microhardness.

**Keywords:** Biological, Tooth Material

## Introduction

The human teeth are vital part of the body. These are the structures used for mastication<sup>1</sup> Teeth are generally used for chewing, biting and esthetics purpose. Anterior is use esthetics, canine is used for chewing, biting and esthetics purpose and posterior is used for chewing. Teeth divide the food finely so that a large surface area is available for the action of the digestive juices. Besides this, teeth assist the tongue and lips in the sound of speech. Furthermore, teeth form an important feature of the face and by supporting the lips and cheeks, these structures perform their function of manipulating the food as well as expressing the emotions.

Teeth form a part of the masticatory apparatus and are fixed to the jaw. Each tooth has three parts.

1. A crown, projection above the gum.
2. A root embedded in a jaw beneath the gum.
3. A neck between the crown and the root surrounded by the gum.

Each tooth is composed<sup>2</sup> of

1. Pulp in the center which is a loose fibrous tissue,
2. Dentine surrounding the pulp which is a calcified material containing spiral tubules radiating from the pulp cavity,
3. Enamel as the hardest animal in existence with 97% calcium.
4. Cemented which resembles the bone in the structure but like enamel and dentine it has no blood supply nor any nerve supply,
5. Periodontal membrane which holds the root in the socket.

Premature loss of any tooth cause a collapse of the dental arch and movement of individual teeth, with loss of inter proximal contacts. Gingival and periodontal disease in their various forms have affected mankind since the down of history<sup>3</sup>. No man is free from it and no race is immune to them The fear of dental ills has been a common tormentor since human being arrived on the earth. Primitive paintings and carvings depict early humans suffering from dental pain, attesting to the its historical significance<sup>4</sup>. Although recent advances have yielded relatively painless method of provision of dental treatment, fear and anxiety still remain associated with dentistry.

## Objective of the Study

Wide survey of literature was made on tooth material. It was found that this is very interesting field of research and scientist all around the world are working on tooth. Their findings have been enumerated in this chapter. The objectives of this present study have been given to clarify the studies to be made during the course of research work.

## Materials and Method

Five different tooth such as central incisor, lateral incisor, canine, Ist molar and IInd molar of a buffalo are collected from animal hospital. It is evident that the used teeth have different size with typical formation and colours. The sample were first, cleaned in benzene in order to remove

contamination from the surface of the sample.

**Hardness**

**Introduction**

Surface hardness is the result of the interaction of numerous properties among the properties that influence the hardness of material are its strength proportional limit ductility, malleability and resistance to brasion and cutting, because numerous factor influence hardness, the term is difficult to define. In fact, no specific definition exists. In mineralogy the relative hardness of a substance is based upon its ability to resist scratching. There are many surface hardness tests. Most are base upon the ability of the surface of a material to resist penetration by a point under a specified load. The test most frequently used in dererming the hardness of the dental material are the brinell, rockwell, vickers and Knoop.

**Brinell Test**

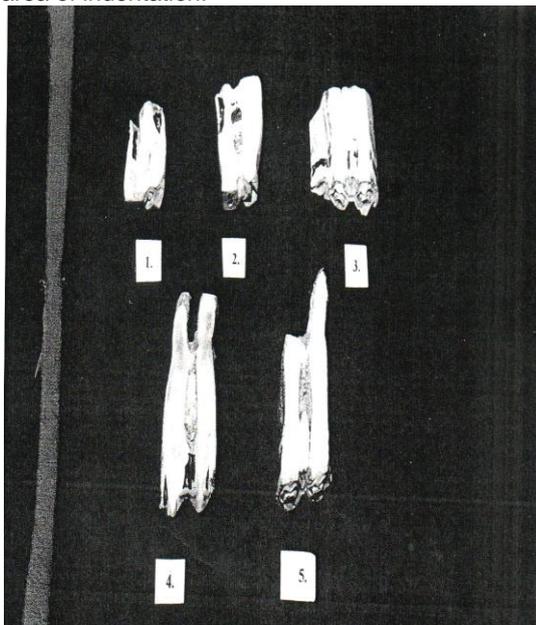
The brinell test is one of the oldest test employes for diterming the hardness of metals. In brinell test, a hardness steel ball is pressed into a polished surface of material under a specified load. Thus the smaller the indentation, the larger is the hardness number, and the harder is the material. The brinell test has been used extensively for determining the hardness of metals and metallic materials used in dentistry.

