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Experimental Analysis on Strength Performance of Coarse Aggregate Concrete by partially replacing of Tiles waste

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Abstract

Solid waste and its management is a serious problem worldwide. Waste recycling is now an attractive disposal alternative. Therefore, the main aim of this work was to evaluate the strength behavior of coarse concrete using tile waste as a partial substitute for aggregate. From the experimental analysis, it is revealed the workability of concrete increases with the increase in tile aggregatereplacement. The properties of concrete increased linearly with the increase in tile aggregate up to 20% replacement later it is decreased linearly. M25 mix of concrete produced a better concrete in terms of compressive strength, and flexural strength than the other mixes. But the mixes up to 40% of tile coarse aggregate can be used. Granite powder using as fine aggregate has more influence on the concrete than the ceramic fine because of chemical composition it is made of and works as admixture. The split tensile strength of tile aggregate is very much in a straighter path compared to conventional grades of concrete.

Keywords: Coarse aggregates, Tile waste, Compressive strength, flexural strength, Concrete.

Introduction

In the present construction world, the solid waste is increasing day by day from the demolitions of constructions. There is a huge usage of ceramic tiles in the present constructions is going on and it is increasing in day by day construction field. Ceramic products are part of the essential construction materials used in most buildings. Some common manufactured ceramics include wall tiles, floor tiles, sanitary ware, household ceramics and technical ceramics and that contain high content of clay minerals. However, despite the ornamental benefits of ceramics,its wastes among others cause a lot of nuisance to the environment [1,2] and also in other side waste tile is also producing from demolished wastes from construction. Indian tiles production is 100 million ton per year in the ceramic industry, about 15%- 30% waste material generated from the total production. This waste is not recycled in any form at present, however the ceramic waste is durable, hard and highly resistant to biological, chemical and physical degradation forces so, we selected these waste

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Studies on effect of wire EDM process parameters on machining characteristics of Inconel 825 plate

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Abstract

Wire-cut Electrical Discharge Machining (WEDM) is an emerging engineering process in the field of micro parts manufacturing to fabricate the complex shapes of micro products. This machining method has been magnificently employed in machining various materials starting from Al metal, a highly ductile material to a very high hard material like ceramics and Inconel's. Inconel and Ti-based alloys treasure trove wider applications in these present industries. Those parts are producing difficulty in several machining processes and create difficult interactions with machining process parameters. Inconel 825 is a Ni-based strength metal and temperature resistant. Conventional machining of these results in large amounts of cutting forces, more strain-hardened and toughened chips, and extreme tool wear. In this work, an effort is made to study the influence of WEDM process parameters such as T_{on}, T_{off} and WF on the output variables such as the Cutting Width of Wire-cut EDM for Inconel 825. Preliminary trials were conducted by varying the process parameters in order to design a process parameter window. Factorial design matrix has been developed with L9 numbers of experiments and the corresponding output/responses such as Kerf Width and surface roughness (Ra) were measured and recorded. The responses have been used to measure the Ra and kerf values of all the specimens after cutting by Wire cut EDM machine. Use of ANOVA using identifies the influenced process parameter on machining (cutting) Inconel 825 output responses Kerf Width and surface roughness.

Introduction

Manufacturing situation is altering very fast by accommodating technological changes. The Power station ash hoppers, propellor shafts, hot vessels for food, water and seawater using metal industry have continually been facing with an cumulative demand for accuracy with precision [1]. The necessity to machine hard metals, difficult shapes and contours which are challenging by conventional methods, has made many unconventional methods like WEDM. To reach well surface finish on the instrument as well as in the component, optimal process parameter setting is a very significant factor. Machining input parameters optimal combinations are using different techniques for improving the quality.

Inconel and Ti based alloys treasure trove wider applications in these present industries. Those parts are producing difficulty in several machining processes and create difficult interactions with machining process parameters. Inconel 825 is a Ni-based high amount strength metal and temperature resistant [2].

Taguchi technique is extensively used in engineering in manufacturing applications. It permits the optimal no. of trials, combination of parameters in machining by Turning, milling, EDM wire cut, metal joining, grinding, etc. The optimization is implemented with lowest number of specimens (trills) and therefore, least overall cost and time.

