

Comparative analysis of *Kajjali* (1:1) in Ayurveda *Rasashastra* with synthesized β -HgS

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The black colour compound prepared manually by grinding purified mercury and purified sulphur is known as *kajjali* in Ayurveda *rasashastra*. This insoluble inorganic compound is known as β -HgS in chemistry. Although *kajjali* has been evaluated as a nano-range compound, there is no comparative research evidences with synthesized β -HgS. Therefore this research was carried out to elucidate the structural, chemical patterns of *kajjali* (1:1) with β -HgS. For this purpose, purified mercury and purified sulphur (1:1) were manually ground in a ceramic motor to obtain *kajjali* (1:1). β -HgS was synthesized using a controlled precipitation process by injecting Na₂S and NaOH into the Hg(NO₃)₂ solution. The prepared samples were analysed using Scanning Electron Microscopy (SEM), Energy Dispersive x-ray Spectroscopy (EDS), X-ray diffraction (XRD), Fourier Transform Infrared Spectrometry (FTIR), Raman spectroscopy, X-ray Fluorescence (XRF) spectroscopy, particle size analysis (PSA) and CHN elemental analysis. According to SEM images (10.0kV, x50.0k) of the samples highlighted the agglomerated nano-spheres in the *kajjali* while in nano-spheres coupled with nano-flakes in the β -HgS. The EDS data show mercury (47.5%) and sulphur (31.5%) in *kajjali* and mercury (80.5%) and sulphur (11.5%) in β -HgS. XRD peaks agree with meta-cinnabar in both samples and low intense peaks remained reference to free sulphur in *kajjali*. FTIR spectra of *kajjali* explains the changes in functional groups while purification in Ayurveda and Raman spectra of β -HgS shows the amorphous nature. XRF results reveal higher sulphur percentages in both samples and it is with good agreement with support of sulphur in chelation. PSA show the particles within the 58.77 nm–1718 nm in *kajjali* and 58.77 nm–712.40 nm in β -HgS. CHN analysis shows changes in carbon, hydrogen and nitrogen levels in both samples with their procedures. Although samples show the similarities, still *kajjali* expresses more applicability as a medicine according to FTIR and EDS data.

Keywords: Ayurveda, β -HgS, *kajjali*, nanoparticles, *Rasashastra*

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