Date. 12.08.2019

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Aim: Engineering application of nanomaterials.

Apparatus: XRD pattern, peak fitting program.

S.L.O: To determine the average crystallite size from the given X-ray diffraction (XRD) pattern of a polycrystalline material.

Formula to use: The Scherrer equation is to calculate the avg crystallite size. This method gives qualitative results.

The Scherrer equation is:

$$D = \frac{K\lambda}{\beta \cos\theta}$$

Here, β (in radians) = Peak width

D = Crystallite size

λ = X ray wavelength. θ = Peak position

Data given -

Instrumental broadening: (0.01°)

Wavelength of the X-ray used: 1.546 Å

Scherrer constant: 0.94 (assuming that crystallites are spherical in shape)

Result -

The average crystalline size is 50.32 nm.

Teacher's Signature : .....

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	Peak Center (in ~~deg.~~ Rad.)	FWHM (in deg.)	FWHM after instrumental broadening correction (in deg)	FWHM/2 (in Radian)	Avg. crystal size (nm)
(1)	28.57	0.320	0.311	5.4×10^{-3}	57.32
(2)	47.54	0.~~370~~ 371	0.361	6.29×10^{-3}	50.37
(3)	56.~~13~~ 17	0.406	0.396	6.90×10^{-3}	47.60
(4)	37.~~18~~ 13	0.379	0.329	5.77×10^{-3}	57.98
(5)	59.13	0.440	0.430	7.5×10^{-3}	44.~~28~~

Avg Mean = 50.32