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# IMPACT OF KOTA STONE SLURRY ON WATER QUALITY- A CHEMICAL ANALYSIS

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## ABSTRACT
The aim of this paper is to address the impact on water quality due to mixing of kota stone slurry which is a by-product of 'kota stone' industry. Kota stone slabs are marvelous flooring material and available in different textures and colors. It is splitable lime stone popular across the world. It is supporting tremendously in the economic growth and development of India. Although physical and chemical properties of kota stone are good in all respect yet its indiscriminate use and unavailability of modern and scientific sharp cutting tools and polishing machines the huge quantity of slurry is being produced. The disposal of its slurry is not being employed suitably as per acts, policies and legislations set for it. By conducting experimental studies on quality of water of nallah in Indra Prasth Industrial area of Kota and impact of different slurry contents on distilled water quality had been determined. The test results are alarming as water quality parameters namely total dissolved solids, chlorides, total alkalinity and total hardness as CaCO3 exceeds the prescribed limits set by IS 10500-2012. The graphical representation has been done to elaborate the chemical test results.

## INTRODUCTION
Kota stone may take mirror polish and It gives attractive appearance and is available in different color shade like red, blue and combination thereof. It impart very good quality floor which is used in interiors as well as exteriors. Its flooring is comparatively cheaper than other stone slab.

Processing the kota stone is a resource development activity. Around a half to one lac metric tons quantity of kota stone has been producing every year from processing units. The demand of kota stone is increasing simultaneously day by day which requires large volume of the quarried, cut, dressed and polished kota stone. Even from abroad the demand of polished kota stone is increasing drastically. The processing units are established in Indraprasth Industrial Area of Kota and at Ramganj Mandi town which is situated in southern most part of Kota District, Rajasthan.

During last 13 year it has been estimated that 112813 thousand tons slurry had produced by factories. The water content in slurry has been observed more than 85% by weight. After dumping the slurry dumped slurry waste retain only 15% water content and balance 70% water get escaped in ground or nearby natural channels or water bodies or low lying areas. About 33843.9 thousand tons slurry remained in dumps.

Kota stone industry is on the rise and so is the water pollution due to slurry wastes generated from industries. Water pollution due to Kota stone slurry has the potential to cause irreversible damage to the environment. Water bodies of Kota stone industrial area and its ecosystems are susceptible to adverse environmental impacts. Disposal of slurry waste substantially increase the risks to the environment. For effective control of water pollution due to kota stone industry, authentic data water pollution, effluent, waste water required to be obtained for certain location and their subsequent analysis.

## RESEARCH METHODOLOGY
To analyze water pollution due to 'kota stone slurry' chemical tests have been carried out.

## CHEMICAL TESTS FOR WATER POLLUTION

Samples of the kota stone waste powder and reagent water were prepared for these tests. The concentration of the powder were 10 gram per litre, 20 gram per litre, 40 gram per liter and Nallah slurry water containing 138gm kota stone slurry powder per litre was also tested.

## TOTAL SOLIDS

It is some of quantiteis of solids in form of suspension, colloidal and dissolved impurities.

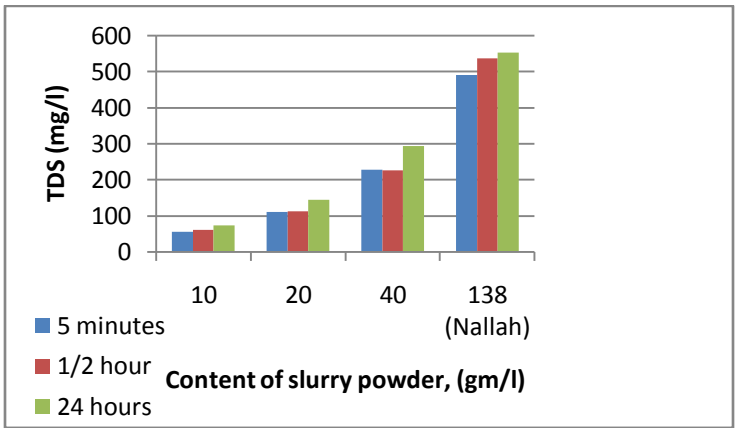


**Fig. 1: Impact on total dissolved solid due to slurry of kota stone**

As content of slurry increases the magnitude of total dissolved solids also increases and it crosses the permissible limit of 500 mg/l for drinking water as shown in Fig. 1. The total suspended solids increases with increase in content of slurry but decreases with time period lapsed.

