STUDY THE EFFECT OF ZNO NANOPOWDER IN FERTILIZER

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ABSTRACT :-

In this research, nano powder of zinc oxide was added to a mixture of soil ,urea powder and water at different weight percentages in order to study the effect of nano additives. X-ray diffraction and particle size analysis has been studied. An addition examination of measuring the pH of the soil and temperature to mixture with nanoscale powder. The results shows that the powder of zinc oxide nanoparticles was granular size (80 nm) and his installation of hexagonal crystal, and adding the powder nanoscale reduced acidity and maintained a constant temperature of soil and reduce the amount of urea required temperature therefore added reduce the harmful effect of urea on the constructions
KEY WORD : ZnO nano powder, Fertilizer, urea, water amount.

دراسة تأثير مسحوق أكسيد الزنك النانوي لتطوير الأسمدة

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الخلاصة :-

في هذا البحث مسحوق نانوي من أوكسيد الزنك تم إضافته إلى خليط من مسحوق التربة و اليوريا والماء إلى بنسب وزنة مختلفة لأجل دراسة تأثير النانو المضاف . تم إجراء فحص حيود الأشعة السينية و الحجم الحبيبي للمسحوق النانوي علاوة على قياس درجة الحموضة للتربة و درجة الحرارة . بينت النتائج بأن مسحوق أوكسيد الزنك النانوي كان بحجم حبيبي (80 نانومتر) و له تركيب بلوري سداسي، وان إضافة المسحوق النانوي قلل الحموضة وحافظ على درجة حرارة التربة ثابتة وتخفيض كمية من اليوريا المطلوبة بالتالي فان الإضافة تقلل من التأثير الضار لليوريا على الإنشاءات .

1- INTRODUCTION :-

World-wide use of zinc oxide is in excess of 1.2 million tons annually. On a contained zinc basis the oxide accounts for about 9% of metallic zinc. Probably 60% of zinc oxide uses secondary zinc, primarily top dross from continuous galvanising, as the zinc source. China is by far the dominant supplier and also largest user, followed by the U.S.. Although rubber products and in particular tires are the major use for rubber, there are considerable variations around the world in use patterns A. R Gonzale et.al.. For example the ceramic market is equally as important as rubber in some areas. Oil additive compounds are dominated by manufacture within the U.S. M. Liedekerke, literature survey in this field were investigate, R. D. Bardgett et.al. studied Plant species and nitrogen effects on soil biological properties of temperate upland grasslands, he was assess the extent to which the microbial biomass and activity, and community structure of fertilized upland grasslands are directly related to changes in soil availability or indirectly related to individual plant species effects caused by changes in plant species composition and dominance. He investigated the short-term interactive effects of dominant plant and grasslands. N. Milani et.al. studies the Fate of nano particulate zinc oxide fertilizer in soil: solubility, diffusion and solid phase speciation Zinc (Zn) deficiency has recognised as one of the main problems limiting agricultural productivity in alkaline calcareous soils. Application of Zn fertilizer is a common procedure in these soils to provide plant Zn requirements. Nano materials can be used in producing more soluble and diffusible sources of Zn fertilizer. Higher specific surface area and reactivity of zinc oxide (ZnO) nano particles compared to bulk ZnO may affect Zn solubility, diffusion in soil and hence Zn availability to plants. Absorption spectroscopy to examine diffusion and solid phase speciation of Zn in an alkaline calcareous soil to which nano particulate and bulk ZnO associated with two fertilizer products (monoammonium phosphate (MAP) and urea) were applied. Dissolution kinetics of ZnO coated fertilizer treatments and Zn standard compounds were also evaluated in sand columns. M. C. DeRosa et.al. study Nanotechnology in fertilizers, which is a key nutrient source for food, biomass, and fibre production in agriculture, is by far the most important element in fertilizers when judged in terms of the energy required for its synthesis, tonnage used and monetary value. However, compared with amounts of nitrogen applied to soil, the nitrogen use efficiency (NUE) by crops is very low, and the basic compare chromatic . L. R. Heggelund et.al., study bioavailability and toxic. The lower toxicity of nano zinc oxide (ZnO NPs) compared with non-nano ZnO in a natural soil at three pH levels. The main aim of the work is to add ZnO nanopowder to soil urea mixture and study some of mixing properties, for suitability of the soil for ensuing construction applications.

2-EXPERIMENTAL PART :-

At first characteristic of nano powder of ZnO was done by measurement of particle size is worked in Nanotechnology and advanced research Center. (Models: Brookhaven NanoBrook 90 Plus USA) Particle Size Analyzer ,ISO 13321 & ISO 22412 ,used for Most nanoparticle, and colloidal-sized materials, in any non-absorbing liquid Range: 2 nm to 6 μm, Scattering Angle 90°.Measurement of XRD was done also at the same Center .