**Rock Well Test**

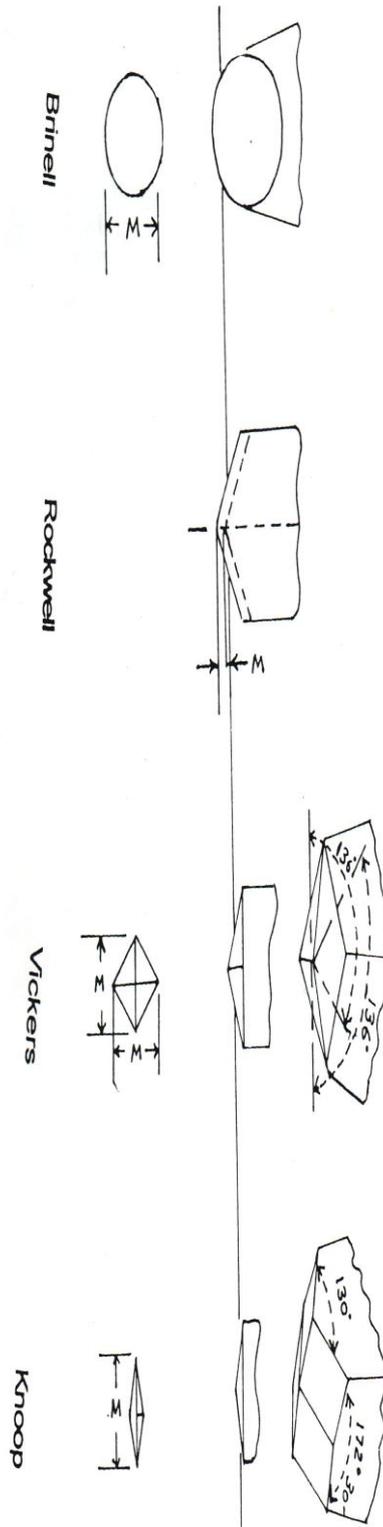
The rockwell hardness test is some what similar to the Brinell test intent a steel ball or a conical diamond point is used as shown in fig.

**Vickers Test**

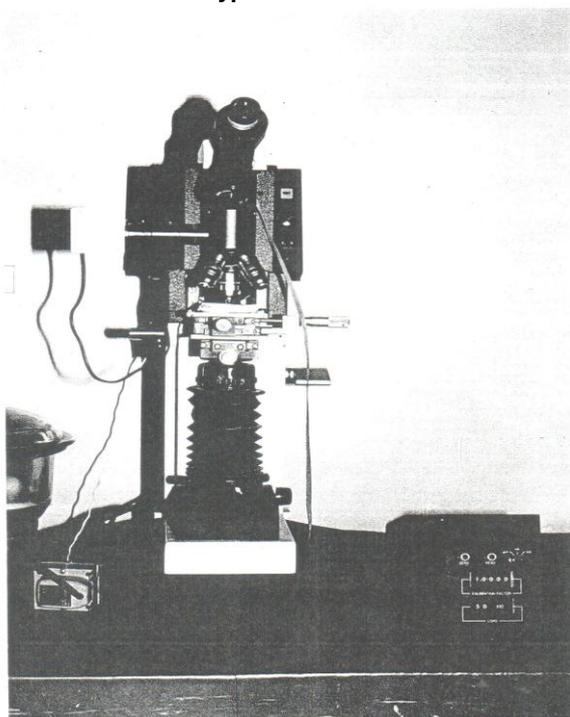
The vickers hardness test employs the same principle of hardness testing as brinell test. The method of computation of the vickers hardness number (VHN) is the same as that for the Brinell hardness number is that the load is divided by the area of indentation.



