for the promotion of Assistant P
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(1) Research Papers in Peer-Reviewed or UGC listed Journals: (Pleas

Sr. No.	Title of paper	Journal Name, Page nos., Vol. no., Issue no., Year of publication	ISSN / ISBN NO.	Impact Factor if any	No. of Co-Authors
1	A Study on Synthesis of Natural Zeolites	JASRAE Vol15 Issue 9 Oct2018 UGC Listed **49103**	ISSN: 2230-7540	3.46	-
2	Engineering Materials and their Properties	JASRAE Vol16 Issue2 Feb 2019 UGC Listed 49103	ISSN: 2230-7540	3.46	-
3	A Study on Trending Research in Material Science	JAST Vol16, Issue 1 March 2019 UGC Listed 8099	ISSN: 2230-9659	1	-
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A Study on the Synthesis of Natural Zeolite

Dr. H. V. Bakshi*

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Abstract – ***Natural zeolites are environmentally and economically acceptable hydrated aluminosilicate materials with exceptional ion-exchange and sorption properties. Their effectiveness in different technological processes depends on their physical-chemical properties that are tightly connected to their geological deposits.***

The unique tree-dimensional porous structure gives natural zeolites various application possibilities. Because of the excess of the negative charge on the surface of zeolite, which results from isomorphic replacement of silicon by aluminum in the primary structural units, natural zeolites belong to the group of cationic exchangers. Numerous studies so far have confirmed their excellent performance on the removal of metal cations from wastewaters.

However, zeolites can be chemically modified by inorganic salts or organic surfactants, which are adsorbed on the surface and lead to the generation of positively charged oxi-hydroxides or surfactant micelles, and which enables the zeolite to bind also anions, like arsenates or chromates, in stable or less stable complexes.

Keywords: Zeolite, Complex, Stable

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INTRODUCTION

Natural zeolites have advantages over other cation exchange materials such as commonly used organic resins, because they are cheap, they exhibit excellent selectivity for different cations at low temperatures, which is accompanied with a release of non-toxic exchangeable cations (K^+ Na^+, Ca^{2+} and Mg^{2+}) to the environment, they are compact in size and they allow simple and cheap maintenance in the full-scale applications.

The efficiency of water treatment by using natural and modified zeolites depends on the type and quantity of the used zeolite, the size distribution of zeolite particles, the initial concentration of contaminants (cation/anion) pH value of solution, ionic strength of solution temperature, pressure, contact time of system zeolite/solution and the presence of other organic compounds and anions. For water treatment with natural zeolites, standard procedures are used, usually a procedure in column or batch process.

Ion exchange and adsorption properties of natural zeolites in comparison with other chemical and biological processes have the advantage of removing impurities also at relatively low concentrations and allows conservation of water chemistry, if the treatment is carried out in the column process.

Subject of further academic and industrial research should be to improve the chemical and physical stability of modified zeolites and to explore their catalytic properties, which would allow their use in catalytic degradation of organic pollutants.

More careful consideration of their superb metal removal properties and awareness of possible regeneration or further use of contaminant/metal-loaded forms can considerably increase their environmental application possibilities, with a focus the reduction of high concentrations of cations and anions in drinking water and wastewater, for surface, underground and public municipal water treatment independently or in combination with others physical - chemical methods.

Natural zeolites have been used in a wide variety of applications over the world. Among these, its utilization for carrying energy in energy conversation and heat exchanging systems is noteworthy. The main objective of the present study is to investigate potential and utilization opportunities of natural zeolites in energy-related applications.

