[0006] In one aspect, a method of synthesizing sodium titanate is provided that includes: providing at least one source of titanium that includes nano-crystalline titanium having a mean primary crystallite diameter of about 1 nm to about 30 nm; providing at least one source of sodium oxide; forming a reaction mixture that includes the at least one source of titanium and the at least one source of sodium oxide in a suitable solvent; and reacting the components of the reaction mixture to produce a reaction product that includes sodium titanate having a particle size ranging from 1 micron to 100 microns.

[0006a] In another aspect, there is provided an ion exchange medium comprising sodium titanate produced by the method as defined herein.

[0006b] In another aspect, there is provided a method of removing contaminants from water, the method comprising the steps of:

providing an ion exchange medium to a treatment vessel, the ion exchange medium comprising sodium titanate synthesized by:

providing at least one source of titanium that includes nano-crystalline titanium having a mean primary crystallite diameter of 1 nm to 30 nm;

providing at least one source of sodium oxide;

forming a reaction mixture that includes the at least one source of titanium and the at least one source of sodium oxide in a suitable solvent; and

reacting the components of the reaction mixture to produce a reaction product that includes sodium titanate having a particle size ranging from 1 micron to 100 microns;

providing water from a water source to the treatment vessel; and

passing the water through the sodium titanate ion exchange medium in the treatment vessel to remove at least one contaminant.

[0007] In another aspect, a method of removing contaminants from water is provided that includes: providing an ion exchange medium to a treatment vessel, the ion exchange medium comprising sodium titanate; providing water from a water source to the treatment vessel; and passing the water through the sodium titanate ion exchange medium in the treatment vessel to remove at least one contaminant. The sodium titanate as the ion exchange medium can be synthesized by: providing at least one source of titanium that includes nano-crystalline titanium having a mean primary crystallite diameter of about 1 nm to about 30 nm; providing at least one source of sodium oxide; forming a reaction mixture that includes at least one source of titanium and the at least one source of sodium oxide in a suitable solvent; and reacting the components of the reaction mixture to produce a reaction product that includes sodium titanate having a particle size ranging from 1 micron to 100 microns and subsequent agglomeration products having a particle size range from 1 mm to 4 mm.

BRIEF DESCRIPTION OF SEVERAL VIEWS OF THE DRAWINGS

[0008] Specific examples have been chosen for purposes of illustration and description, and are shown in the accompanying drawings, forming a part of the specification.

[0009] Figure 1 illustrates an XRD plot of titanium diodixe (TiO_2), showing the peaks associated therewith.

[0010] Figure 2 illustrates an XRD of sodium titanate, showing a sodium titanate peak at 10 degrees 2 theta, and indicating that synthesis is complete.