Secondly; Mixing materials powder were prepared by drying at furnace at 60^0C .Iraqi soil , fertilize type Urea and ZnO NPs (at different percentage) were mixed as shows in table (1), as show in Fig.1(a).

At last ;measuring the pH of the mixture was done by pH paper as shows in Fig.1(b) ,and temperature by thermometer.

3-RESULTS AND DISCUSSION :-

The results of X-ray diffraction are shown in figure (2) a correspond with the standard value (ASTM card No. 36-1451) K. Momma and F. Izumi, ZnO have a hexagonal system , and clear match with the values of the peaks intensity with salt types M. M. Rohe and H. U. Wolf. The particle size measurement shows in fig.(3) ,it can seem that particle size about (80 nm) with homogenous distribution and uniformity. The PH results, notes from the figure(4) that the soil alone have fixed acidic function(pH) and reach 7 O. Madelung et.al., when urea added in ratios as mentioned in table(1) , raises the value and which is harmful for soil over days, M. A. TabatabaI and J. M. Bremner. Adding nano-oxide zinc concentrations of 0.1 and 1 wt% preserves the pH of the mixture acidic at 7 due to increased surface area. While adding 10% do not fixed the acidic function due to the conglomerates of nanoparticles, A.Gen. The temperature is stable in the absence of urea and when it added temperature dramatically rise to 35 which adversely affects their soil and the addition of nano-demonstrate temperature and prevents the rise temperature sink, O. Madelung et.al.

4-CONCLUSION :-

The addition of nanomaterials promising to preserve the soil from the harmful effects and the extent of the suitability later to the construction and future construction. The 0.1wt% was most appropriate in the adopted Mixing.

Table (1) Composition of Mixture samples.

Materials	wt%		
ZnO	0.1	0.01	0.001
Urea Fertilizer	2	2	2
Soil	Seq.		
Water	20 ml		

Table (2) XRD standard of ZnO No. 36-1451

2θ	I%	hkl
31.769	57	100
34.421	44	002
36.252	100	101
47.538	23	102

a **b**

Fig.(1) The prepared mixed samples in (a), the pH measurement of mixed in (b)