The optimization process begins with defining the parameters that will influence the properties to be optimized. For example, in EDM machining of steel materials, Ton, Toff, peak current and the cutting fluid pressure would be potential for obtaining surface finish. The Taguchi's technique is mostly used for experimental purpose. Taguchi was the first quality leader to provide guidance for product characteristic optimization. Taguchi is the person giving more importance to minimize the loss to the society. He defined quality as the "total loss imparted to the society from the time a product is shipped to the customer" (Ghani et al 2004). Society loses money when the costs of production and use are combined. This includes both financial losses incurred during the manufacturing process as well as additional expenses for customers who have to deal with malfunctions or lost business due to repair. To minimize the loss to manufacturing, Taguchi's plan encourages uniform parts and economical reduces at the point of manufacture and at the point of consumption.

Section snippets

Literature review

This section deals with review of WEDM, machining processes by WEDM, and better combination of process parameters using various optimization techniques and also the aims of the current work are discussed.

Durairaj M et.al » [3] studied surface roughness for Inconel 800 by Taguchi's L16 Orthogonal Array and applying noise ratio for measuring the performance characteristics. Jaksan D P and Kalpesh D M [4] investigated on measurement of MRR, Surface Roughness, dimensional deviation, Kerf width and ...

Experimentation process

Based on the objective, conducting the EDM machining operations on Inconel 825 metal. The base metal considering consists of 100mm×200mm×5mm thick and cutting size of sample is 10mm×10mm×5mm. The sample size is machined accordingly Taguchi L_9 Array. The machined specimen is shown in the following Fig. 1 (a). The smart cut machine is used for the experimental work and it is shown in the following Fig. 1 (b).

Before begin to machining the work piece, acetone is using to cleaned work ...

Measurement of response

Based on the linear cutting profile on Inconel 825, the Surface Roughness (SR) and Kerf Width (KW) are measuring. The measurements of responses are discussed in the following sections. ...

Results and discussions

Based on the experimental measuring values better influenced process parameter is identified by using ANOVA and Performance curves drawn. ...

Conclusion

Machining of Inconel 825 in linear cut profile cut by WEDM according to Taguchi DOE have been done. The input parameters are combination L9 is using Taguchi Technique. Based on the Experimental results and discussions, the following conclusions are made.

- Based on the ANOVA. The ANOVA table shows that the T_{on} influences the SR and Kerf. After that T_{off} and WF influences the Inconel 825 wire EDM cutting process output response SR and Kerf. ...
- Based on performance curves. The T_{on} increasing SR is ...

...

Declaration of Competing Interest

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Experimental Study of Laser Beam Welding Process Parameters on AISI 4130-309 Joint Strength

B. Narayana Reddy, P. Hema, G. Vishnu Vardhan, G. Padmanabhan

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Abstract

Laser Beam Welding (LBW) is extensively being utilized in manufacturing processes to join dissimilar metals and alloy steels because its special advantages of controlled heating, Low Heat Affected Zone (HAZ) and smaller weld bead formation. However, it is viewed as a strange strategy with applications normally and constrained to welding of thick plates of metals. With a new generation of high power lasers, there has been a renewed interest in thick section LBW (also known as Keyhole Laser Welding (KLW)). KLW makes the process a possibility for industrial applications dealing with thick metals for welding in power plants, pipelines, offshore structures, shipbuilding. The advantages provided by such LBW, is suitable for joining at high process speed, low heat input, and to achieve high productivity, leading to significantly reduction in process costs. LBW of dissimilar metals such as alloy steel and stainless steel is still a challenging task, particularly due to the formation of martensitic formation in HAZ, brittle phases in the weld and solidification cracking in the fusion zone. Such issues can significantly deteriorate strength of the welded joint. Therefore, the aim of the present work is to examine the basic phenomena that happen inside the different weld zones and their impact on weld quality in the wake of LBW joints. Taguchi L_{25} is chosen and experiments

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Investigations of the combustion of diesel engine with anodizing of piston crown

