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Adsorption of Some Alkaline Metals and Alkaline Earth Metals on Carbon Nanotube

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In this work, the adsorption of some alkaline metals and alkaline earth metal nitrates on carbon nanotube have been measured. The results are significant for biologists, druggists and any one who investigate on alkaline metals and alkaline earth metals on carbon nanotube. This function is most important for Physicians to treat cancer or Osseo emptiness and by that we can loose water hardly and filtration. In this studies the alkaline nitrate and alkaline earth nitrate, mixed with carbon nanotube then after 5 min the amount of the compounds adsorbed on carbon nanotube was measured by atomic adsorption spectrometer method. Alkaline metals have more adsorption in comparison of alkaline earth metals on carbon nanotube.

Key Words: Adsorption, Alkaline metals, Alkaline earth metals, Carbon nanotube, Atomic adsorption.

INTRODUCTION

After the discovery of carbon nanotube (CNT)[1], it reaches a critical mass in many areas of physics and chemistry. Synthesis methods have been rapidly improved, making it possible to produce large amount of size-controlled CNT for commercial applications[2]. Carbon nanotube can adsorbe a number of atomic and molecular species, *e.g.*, alkali metal *i.e.*, Li[3], K[4], Rb[5] and Cs[6] hydrogen[7], nitrogen[8], oxygen[9] and methane[10] gases. After its discovery by Iijima[1] in 1991, research on carbon nanotube (CNT) reaches a critical mass in many areas adsorption properties provide the opportunities for applications such as hydrogen and other gases storage[11], sensor[12], catalyst[13] and Li-ion batteries[14]. The chemistry of single-wall carbon nanotubes (SWNTC) has been a subject of interest[15-18]. The crystalline porous structure and large surface area of the carbon nanotube make it an ideal adsorption for polymer. Usually, the adsorption of polymer on carbon nanotubes can be surveyed by some traditional techniques such as SEM, STM and Raman spectra. However, more valuable information on the modification of surface properties such as surface irregularities and defects can be monitored by the fractal analysis. Many investigations have been carried out on the synthesis, purification, structural characterization and application of the carbon nanoparticles[19-29]. few of which are related to the surface fractal analysis. Hence, the surface fractal analysis may be a feasible approach to

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explain some phenomena occurring at surface and interface of carbon nanotubes such as adsorption, surface modification and coating by some polymer[30]. Chemical derivatization (or fictionalization) is an efficient and widely used tool to modify the chemical and physical properties of carbon nanotubes (CNTs) and to expand in this way application areas of the latter. All the existing derivatization methods, the belong to one of two large groups, covalent and noncovalant derivatization[31-34]. While covalent derivatization can be equally applied to both CNT tips and side wall, the noncovalant technique based essentially upon physisorption on CNTs (through hydrophobic, stacking interactions, *etc.*) and therefore takes place predominantly on CNT-side walls. Both approaches have their advantages and draw backs, depending on the application area. The main 'pro' of nanocovalent CNT derivatization. Substituted pyrenees are first to be motioned, which were primarily employed as molecular anchors as well as for increasing CNT solubility. Interaction of other aromatic molecular with were anthracene derivative and 1,2-dichlbrobenzen[35].

EXPERIMENTAL

In this work several alkaline nitrates and alkaline earth nitrates were used. The nitrates are perfectly stable and have high solubilities. The standard solution with (0.3, 0.4, 0.5, 0.6, 0.7) ppm has been prepared and then its adsorption with distilled water control and in λ_{max} measurement by atomic adsorption spectrometer (AAS). After any condense take 10 mL of solution and pouring in different bashers and by adding 300 mg of carbon nanotubes like adsorbent and kept on room temperature. Then complex settled on the shaking equipment till prefect adsorbing. Then by filtering carbon nanotubes and separate them, measuring adsorption by AAS. In this way use distilling water control and carbon nanotubes complex. At last adsorption rate of metals on the carbon nanotubes were studied.

Adsorption of Li, Na, K, Be, Mg, Ca and Ba ions on carbon nanotube: 300 mg carbon nanotube as adsorbed was placed in a balloon with 10 mL of 0.3, 0.4, 0.5, 0.6, 0.7 ppm each of element salts contact and stirred at temperature room after 24 h for the adsorption equilibrium and filtered. Amounts of Li, Na, K, Be, Mg, Ca and Ba ions adsorbed determination with atomic adsorption. The amounts of Li, Na, K, Be, Mg, Ca and Ba calculated by subtracting the equilibrium of elements content from the initial elements contents. Adsorption results shown in Tables 1-7.

