**Fig. 4.1(a):** XRD patterns of $Y_3In_xFe_{5-x}O_{12}$ ($x = 0.0$ and $0.1$).
Fig. 4.1(b): XRD patterns of $\text{Y}_3\text{In}_x\text{Fe}_{5-x}\text{O}_{12}$ ($x = 0.2$ and $0.3$).
Fig. 4.1(c): XRD patterns of $Y_3\ln_x\text{Fe}_{5-x}\text{O}_{12}$ ($x = 0.4$ and $0.5$).
Fig. 4.1(d): XRD patterns of $Y_3In_xFe_{5-x}O_{12}$ ($x = 0.6$).
Fig. 4.2: Variation of lattice constant ‘a’ with composition (x) of
$Y_3\text{In}_x\text{Fe}_{5-x}\text{O}_{12}$ ($x = 0.0$ to $0.6$).
Fig. 4.3: Variation of X-ray density ‘$d_x$’ with composition ‘$x$’ of $Y_3In_xFe_{5-x}O_{12}$ ($x = 0.0-0.6$).
**Fig. 4.4 (a):** IR spectra of $Y_3\text{In}_x\text{Fe}_{5-x}\text{O}_{12}$ of typical samples $x = 0.0$ and 0.2.
Fig. 4.4 (b): IR spectra of $Y_3In_xFe_{5-x}O_{12}$ of typical samples

$x = 0.6$. 
Fig. 4.5 (a): Variation of log$\rho$ versus 1000/T of Y$_3$In$_x$Fe$_{5-x}$O$_{12}$. ($x = 0.0$ and 0.1)
Fig. 4.5 (b): Variation of logρ versus 1000/T of Y$_3$In$_x$Fe$_{5-x}$O$_{12}$.
Fig. 4.5 (c): Variation of logρ versus 1000/T of $Y_3\text{In}_{x}\text{Fe}_{5-x}\text{O}_{12}$. 

$x = 0.4$

$x = 0.5$
**Fig. 4.5 (d):** Variation of $\log \rho$ versus $1000/T$ of $Y_3In_xFe_{5-x}O_{12}$.
**Fig. 4.6:** Variation of activation energy ($\Delta E$) versus composition $x$ of $Y_{3}In_{x}Fe_{5-x}O_{12}$. 
Fig. 4.7: Variation of dielectric constant ($\varepsilon'$) with logarithm of frequency (Log F) of $Y_3\text{In}_x\text{Fe}_{5-x}\text{O}_{12}$.

Fig. 4.8: Variation of dielectric loss ($\varepsilon''$) with logarithm of frequency (Log F) of $Y_3\text{In}_x\text{Fe}_{5-x}\text{O}_{12}$. 
Fig. 4.9: Variation of dielectric loss tangent (tanδ) with logarithm (Log F) of $Y_{3}In_{x}Fe_{5-x}O_{12}$. 
**Fig.4.10**: Hysteresis loop patterns of $\text{Y}_3\text{In}_x\text{Fe}_{5-x}\text{O}_{12}$ samples ($x=0.0$ to $0.6$) at room temperature.
Fig. 4.11: Variation of Saturation Magnetization (Ms) with composition (x) of Y$_3$In$_x$Fe$_{5-x}$O$_{12}$. 
Fig.4.12: Variation of magneton number ($n_B$) with Composition ($x$) of $Y_{3In_xFe_{5-x}O_{12}}$. 
Fig. 4.13 (a): Variation of a.c. Susceptibility ($\chi_T/\chi_{RT}$) with temperature (T) of Y$_3$In$_x$Fe$_{5-x}$O$_{12}$. 
Fig. 4.13 (b): Variation of a.c. Susceptibility ($\chi_T/\chi_{RT}$) with temperature (T) of $Y_3In_xFe_{5-x}O_{12}$.
Fig. 4.13 (c): Variation of a.c. Susceptibility ($\chi_T/\chi_{RT}$) with temperature (T) of $Y_3In_xFe_{5-x}O_{12}$. 
Fig. 4.13 (d): Variation of a.c. Susceptibility ($\chi_T/\chi_{RT}$) with temperature (T) of $Y_3In_xFe_{5-x}O_{12}$.
Fig. 4.14: Variation of Curie Temperatures ($T_c$) with composition ($x$) of $Y_3In_xFe_{5-x}O_{12}$. 

![Graph showing variation of $T_c$ with composition](image-url)