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Abstract

Day to day, the pollution in the atmosphere is due to the increase in cars, busses and transport vehicles. To reduce pollution in the atmosphere one of the most advanced technologies is Anodizing. It is one of the electrochemical processes. It improves the performance of the working engine. In this process, the required work piece is put into the Electrolytic substance at the required temperature and maintained a suitable voltage. Actually, a work piece having grease, dust. These are removed from the pretreatment process. This paper represents the experiments conducted on the 5Hp Kirloskar made engine. In this test, Anodizing coating was applied on the piston crown surface of the working piston. The experimental results clears that, the thermal efficiency enhanced by 8.4%, CO emissions are controlled by 9%, and NOx emissions are controlled by 21.3%. With the help of this advanced technology reduces, it environmental pollution in society.

Introduction

In our society Internal Combustion engines plays a major role, since quarter of the 19th century. The principle operation of IC engine is generating a Mechanical energy from chemical energy [1]. The IC engines are widely used in different applications in small to large applications. Today the engines are developed the bore diameter 20mm to 1000mm and also increases the speed up to 100rpm. The heavy duty engines like Truck, Cars efficiently used for Transportation applications. And, also these type of engines used in Industrial applications.

The Internal Combustion engines operated in four processes, they are Suction, Compression, Power and Exhaust strokes. The piston is the heart of the component in IC engines. The parts of the piston are Piston head, Piston crown, piston skirt, piston rings and Piston pin. Fig. 1a shows the parts of the piston. In these components Piston Crown and Skirt plays a very important role in the combustion processes. When the piston is damaged due to corrosion and lack of lubrication in between the cylinder head and piston combustion is not proper or not good in engine. So, more emissions are generated and discharged from the exhaust [2]. Finally, the combustion rate and combustion efficiency is decreased. More researchers are finding and number of tests conducted; finally suggest the Anodizing is best alternative method removing the corrosion on Piston Crown and skirt of the engine. This process increases the life of piston and improves the performance of IC engine. In this test analyze the performance of the engine with anodizing the piston crown.

Section snippets

Anodizing

It is one of electrochemical operation. It develops a Aluminum oxide coating on the required surface of the product improves the corrosion resistance, lubricity, emissivity, Abrasion resistance and improves the wear and tear of the product. This process is suitable for Aluminum alloy material products [3].

Aluminium is one of the most utilized metals in the world. It improves the life of the product compared to other materials. In 1923 the Anodizing process started for industrial applications. ...

Experimental setup

The experiment is conducted on 5hp Kirloskar make engine. In this test, the piston is removed from the cylinder and the piston crown surface is coated with the Aluminium oxide and fitted into the inside cylinder. The Fig. 2 shows the experimental setup. With the help of Exhaust gas Analyzer measures the exhaust gas emissions Nitrogen Oxides, Carbon monoxide, Hydrocarbons and Carbon Dioxide percentages released from the working engine.

We conduct the two tests i.e. with and without Anodizing on ...

Result analysis

Showing the Results with anodizing of piston crown: In the performance tests draw the graphs between Load verses Specific fuel consumption and Brake thermal efficiencies of the engine. And, the emission tests draw the graph between the Load verses Hydrocarbons, Oxides of Nitrogen and Opacity values. ...

Conclusion

Anodizing process improves the corrosion resistance of the material. When the piston crown affected by the corrosion the exhaust gases are not actually or perfectly released through exhaust valve. Some of the gases or smoke stored on to the piston crown, it is affected by the combustion. To avoid the corrosion on piston crown surface by the anodizing process, improves the combustion in the combustion chamber. So that cleaner smoke released from the exhaust valve. The experimental work is ...

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: [Avvaru renuka prasad reports was provided by Srinivas University. Avvaru renuka prasad reports a relationship with Srinivas University that includes: non-financial support.] ...