## PH VALUE

The pH of the different solutions were measured as

negative logarithm of hydrogen ion concentration at specific temprature indicating the intensity of the basic or acidic character of these solutions. Electrometric method, an accurate method and free from interferences like colour, turbidity, salinity and others was employed to determine the pH value of a solution. pH value decrease with lapse of time but it increases with incease in concentration. pH value of slurry water crosses it prescribed limits 6.5-8.5. The effect of kota stone waste powder on pH value is shown in fig. 2.

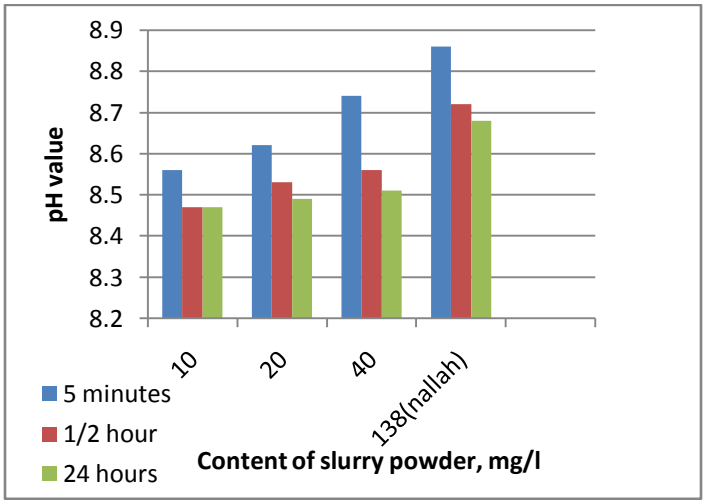


**Fig. 2: Impact on pH due to slurry of kota stone**

## CONDUCTIVITY TEST

Conductivity is the capacity of water to carry ion as charge. Conductivity varies both with number and types of ions in the solutions that are the concentration of ionized substances mostly dissolved inorganic substance in the ionized form and hence contribute to conductance. Conductivity decreases with time but increase with increase in concentration of slurry in water. Conductivity of slurry water of nallah is extremely high. Impact on conductivity of water due to slurry of kota stone is shown in fig. 3.

## HARDNESS

It is a measure of the capacity of water to precipitate soap and a variable and complex mixture of cations and anions. Soft water form soft and beautiful lather/foam in soap test. The presence of carbonate and bicarbonates impart temporary hardness which can be removed/percipited by boiling and responsible for the deposition of scale in hot water pipes and kettles) and non-carbonate like chlorides, sulphate of calcium and magnesium, sometime chloride and nitrate of calcium and magnesium, iron, magneese , aluminium prevent the lathering and cause permanent hardness in water. Hard water get combined with sterates in soaps and form curd or insoluble foam of calcium sterate or magnesium sterate.

