

عنوان مقاله:

Modified pillared organo nanoclay as adsorbent for removal of aniline from aqueous solution

محل انتشار:

دومین کنگره بین المللی علوم و فناوری نانو (سال: 1387)

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خلاصه مقاله:

Clays are hydrous aluminosilicates broadly defined as those minerals that make up the colloid fraction ($< 2\mu$) of soils, sediments, rocks and water [1] and may be composed of mixtures of fine grained clay minerals and clay-sized crystals of other minerals such as quartz, carbonate and metal oxides. Usually the term clay is used for materials that become plastic when mixed with a small amount of water. Clays play an important role in the environment by acting as a natural scavenger of pollutants by taking up cations and anions either through ion exchange or adsorption or both. Thus, clays invariably contain exchangeable cations and anions held to the surface. The prominent cations and anions found on clay surface are Ca^{2+} , Mg^{2+} , H^{+} , K^{+} , NH_4^{+} , Na^{+} , and SO_4^{2-} , Cl^{-} , PO_4^{3-} , NO_3^{-} . These ions can be exchanged with other ions relatively easily without affecting the clay mineral structure. Large specific surface area, chemical and mechanical stability, layered structure, high cation exchange capacity etc., have made the clays excellent adsorbent materials. Both Bronsted and Lewis type of acidity in clays [2] has boosted the adsorption capacity of clay minerals to a great extent. Pillaring of clay minerals by various inorganic as well as organic compounds [3] is well known. In pillared clays, the two-dimensional silicate layers of thickness of about 1 nm are kept apart by ceramic oxides with a dimension of nano- to subnano-metre sizes [4]. The pillaring process is generally presented as a way of increasing the accessibility of the clay layers, but an alternative viewpoint is that it stabilizes 'oxide' particles of nanometer dimension that prevent aggregation by interaction with the layers. The surface groups exposed by these ultra dispersed 'oxides' probably play a key role in determining the promising adsorptive and catalytic properties of pillared clays [5]. Clays pillared with metal oxides are of great importance because of their high thermal stability, high surface area, and intrinsic catalytic activity. These materials are usually prepared by ion-exchanging cations in the interlayer region of swelling clays with bulky alkylammonium ions, polynuclear complex ions bearing inorganic ligands large metal complex ions bearing organic ligands, etc. The intercalated species are capable of preventing the collapse of the interlayer spaces, propping open the layers as pillars, and forming interlayer space. On heating, the intercalated inorganic species are converted to metal oxide clusters, generating a stable micro porous structure with a high surface area.

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