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Performance evaluation of diesel engine with electroless nickel plating on piston skirt

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Electro less coating
Corrosion resistance
Heat energy

ABSTRACT

The principle operation of the engine, converts the chemical energy of a fuel into heat energy. The produced heat energy can be utilized for useful works in Industries, Automotives, Agriculture and power production applications. In Internal Combustion engines combustion is a important phenomena to developing the heat energy from the engine cylinder. Due to corrosion, wear and tear on the Piston skirt, the heat energy is not effectively produced inside the cylinder of the engine and a large amount of exhaust gases is released. The piston skirt is coated with Electroless Nickel plating, it improves the combustion rate and efficiency of the engine. The performance results show that it reduces the 19.4% NOx and 8.6% of PM emissions, heat losses and improves the brake power, and corrosion resistance of the piston.

1. Introduction

The combustion is a chemical process, in which the Hydrogen and Carbons in the fuel reacts with Oxygen in the atmosphere developing the heat energy in the form of heat. Combustion is a very important phenomena in the Internal Combustion engines. Many researches or Scientists performing the different methods for improving the combustion rate and reduces the heat losses in the Internal Combustion engines, still today not fully understood on the combustion phenomena. The combustion always depends on the purity of air fuel mixture [1]. It improves the efficiency and performance of the engine. The combustion process takes place in three district stages.(See Table 1).

In first stage, a small quantity of fuel has been admitted, but not ignited inside the cylinder [2]. For time taken of first stage is 0.001 s. In the second stage, the pressure is rapidly accelerate and the fuel splitting in combustion chamber and fresh air all around them. About one third of the heat energy is released during this stage. This stage also known as Uncontrolled combustion stage. At the end of second stage, the pressure and temperature are so high, that the fuel particles injected during this stage, burn almost completed and any further pressure increases, mechanically controlled by the engine i.e. by the injection rate [3]. The heat energy developed about 75 to 85 percent at the end of this stage.

After burning, the crank travel about 70 to 80°and heat energy developed by the end of entire combustion process is 95 to 97 percent and 3–5 percent of heat goes as un burnt fuel in exhaust. In the combustion process, pistons are major component or part of the engine. The pistons are continuous movement during the work of the engine [4,5]. The pistons are wear or damaged due to multiple reasons. When, the piston detriment arise, it creates a direct and distinguished effect on the engine performance, such as decreases the efficiency, increases the fuel consumption, colored smoke released from the exhaust and noise from the engine. To overcome all these problems by applying the Electroless Nickel Plating on the Piston skirt surface. It is one of the best method to increase the performance of the engine [6].

Sathiyagnanam et al investigated to evaluate the performance, combustion and emission characteristics of thermal barrier coated diesel engine plus fuel additives. Plasma spray coating (PSC) technique has been used to coat the cylinder head, valves and piston crown with ZrO_2/Al_2O_3 about 150/150 µm. Sreenivasa Reddy et al used an insulated cylinder head in a 3.67 kW,4 S, single cylinder direct injection diesel engine to study the performance of a semi adiabatic engine. It has been reported that the surface of the cylinder was coated with 0.5 mm thick partially stabilized Zirconia coating at 2000 °C. It has been concluded that the ceramic coated engine showed improvement in thermal efficiency, increase in friction, and increase in exhaust gas temperature and some loss in volumetric efficiency. Milton F.Stevenson et. Al. says anodizing refers to conversion coating of the surface of aluminum and its alloys to porous aluminum oxide. The process derives its name from the fact that the aluminum part to be coated becomes the anode in an electrolytic cell.

Bhavik B et.al. explains the various methods are in use on cylinder piston group for improving service life of IC Engine for reducing exhaust emission and improving engine performance. The wear resistance of thermal sprayed molybdenum applicable to the piston ring will be

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DeepSegNet: An Innovative Framework for Accurate Blood Cell Image Segmentation

