

Mineralogy of agate gemstone in Quaternary deposits, Southeastern Basrah, Iraq

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Abstract

A mineral-geological study was conducted for the dispersion agate that spread on the surface of the Dib-dibba desert within the border of Basrah Governorate -Southern Iraq. The collected stones were studied using polarized microscopy, XRD and EDX- SEM techniques to determine their mineral and chemical composition. Five types have been distinguished: white, colloidal, banded, cluster, and fleshy. It is believed that these stones are part of the gravels that are included in the components of clastics Dibdibba Formation, it forming resulting of the erosion of the igneous and metamorphic rocks that related to Arabian Shield, which were moved by torrential waters and seasonal floods to long distances and cumulated in that area. Several mechanical operations affected these stones like crushing, sorting, and polishing which contributed to their appearance and exposure on the surface of the earth.

Keywords: Agate, Gemstone, Mineralogy, Petrography, Dibdibba Formation, Iraq.

1. Introduction

Agate is one of the well-known and common semi-precious stones in the world, which is characterized by specifications that distinguish it from other stones, such as hardness, luster, colors, and special shapes. Agate is an expression that does not describe a specific mineral, but it is called a group of different forms of silica, especially chalcedony, which is one of the types of cryptocrystalline quartz, with a waxy luster, transparent or translucent, and is characterized by white, gray, brown or black colors. Agate belongs to the hexagonal crystallization systems; the specific weight is between (2.60 - 2.65) while the refractive index is between (1.544 - 1.553) and its hardness ranges between 6.5 -7. It chemically consists of silicon dioxide SiO_2 with various impurities of iron or manganese oxides and sometimes some nickel as it may be surrounded by water or gas bubbles [1]. Chalcedony is formed as a result of aqueous solutions in the voids and cracks in the host rocks, primarily igneous rocks [2]. Some types of chalcedony are distinguished by the presence of bands or layers that alternate in colors between white and black, or white and red, giving attractive shapes such as onyx and sardonyx. The importance of chalcedony lies in the use of its various types as semi-precious stones, the most famous of which are red agate, brown agate, onyx, sardonyx, and tree agate. The Arabic word "Akeek" is of Arabic origin, meaning "the thing that cracked", due to the cracking rocks hosting it. As for the word "Agate", which means agate, it is of Latin origin, and it derives from the name of the River "Achates" on the island of Sicily, Italy.

Agate is found in several countries in the world, the most important of which are Yemen, Australia, America, Brazil, Uruguay, the Czech Republic, Germany, Italy, India, China, Mexico, Thailand, Sri Lanka, South Africa, New Zealand, Zaire, and Armenia [3]. Agate is a semi-precious stone, and it is either in the form of chalcedony, which is translucent - translucent or opaque, in this case, it is called jasper. This stone is a beautiful stone that enhances positive energy and improves mood in humans, and is characterized by its warm colors, such as light yellow and dark red-green, and purple, which gives the impression of optimism and satisfaction. This stone has many uses, including in the manufacture of ornaments and jewelry, as well as in the manufacture of antiques, furniture pieces, thermal insulators, and it is used in laboratories for the manufacture of agate grinding mortars [4]. There are many sellers and hobbyists of gemstones in the local market in Iraq who offer large quantities of stones as agate stones, which were collected from different desert areas in western and southwestern Iraq, while the largest number of these stones form pieces of different rocks of quartz, flint, and others minerals. This study aims at diagnosing the main types of agate found in the Al-Dibdibba desert area in southwestern Iraq, determining their types, shapes, and areas of gathering, as well as determining their sources and conditions of existence in this region (Fig.1).