Sample Used For Hardness



**Type of Hardness**



**Microhardness Tester Model 300 Tukon  
(Used at Department of Material Science,  
Indian Institute of Technology, Roorkee)**

**Knoop Hardness**

The Knoop hardness test employs a diamond indenting tool that is cut in a geometrical configuration as shown in fig.. The impression is rhombic in out line and the length of largest diagonal is measured the projected area is divided into the load to give the “knoop hardness number”(KHN). When the indentation is made, a cutting action occue, along the major axis of the impression, and the spreading take place along the minor axis. The hardness of teeth enamel can be compared with that of gold, porcelaine, resin and other tooth restorative materials.The load may be varied over a wide range from 1 gm to more than one kilogram, so that values for both exceedingly hard and soft materials can be obtained by this test. The Knoop and vickers tests are classified as microhardness test in comparison with Brinell and rockwell micro hardness test. Both knoop and wickers employ loads less than 9.8 N. The regulating indentation are small and are limited to a depth of less than 19um. Hence they are capable of measuring very this object and giving hardness value of small region.

**Result and Discussions**

The term microhardness usually refers to static indentation test made with load up to 1000 grams. The indentation is made with the Knoop and wickers diamond indenter. Load application is critical and be applied without friction or impact of reliable result are to be obtained because the size of the indentation is extremely shallow, the diamond indenter must be accurately shaped.

The diagonal of the indentation is measured by using a microscope which should have adequate

resolving power. This measurement used in knoop and Vicker formula in conjunction with the load, can than be calculated to a knoop and vickers hardness number the optical digital display unit of the modle 300 tester eliminates the need of manual calculation.

Preparation of the test surface is important. The speciman should be lapped and polished in accurate with metallurgical procedure. When employed the test load 100 grams or less, a metallographic finish is necessary. Typical application of microhardness testing include small precision parts surface layers then materials, small diameter wires and hardness near the edge of cutting material. Hardness of components of a microstructure with a Tukon Tester and mechanical stage, it is possible to locate with few micro with the knoop indenter crystals less than microns long may be tested, and with a vickers, crystals of 7 microns when using the testing load of .25 grams.

The hardness in case of buffalo teeth us given in the table below the hardness is differ for different teeth but, we conclude that the hardness of canine teeth very high as compared to other teeth. The hardness of central incisor is very low as compared to Ist molar and IInd molar.

Finally we conclude that the canine teeth is three time hardness then another teeth in case of animal teeth.

Type of teeth	Central incisor	Lateral incisor	Canine	Ist molar	IInd molar
Hardness	34.1 VHM	55.2 VHM	171 VHM	36 VHM	76 VHM

**Acknowledgement**

Authors wish to thank Dr. A.K. Ray Choudhary, Director, National Physical laboratory New Delhi for the encouragement in the work thanks are also due to the staff of N.P.L.

**Conclusion**

Hardness of canine teeth is very high as compared to incisor and molars teeth. the hardness of central incisor in very low as compared to Ist molar and IInd molar.

**References**

1. Nancy Roper; *Pocket Medical Dictionary, ELBS, Britain (1974).*
2. P.V.Krishna Raju, B.R.R Varma and Mahilinga Bhat, *periodontal Implication of class IInd restoration clinical and SEM eveluation, Indian J.Dent. Res. Vol. 7,No 1, 21(1996)*
3. Bhaskar, S.N. *oral histrology and Embryology, Tenth Edition (1970)*
4. Ashwini Rao Peter (esquire and Soben Peter, *Characteristes of Dental Fear Amongist Dental and medical students, Indian J. Dent. Res. Vol 8 No 4,111(1997)*