In this regard, the reserve potential of natural zeolites in Turkey is presented, while their worldwide application areas, current, and other utilization opportunities are given. High water

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Engineering Material and Their Properties

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Abstract – Nanotechnology is not only a simple continuation of miniaturization from micron meter scale down to nanometer scale. Because of their small size which gives large surface areas, they can lead to unexpected or dramatically differing properties than the bulk. Different sized nano materials exhibit different properties. For example bulk gold has golden color but the gold nano particle having diameters of >1nm and 3-30 nm has orange and red colors. They are useful candidates for many applications like solar cells, batteries, computer chips, cosmetics, drug delivery, optoelectronic devices, catalysis, display devices, photo and electroluminescent devices, spintronics, sensors etc. leading them to enter the world market in a big way. Although many countries are majorly investing in this field of nanotechnology.

Natural inorganic nanomaterials occur through crystal growth in the diverse chemical conditions of the earth's crust. Fullerenes, carbon nanotubes are some of the examples of synthetic organic nanomaterials. Inorganic nanomaterials are based on other elements, such as silicon. Solids and molecules have been studied and understood quite well, however nanomaterials exhibits properties that are entirely different from either of the two. If the physical size of the material is reduced below the nanometer length scale, it's all properties like mechanical strength, thermal, optical, magnetic, conducting etc. change and become sensitive to its size and shape.

Keywords: Synthesis, Polymer, Nano-Composites, Organic, Polymers

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INTRODUCTION

The number of surface atom increases with decreasing particle size. In other words nanomaterials have large number of atoms on their surface as compared to those in the interior. For example, in a cube of edge size 1 cm, the % of the surface atoms would be 10-5 % of the bulk atoms whereas for a cube of edge size 1 nm, the percentage surface atoms would be 10 % of the bulk atoms.

The surface atoms in nanomaterials play a dominant role in governing the electronic, optical and thermodynamic properties of nanomaterials. The variation in material properties with size i.e. from bulk to nano includes depression in melting point, increase in the pressure required to produce transformation, reduction in Young's modulus, increase in specific heat, increase in resistivity, enhancement in luminescence etc. For example, bulk gold has melting point ~1064 °C, whereas on reducing the size of gold from bulk to particle size of 2 nm, the reduction in melting point is observed and it melts at ~ 500 °C.

Nanomaterials can be synthesized by growing and shaping the materials by variety of physical, chemical, biological or hybrid methods. All the nanomaterial synthesis method are often divided into two categories: top down and bottom up approach.[9] In top down approach materials are brought down from a larger size to nanometer dimensions. This approach involves milling, machining and lithographic techniques. On the other hand, it is also possible to start with atoms or molecules, bring them together to make the required particles or assemblies of nanometer size. This is known as bottom up approach. The bottom up approach consists of physical as well as chemical methods.

A polymer is like a thread joining many coins punched through the center, in the end we get a string of coins, the coins would be the monomers, and the chain with the coins would be the polymer. The basic part of a polymer are the monomers, the monomers are the chemical units that are repeated throughout the chain of a polymer, eg In polyethylene, monomer is ethylene, which is repeated 'n' times along throughout the chain. Number of polymers, such as starch and proteins are natural materials and have been used by human being. In reality, the body of man itself is partly composed of polymer substance, such as the keratin in hair and nails and the deoxyribonucleic acid (DNA) found in the every nucleus of the body cells. Now a days, the material made of polymers finds multifarious uses starting from common household utensils, automobiles, furniture, etc to

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A Study on Trending Research in Material Science

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Abstract *– Material science is a new revolution in the field of science. Presently, many researches are going on so as to take more and more benefits of this technology. It has a lot of scope in future. Nano-particles are very small in size. Material science comprises the knowledge from physics, chemistry and biology and hence becomes the most powerful technology which can offer a number of services to the living persons making their lives more comfortable. At first, nano-particles are identified and characterized chemically so as to examine the risks offered through material science. It is observed that for the purpose of examining the ill effects and hazards, it is necessary to understand the chemical properties of particles. The current article highlights the scope of nano technology in electronic networks.*

Keywords: Nano Technology, Size, Particle

INTRODUCTION

There are many chemical properties which can be referred so as to characterize the materials and some of these properties include boiling point, melting point, molecular weight and structure etc. The information regarding performance and purity of a product can be determined with the help of its formulation and manufacture details.

