

## **How to explore gemstones in Pakistan?**

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Gemstones in Pakistan have formed due to metamorphic and hydrothermal activities. The most common gemstones of the area include ruby, emerald, peridot, aquamarine, tourmaline and topaz. Ruby occurs in marble of the Karakoram metamorphic belt at Hunza and Nagar, and higher Himalaya at Nangimali in Neelum Valley of Azad Jammu and Kashmir. Fluid inclusion studies show two phase primary inclusions of CO<sub>2</sub> with Tm -56.90°C to -64°C and Th 11.6°C to 30°C in Hunza ruby and Tm -63°C to -64°C and Th 33°C to 34°C in Nangimali ruby confirming their growth from CO<sub>2</sub> fluids during metamorphism. Phlogopite, chromian muscovite and pyrite appear to be the pathfinder minerals for ruby. Emerald mineralization occurs in talc-carbonate schists of the ophiolitic mélange in Swat area, dolomite and pegmatite in Gandao and Khaltaro areas of Mohmand Agency and Gilgit-Baltistan region respectively. High abundances of trace elements such as Cr, V, Be, Li, Sr and La in rocks and stream sediments may indicate emerald mineralization. Peridot occurs in sheared dunite, located just above the Indus suture zone in Sapat Valley of Kohistan. Magnetite trails found in the sheared dunite indicate peridot mineralization. Aquamarine, tourmaline and topaz occur in Gilgit-Baltistan region. Their host rocks are zoned pegmatites. The criteria to find these gemstones include the analysis of muscovite for Rb, Ba, Nb, Ta, Sn, Li, Cs, Mn and Mg. These elements are the indicators to distinguish barren pegmatites from the gemstones-bearing ores.