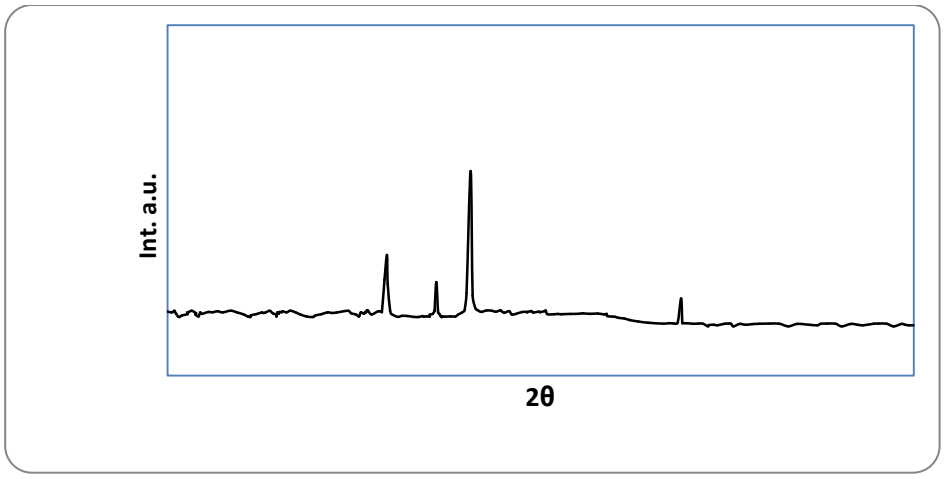

Fig.(2) The XRD of ZnO sample

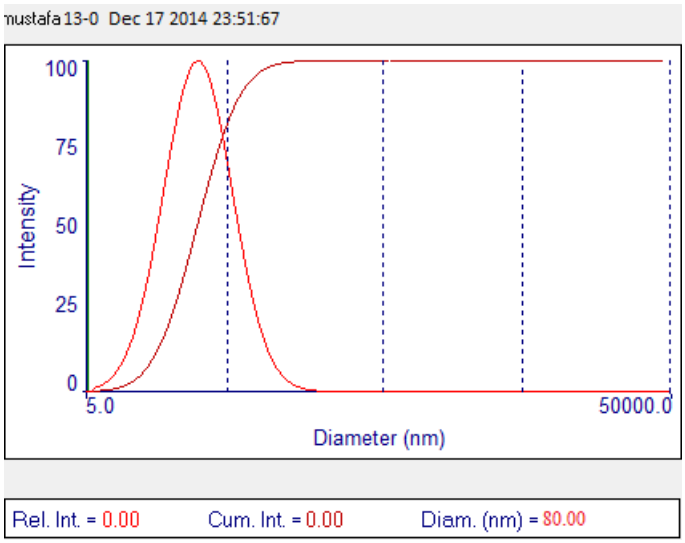

Fig.(3) The particle size of ZnO sample

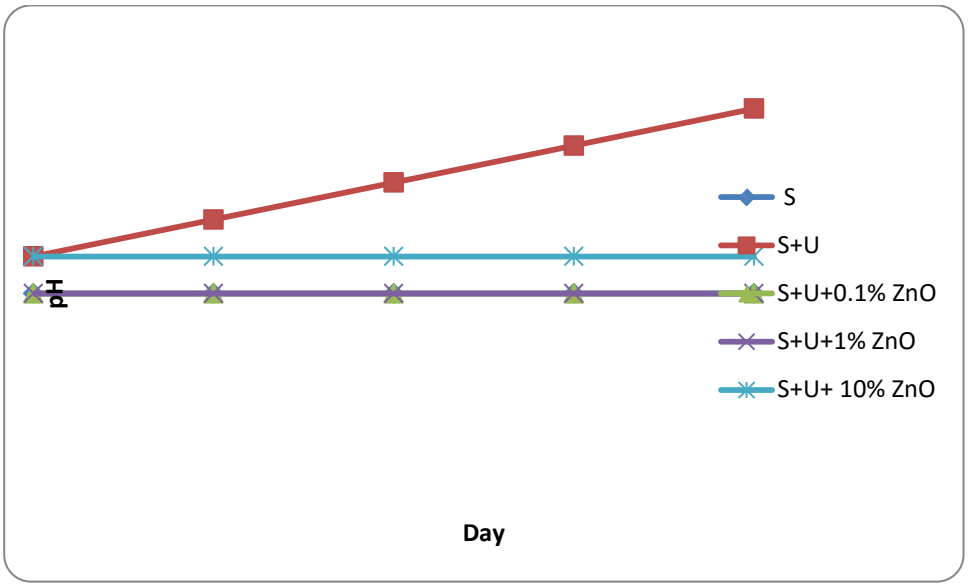

Fig.(4) The pH results of mixed samples.

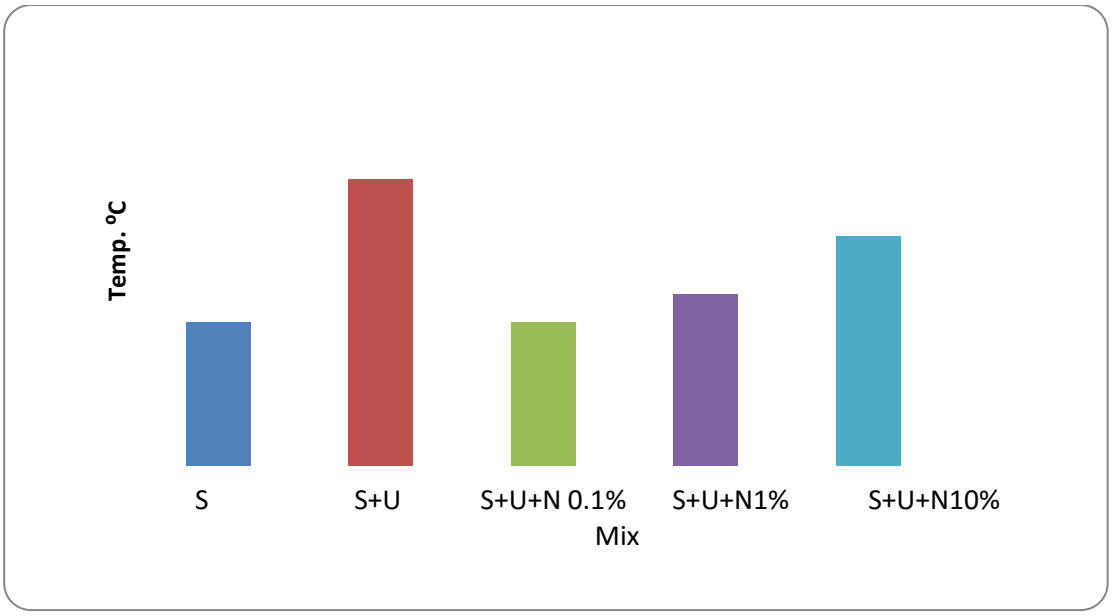

Fig.(4) The Temperature results of mixed samples .

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