The identification and characterization of nano particles chemically is also supposed to be very essential. However, the task of identifying and characterizing of nano particles is found to be difficult one due to the fact that the nano particles have much complexity and diversity. It is also observed that a number of properties are needed to be examined for the purpose of characterizing the nano-particles for assessing risks.

In case of nano materials, the chemical properties such as size of particle, molecular weight and structure are considered as very critical. In the same manner, the electrical properties such as surface characteristics, conductivity and dispersion etc. play a major role in nano materials.

There may be a number of different processes to make a given nano material which may result in the generation of many of derivatives of a single material. An example is nano-tube which can be manufactured with the help of a number of different processes that can yield products having dissimilar chemical and physical properties.

There are many methods that are available for the characterization of nano materials but these methods may be insufficient to examine their risks and hazards. Although, it is noticed that the properties like boiling point are not sufficient for the task of characterizing of nano materials.

It is also observed that the chemical properties of nano-materials tend to vary at nano scale. Reactivities of nano materials are found to be more than that of bulk objects because of the fact that the number of surface atoms in former is found to be large as compared to latter.

There are some points which are related to chemical properties which are mentioned below:

1) The reason behind the variation in behaviour of nano materials at nano scale is observed to be the prevalence of surface. Since in nano particles, a number of surface atoms are found; therefore, it is quite difficult to determine the electrical transport with the help of bulk procedure.

2) As the quantity of surface atoms is larger in nano-materials as compared to that of atoms; therefore, average energy is found to be more in former. For instance, catalytic materials have higher reactivity because the size of catalyst tends to minimize at nano scale.

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THERMAL BEHAVIOR OF Na-EXCHANGED HEULANDITE

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ABSTRACT :

Crystals collected from Ajanta, Aurangabad Maharashtra, India have been characterized as heulanditeby x-ray diffraction, IR spectroscopy and chemical analysis.

Three sample of (Na-Heu) was prepared by ion exchange and was fully characterized. Thermal behavior of (Na-Heu) was studied using thermo gravimetric and differential thermal analysis (TGA/DTA)

KEYWORDS : *Heulandite, thermal behavior.*

1 INTRODUCTION

Heu andite is commonly occurring platy natural zeolite, that belong VII group of zeolites.[1] It occurs in cavities of basalts and in igneous rocks.Heulandite is a zeolite mineral series having the distinctive framework topology and the ratio of Si/Al <4. The structural topology oftetrahedral Heu framework[2]is well understood topology and Possesses C2/msymmetry. Many researchers have studied the thermal stability of heuland te[3 4 5 6]

2 EXPERIMENTAL

The crystal were collected from Ajanta ranges and area surrounding Aurangabad city. The collected samples were cleared, crushed and sieved to gel 106μm sized crystals.The powdered samples were washed repeatedly. The tree verities of samples of as grown heulanditesamples were treated three times at 95^{0}c fortwo hours in o.1M solution of Nacl which a solid solution ratio 1:10 with stirring.After washing with distilled water. filtering and drying at 80^{0}cfor several hours theion exchanged samples were obtained.

Thetree different varities of heulandite were exchanged with Na$^+$and were designated as A,B,C. All the samples were characterized my x-ray diffraction, infrared s; ectroscopy and thermal analysis (DTA/TGA).

2.1 X-ray diffraction :-

The x-ray diffractogram was recorded between 2θ values ranging from 5^0 to 50^{0}with a chartspeedof 1^0/min. onPhi lips x-ray diffractometer(modelpw1730) and Ni filtered CuKα radiation (λ=1.5406A^0). The relative intensities and dvalues compared withstandard d values.

2.2 Thermal analysis :-

The TG/DTG/DTA curves wererecorded on Setaram 92-12 thermal analyzerin air using precalcinated α –alumina as reference materia.. The TG/DTG/DTA curves of sample AB&C are as shownfig 1