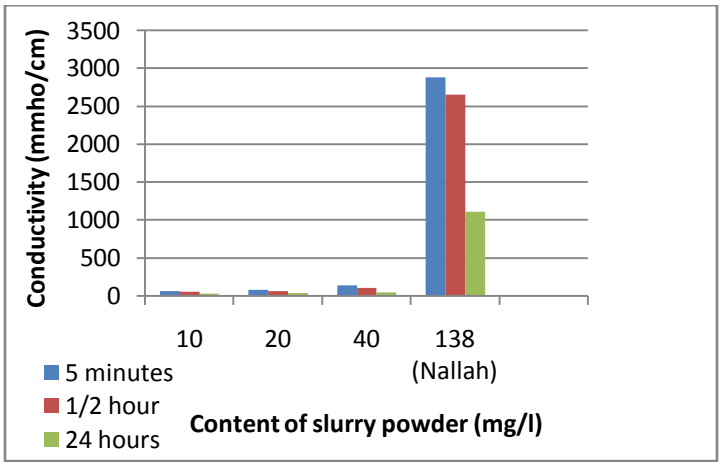


**Fig. 3: Impact on conductivity due to slurry of kota stone**

As per IS 10500-2012 maximum permissible limit of total hard as $CaCO_3$ is 200 mg/l. Test results presented in fig. 4 shows that on increasing content of slurry powder the total hardness crosses its permissible limit and water no longer remain potable. It has been observed that the calcium and magnesium hardness increases with increase in content of the slurry but reduces when time lapsed.

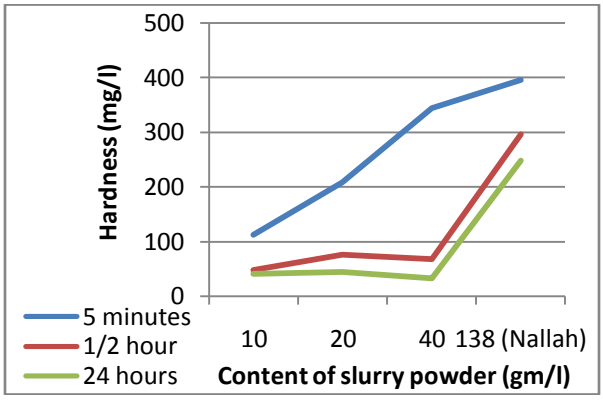


**Fig. 4: Impact on hardness due to slurry of kota stone**

## ALKALINITY

Alkalinity decreases with passes of time but increases with increase in concentration. Alkalinity of slurry water of Nallah crosses it prescribed limit 200 mg/l. Impact of kota stone slurry on alkalinity is shown in fig. 5

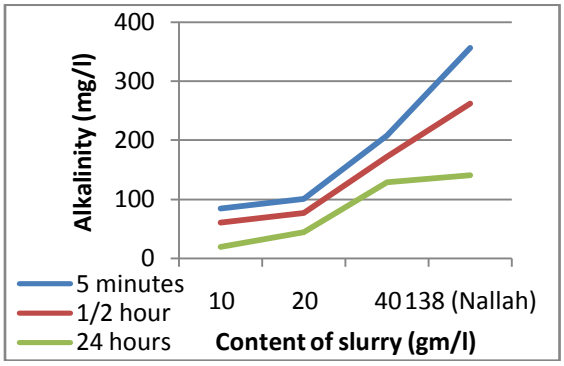


**Fig. 5: Impact on alkalinity due to slurry of kota stone**

## CONCLUSIONS

After analyzing the results of chemical experimental study it can be concluded that the kota stone slurry is polluting water bodies and creating imbalance in the ecosystem. Hence, it is drawback of kota stone industry. Chemical test results regarding total solids, suspended solid, pH , conductivity, hardness, alkalinity shows that quantum of impurities due to slurry dust powder depend on time lapsed after adding it to water and its concentration. It has been found that the most of the characteristics value of the water of the area had been crossed beyond permissible limits set by IS 10500-2012 because of suspended and colloidal impurities which are produced by processing activities of the kota stone industries in the surrounding regions.

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## AUTHOR BIOGRAPHY

**Durga Prasad Tanwar p**assed ME (Civil) from NITTTR Chandigarh. More than 25 years experience in field work and teaching. He has additional experience in project planning, design, management and execution of Highway and Building Projects in CPWD. He has worked as Assistant Commander-I in Construction Squadron, NSG Headquarters at Manesar for maintenance and construction of different obstacles and fire ranges. Presently he is working as Lecturer (Civil Engineering) in Government polytechnic college, Kota since 2001.