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Abstract - Image segmentation plays a crucial and indispensable role in computer vision, as it allows the partitioning of an image into meaningful regions or objects. Among its numerous applications, image segmentation holds particular significance in the domains of medical diagnosis and healthcare. Its vital role in this field stems from its ability to extract and delineate specific anatomical structures, tumors, lesions, and other critical regions from medical images. In medical diagnosis, accurate and precise segmentation of organs and abnormalities is paramount for effective treatment planning, disease monitoring, and surgical interventions. Blood cell image segmentation is highly valuable for medical diagnosis and research, particularly in the domains of hematology and pathology. Precisely segmenting blood cells from microscopic images is essential, as it offers critical insights into various blood-related disorders and diseases. Although deep learning segmentation models have exhibited promising results in blood cell image segmentation, they suffer from several limitations. These drawbacks encompass scarce data availability, inefficient feature extraction, extended computation time, limited generalization to unseen data, challenges with variations, and artifacts. Consequently, these limitations can adversely impact the overall performance of the models. Blood cell image segmentation encounters persistent challenges due to factors like irregular cell shapes, which pose difficulties in boundary delineation, imperfect cell separation in smears, and low cell contrast, leading to visibility issues during segmentation. This research article introduces the innovative DeepSegNet framework, a powerful solution for precise blood cell image segmentation. The performance of widely-used segmentation models like PSPNet, FPN, and DeepLabv3+ is enhanced through the use of sophisticated preprocessing techniques, improving generalization capability, data diversity, and training stability. Additionally, the incorporation of diverse dilated convolutions and feature fusion further contributes to the improvement of these models. The Improved PSPNet, Improved FPN, Deep Lab V3, and Improved Deep Lab V3+ achieved 98.25%, 99.04%, 98.23%, and 99.31% accuracy, respectively, and the Improved Deep Lab V3+ model outperformed well and produced a Dice Coefficient of 99.32% and Precision of 99.38%. The proposed DeepSegNet framework improves overall performance with an increased accuracy of 8.91%, 3.72%, 17.73%, 22.83%, 7.96%, 9.61%, 17.36%, 6.22%, 13.32%, and 14.32% compared to the existing models. This framework, which can be applied to accurately identify and quantify different cell types from blood cell images, is instrumental in diagnosing a variety of hematological disorders and diseases.

Index terms: Blood Cell, FPN, Segmentation, PSPNet, Deep Lab V3+, Deep Learning, Image

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Gas Cylinder Leakage Detection, Weight Checking & Automatic Cylinder Booking System over IOT

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Abstract

LPG Cylinder is the most commonly used domestic fuel in daily human life, not only in hotels and homes for cooking but also in several industrial sectors. By this, the demand for LPG usage is increasing rapidly. Meanwhile, this high usage of LPG sometimes leads to gas leakage, which may cause a dangerous explosion. There have been many mishaps due to the detonation of LPG cylinders, and in some of the occurrences, it is due to the laxity of gas leakage. To overcome this, our designed system can help monitor and detect gas leakage. To detect the gas in LPG, an MQ-6 sensor is used, and for any gas leakage that arises, the sensor detects it by making an alert with a buzzer that can help people, and an alert message is sent to the registered mobile number of the user. Another major problem faced by the users of LPG Cylinders is the in-opportune fatigue of gas cylinders. This proposed system will automate the entire LPG cylinder booking course of action without human mediation. This apparatus continuously monitors the weight of the cylinder. Once it reaches the slightest doorstep value, it will automatically send a message to the permitted LPG Agent so that they can dispatch the LPG cylinder in time. This will eventually help the consumer know when to restore the cylinder.

1. Introduction

The nation has approximately 30 crores of LPG users, mostly 40% of the population. LPG is one of the clean fuels for domestic household purposes as well as industrial purposes also. With the usage of LPG, some accidents may occur in the home, so technology is needed to prevent those accidents. Most of the accidents are due to the explosion of LPG cylinders. But, sometimes, a very small quantity of gas leakage is unnoticed, leading to a further major accident. It is very vicious when an LPG gas leakage occurs in any domiciliary usage, chemical industry, or other applications. So, this project is mainly focused on monitoring the leakage of Liquid Petroleum Gas (LPG) to avoid major fire accidents and also providing safety precautions where security has been an important issue and automatic cylinder booking without human involvement. This project uses an MQ-6 sensor to detect leakage. When the system points out that LPG congregation in the air reaches the described level, then alerts the end user by sending an SMS to the o inscribed mobile phone number and notifying the people at home by activating the alarm through a buzzer concurrently and also displaying the same message on LCD to take the necessary action like to turn on the exhaust fan and opening the windows to decrease the gas concentration in the air. This system is also designed to measure the weight of the cylinder continuously. Once it reaches the minimum threshold, it will automatically register your LPG Cylinder booking through GSM machinery by sending SMS to the retailer company and an alert to the user simultaneously. This will eventually help the consumer know when to restore the cylinder

2. Problem statement

To investigate Gas leakage and alarming to alert the citizens about leakage who are situated locally and remotely located through this system. Examinations by oil organizations found that most LPG customers are ignorant of the security checks of gas cylinders. Another reason is an unauthorized filling of LPG cylinders likewise causes misadventures. There is a need for an agenda to detect and avoid leakage of LPG.

