

Quality evaluation of quartz raw materials from the typical metamorphic and pegmatitic quartz vein in China

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This study determines the quality grades of metamorphic and pegmatitic quartz vein from the Dabie-Sulu ultrahigh-pressure metamorphic belt and Tianshan orogenic belt, respectively. The content of SiO₂ in the processed quartz sand from metamorphic vein-quartz and pegmatitic quartz vein can reach 99.9971%~99.9968% and 99.997% respectively, which meets the quality requirements of middle and high-end products. The total impurity element contents are 29.4 ppm with 12.2 ppm Al and 2.67ppm Ti for the metamorphic vein-quartz, while the total impurity contents are 31.3ppm with 21.92 ppm Al and 3.77 ppm Ti.

Because the total impurity contents of the snow-white, smoky-gray and milk-white quartz in are 128, 309 and 497ppm, suggesting that the snow-white quartz has lowest impurity contents. The comparative study of different quality of high purity quartz raw materials shows that, if the vein quartz is snow-white in color, higher transparency, larger fluid inclusion sizes dominated by two-phase (liquid-vapor) primary fluid inclusions, and lower impurity elements content, the quartz has the greater probability of becoming high purity quartz raw materials. The contents of impurity elements in recrystallized quartz and core of quartz veins are generally low, thus we should pay more attention to this part of quartz. This conclusion has a significance for evaluating the potential resources of high purity quartz raw materials in this area and clarifying the geological characteristics of future prospecting targets.

Element Sample	Al	B	Li	Na	K	Ca	Mg	Ti	Fe	Mn	Cu	Cr	Total	SiO ₂ (wt%)
Metamorphic	12.2	-	0.63	5.75	1.75	3.05	0.95	2.67	1.94	0.32	0.076	0.11	29.4	99.9971
Quartz	9.08	0.17	0.36	5.76	4.95	6.83	3.33	0.24	1.53	0.15	0	0	32.4	99.9968
Pegmatitic quartz	21.9	0.01	1.07	1.1	0.59	1.68	0.08	3.77	0.76	0.06	0.15	0.08	31.3	99.9967