TABLE-1
AMOUNT OF $LiNO_3$ ADSORBED AT MAXIMUM WAVE LENGTH

Con. $LiNO_3$ (ppm)	Ads. without CNT
0.3	0.0031
0.4	0.0040
0.5	0.0050
0.6	0.0060
0.7	0.0070

TABLE-2
AMOUNT OF $NaNO_3$ ADSORBED AT MAXIMUM WAVE LENGTH

Con. $NaNo_3$ (ppm)	Ads. without CNT
0.3	0.0310
0.4	0.0420
0.5	0.0560
0.6	0.0630
0.7	0.0740

TABLE-3
AMOUNT OF KNO_3 ADSORBED AT MAXIMUM WAVE LENGTH

Con. KNO_3 (ppm)	Ads. without CNT
0.3	0.0031
0.4	0.0040
0.5	0.0050
0.6	0.0060
0.7	0.0070

TABLE-4
AMOUNT OF $Be(NO_3)_2$ ADSORBED AT MAXIMUM WAVE LENGTH

Con. Be $(NO_3)_2$ (ppm)	Ads. without CNT
0.3	0. 0250
0.4	0. 0380
0.5	0. 0450
0.6	0. 0560
0.7	0. 0630

TABLE-5
AMOUNT OF $Mg(NO_3)_2$ ADSORBED AT MAXIMUM WAVE LENGTH

Conc. $Mg(NO_3)_2$ (ppm)	Ads. without CNT
0.3	0. 0008
0.4	0. 0010
0.5	0. 0011
0.6	0. 0012
0.7	0. 0013

TABLE-6
AMOUNT OF $Ca(NO_3)_2$ ADSORBED AT MAXIMUM WAVE LENGTH

Con. Ca $(NO_3)_2$ (ppm)	Ads. without CNT
0.3	0. 0063
0.4	0. 0084
0.5	0. 0105
0.6	0. 0126
0.7	0. 0147

RESULTS AND DISCUSSION

The carbon nanotubes are a kind of carbon material which have exceptional capabilities and have high adsorb index. We examined the measurement adsorption of some alkaline metal nitrates and alkaline earth metal nitrates on carbon nanotubes. There are experiment witnesses that the contact time suitable with carbon nanotubes by a overnight. The experiments show that best adsorb are in the upper concentration dense 0.7 ppm and all of using metals used in this research has better adsorption on the carbon nanotubes. Beryllium has maximum adsorption and barium has minimum adsorption on carbon nanotube (Tables 8-14). Vadi and Zare[36] found that acid refluxed CNTs can be good adsorbents for Pb ion. As a preliminary study of the possibility of reversible modification of CNT side-walls with metal complexes employing similar stacking phenomena. We studied the interaction of Li, Na, K, Be, Mg, Ca

TABLE-7
AMOUNT OF $Ba(NO_3)_2$ ADSORBED AT MAXIMUM WAVE LENGTH

Con. Ba $(NO_3)_2$ (ppm)	Ads. without CNT
0.3	0. 0032
0.4	0. 0045
0.5	0. 0056
0.6	0. 0067
0.7	0. 0078

TABLE-8
AMOUNT OF Li (%) ON CARBON NANOTUBE

Con. $LiNO_3$ (ppm)	Li % ads. on 100 g CNT
0.3	0.0953
0.4	0.1236
0.5	0.1520
0.6	0.1805
0.7	0.2089

TABLE-9
AMOUNT OF Na (%) ON CARBON NANOTUBE

Con. $NaNO_3$ (ppm)	Na % ads. on 100 g CNT
0.3	0.0556
0.4	0.0684
0.5	0.0743
0.6	0.0836
0.7	0.0895

TABLE-10
AMOUNT OF K (%) ON CARBON NANOTUBE

Con. KNO_3 (ppm)	K % ads. on 100 g CNT
0.3	0.0221
0.4	0.0269
0.5	0.0343
0.6	0.0390
0.7	0.0464

TABLE-11
AMOUNT OF Be (%) ON CARBON NANOTUBE

Con. $Be(NO_3)_2$ (ppm)	Be % ads. on 100 g CNT
0.3	0.1601
0.4	0.1821
0.5	0.2355
0.6	0.2732
0.7	0.3109

TABLE-12
AMOUNT OF Mg (%) ON CARBON NANOTUBE

Con. $Mg(NO_3)_2$ (ppm)	Mg % ads. on 100 g CNT
0.3	0.1830
0.4	0.1932
0.5	0.2034
0.6	0.2135
0.7	0.2237

TABLE-13
AMOUNT OF Ca (%) ON CARBON NANOTUBE

Con. $Ca(NO_3)_2$ (ppm)	Ca % ads. on 100 g CNT
0.3	0.0350
0.4	0.0465
0.5	0.0584
0.6	0.0701
0.7	0.0818

TABLE-14
AMOUNT OF Ba (%) ON CARBON NANOTUBE

Con. $Ba(NO_3)_2$ (ppm)	Ba % ads. on 100 g CNT
0.3	0.0153
0.4	0.0210
0.5	0.0267
0.6	0.0323
0.7	0.0380

and Ba with carbon nanotube. The carbon nanotube were modified by nitric acid. Measurement showed that the surface area of modified CNTs expected. Furthermore the Be adsorption behaviour on the surface of modified CNT has been investigated.

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