Suppression of Anionic Pollutant Leaching from Coal Fly Ash by adding Hydroxylated Calcined Dolomite

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Abstract: Coal Fly ash, as the solid waste produced from thermal power plant, always contains many toxic elements which could be released into environment, thereby easily leading to environmental contaminations. Currently, even though recycling utilization is encouraged and developed, there is still large amount of fly ash disposed in ash pond or landfill. In order to dispose fly ash safely, related strategies are needed. In this study, two kinds of hydroxylated calcined dolomites (HCD60 and HCD100) were adopted as the additives to suppress the anionic species leaching from fly ash, and lime was also used to make comparisons. The results showed that both additives were found effective in reducing the leaching concentrations of anionic pollutants, which was better than that of lime addition. $Mg(OH)_2$ and MgO were believed to play important roles in the hydration reaction of fly ash. More hydration products including including calcium silicate hydrate (C-S-H), ettringite (AFt), hydrocalumite (AFm) and other Layered double hydroxides (LDHs) were generated. These hydration products were effective candidates for anion removal and then the final leaching results were controlled by these newly formed phases through adsorption, incorporation or encapsulation. Furthermore, compared to $Mg(OH)_2$, MgO can promote the formation of hydration products in a larger extent because of the hydration process of MgO into $Mg(OH)_2$. There was no systematic trend in the promotion of fly ash hydration by $Mg(OH)_2$ or MgO because it had a close relationship with the properties of fly ash. Objectively, hydroxylated calcined dolomites could be promising candidate additives for suppression of toxic elements leaching from fly ash.