

Formation of Wollastonite (CaSiO_3) and Diopside ($\text{CaMgSi}_2\text{O}_6$) Due to Thermal Metamorphism at Kui Village Near Abu Road, Rajasthan, India

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ABSTRACT:

Formation of minerals wollastonite and diopside has occurred due to thermal metamorphism of limestone and dolomitic limestone containing siliceous impurity. The effect was induced in the rock as a result of development of large plug shape intrusion of troctolite (a gabbro containing titan augite + olivine + plagioclase) within the country rock limestone due to thermal metamorphism. The intrusion of magma must have been occurred under plutonic condition at a depth of more than ~ 7 km depth because the rock troctolite shows granitic texture (holocrystalline and hypidiomorphic texture) where rock is entirely made up of mineral crystals which are partly developed or subhedral. The rock is melanocratic in colour due to complete absence of quartz and presence of plagioclase and titan augite. The rock is basic in nature due to presence of plagioclase and titan augite and complete absence of orthoclase. The rock belongs to soda-lime series due to presence of plagioclase, where it is labradorite or bytownite type. The rock can be considered as of femic type due to presence of titan augite and olivine. The limestone is affected by temperature or heat effect only, which is considered under thermal metamorphism. Here, pressure may be generated only due to thermal expansion of the rock and crowding aside of the rock due to penetration of the magma, which is generally negligible. Further, water content in the magma must be less or absent, as a result of which limited metamorphic aureole is formed with no development of water containing mica or amphibole group of minerals. Furthermore, limestone must be dolomitic at places with siliceous impurity and only limestone with siliceous impurity must be present, which has given rise to $\text{CaCO}_3 + \text{SiO}_2 = \text{CaSiO}_3 + \text{CO}_2$. The CO_2 must have escaped from the resulting wollastonite or might have been trapped in cavities which are found in wollastonite. Dolomitic limestone containing siliceous impurity has provided diopside with chemical reaction: $\text{CaMg}(\text{CO}_3)_2 + 2\text{SiO}_2 = \text{CaMgSi}_2\text{O}_6 + \text{CO}_2$. Here also cavities are present which suggest escape or trapping of CO_2 in the rock. At places wollastonite-pyroxene rock occurs together indicating presence of both limestone and dolomitic limestone with silica as impurity.

Keywords: Charada Lack, Water treatment, Natural and Synthetic Coagulant, Turbidity.