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| **FTIR** | **Raman** | **Assignment** | **Reference** |
| Wavenumber (cm-1) | |  |  |
| - | 220-223 | Fe – O stretching | Das and Hendry (2011) |
| - | 282-287 | Fe – O bending | Legodi and de Waal (2007) |
| - | 389 | Fe – OH stretching | Das and Hendry (2011) |
| - | 398-399 | Fe – O stretching | Legodi and de Waal (2007) |
| - | 402-405 | Fe – O bending | Legodi and de Waal (2007) |
| - | 413 | Fe – O bending | Das and Hendry (2011) |
| - | 582 | Mn – O stretching | Julien et al. (2004) |
| - | 592-597 | Mn – O stretching | Julien et al. (2004) |
| - | 603 | Fe – O bending | Legodi and de Waal (2007) |
| 674 | - | FeOH lattice | Tiwari et al. (2015) |
| - | 684 | Fe – O stretching | de Faria and Lopes (2007) |
| 710 | - | CO3 bending | Rodriguez-Blanco et al. (2011) |
| 795 | - | Fe – O – Fe bending | Musić et al. (2003) |
| 875 | - | CO3 stretching | Rodriguez-Blanco et al. (2011) |
| 1030 | - | Fe – O stretching | Pal and Sharon (2000) |
| 1107 | - | Ca – O stretching | Gunasekaran and Anbalagan (2007) |
| 1400-1414 | - | CO3 stretching | Rodriguez-Blanco et al. (2011) |
| 1619 | - | O – H stretching | Raji et al. (2020) |
| 1795 | - | CO3 stretching | Rodriguez-Blanco et al. (2011) |
| 2515 | - | CO3 stretching | Ricci et al. (2006) |
| 3241 | - | OH stretching | Frost et al. (2011) |
| 3404 | - | OH stretching | Frost et al. (2016) |
| 3532 | - | OH stretching | Frost and Xi (2012) |