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Influence of $\text{MgHPO}_4 \cdot 3\text{H}_2\text{O}$ and $\text{Mg}_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$ on Thermal Reactions ($20^\circ\text{-}1000^\circ\text{C}$) in Solid Solutions with $\text{Al}_2(\text{SO}_4)_3 \cdot 16\text{H}_2\text{O}$

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Influence of $\text{MgHPO}_4 \cdot 3\text{H}_2\text{O}$ and $\text{Mg}_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$ on Thermal Reactions ($20^\circ\text{--}1000^\circ\text{C}$) in Solid Solutions with $\text{Al}_2(\text{SO}_4)_3 \cdot 16\text{H}_2\text{O}$

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The following binary systems were studied: $\text{Al}_2(\text{SO}_4)_3 \cdot 16\text{H}_2\text{O}$ - $\text{MgHPO}_4 \cdot 3\text{H}_2\text{O}$ and $\text{Al}_2(\text{SO}_4)_3 \cdot 16\text{H}_2\text{O}$ - $\text{Mg}_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$.

Weighed substrates were grounded in mortar for about 15 minutes, sieved through $400\mu\text{m}$. sieve and then combined into mixtures of molar percentage ratios 10-90% and at molar ratios 1:1, 1:2 and 2:1. Both substances and binary mixtures were heated in electric furnace for one hour at temperatures 500°C and 1000°C .

The temperature dependent X-ray diffraction (TDXD) and ordinary X-ray diffraction methods proved that substrates undergo phase changes: $\text{Al}_2(\text{SO}_4)_3 \cdot 16\text{H}_2\text{O}$ ($20^\circ\text{--}96^\circ\text{C}$)- crystalline phase, amorphous phase ($96^\circ\text{--}382^\circ\text{C}$), which crystallises as $\text{Al}_2(\text{SO}_4)_3$, and after heating to 1000°C transforms into $\gamma\text{-Al}_2\text{O}_3$, while $\text{MgHPO}_4 \cdot 3\text{H}_2\text{O}$ at the temperature ($20^\circ\text{--}88^\circ\text{C}$) is crystalline then amorphous ($88^\circ\text{--}612^\circ\text{C}$) and heated up to 1000°C becomes $\text{Mg}_2\text{P}_2\text{O}_7$. At the temperature ($20^\circ\text{--}86^\circ\text{C}$) $\text{Mg}_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$ is crystalline then becomes amorphous compound ($86^\circ\text{--}636^\circ\text{C}$) and finally recrystallises as $\text{Mg}_3(\text{PO}_4)_2$ - $\text{Mg}_2\text{P}_2\text{O}_7$.

It has been X-ray and IR proved that binary mixtures (at ratios of 50% of each substrate) with the change of the temperature undergo the following changes:

$\text{Al}_2(\text{SO}_4)_3 \cdot 16\text{H}_2\text{O}$ - $\text{MgHPO}_4 \cdot 3\text{H}_2\text{O}$ (20°C), amorphous ($138^\circ\text{--}396^\circ\text{C}$), $\text{Mg}_2\text{P}_2\text{O}_7$, $\text{Al}_2(\text{SO}_4)_3$ (500°C), $\gamma\text{-Al}_2\text{O}_3$, $\text{Mg}_3(\text{PO}_4)_2$, $\text{Mg}_2\text{P}_2\text{O}_7$ (1000°C).

$\text{Al}_2(\text{SO}_4)_3 \cdot 16\text{H}_2\text{O}$ - $\text{Mg}_3(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$ (20°C), amorphous ($114^\circ\text{--}324^\circ\text{C}$), $\text{Al}_2(\text{SO}_4)_3$, $\text{Mg}_3(\text{PO}_4)_2$ (500°C), MgAl_2O_4 (spinell), MgAlO (1000°C).