- To detect the leakage of the LPG system
- To alert the people about the gas leakage by sending messages through Email, text messages, and

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Monitoring System for the benefit of Agriculture using AI Automation Using IoT and Deep Learning

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Abstract

Introduction: The impact of global food insecurity is highlighted by the fact that over 70% of sub-Saharan countries are predicted to be malnourished, even though some farming regions are under drought status. Due to the climate's recurrent dry seasons, farmers have difficulty growing crops there due to water scarcity and low soil fertility. However, floods remain a significant threat to farmers because they wash away valuable crops. An unexpected way to increase food security is to use artificial intelligence (AI)-powered smart greenhouse to grow and protect plants all year round, regardless of the season, while reducing the need for humans to perform labour-intensive tasks and automating widespread daily data analyses of plant status.

Objectives: Using Artificial Intelligence methods, like the Internet of things and Machine learning methods for monitoring agriculture – mainly focusing on Plants.

Methods: Asproposed, show off a greenhouse system powered by artificial intelligence that can analyze a database of almost 10,000 plant pictures to make snap decisionsand detect.Through the use of a neural network-based computer vision technique, this study was successful.

Results: In terms of accuracy, the best accuracy (98%) was achieved by both the CNN model compared withNeural Networks (ANN) model. In contrast, the Convolutional Neural Networks (CNN) model is much quicker. To gather the information – IoT-based devices were deployed to capture the images of the plant's images in real-time.

Conclusions: This method is used tomonitor the crops remotely.Using Artificial Intelligence methods and models, this model fits greenhouse monitoring, particularly in finding a broad spectrum like plant diseases, types, etc.

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Assessment of Heavy metal pollution and its health implications in groundwater for drinking purpose around inactive mines, SW region of Cuddapah Basin, South India

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Southwestern part of Cuddapah Basin

ABSTRACT

Trace metal leachate comes from inactive mine reservoirs in the study area. The main intention of the study was to analyze the metal content in groundwater samples around inactive mines in the southwest of the Cuddapah Basin and to assess the risk to the local habitants based on calculations using several statistical methods. In this context, the study emphasizes the use of an integrated heavy metal pollution approach, ecological risk assessment incorporating potential health risks, and a multivariate statistical approach at an inactive mining site in the southwestern Cuddapah Basin in southern India. In 2019, we collected 100 samples from bore wells in both pre & post monsoon seasons and ten heavy metals (As, Co, Cd, Fe, Cr, Ni, Mn, Pb, Zn, and Sr) were analyzed using an Agilent 725 ICP-OES instrument. The results showed that As (0–60.5 and 0–56.3 μg/L), Cd (0–28.1 and 0–31.1 μg/L), Ni (0–110.2 and 0–99 μg/L), Pb (0—175.6 and 0–92.3), Sr concentration (0–1150 and 0–1440 μg/L) exceeded permissible values in both seasons. Heavy metal pollution index (HPI), heavy metal evolution index HEI, and pollution degree DOC are used to evaluate the metal pollution of drinking water in this area. As per the HPI values, 17.5 % and 10% of samples show a high pollution index; as per the classes of HEI, 95 % and 100% of samples show a low pollution class during both seasons. According to DOC, all groundwater samples fall in the low contamination zone. As per ecological risk classification, 90% of the samples cause extreme to high ecological risk in both seasons in the study area. From the perspective of health risk assessment, both adults and children have non-carcinogenic effects in the study area; and adequate remedial procedures or treatments are required to avoid metal pollution of groundwater.m.

Introduction

Heavy metals are a group of metallic elements that have a high density and are toxic to humans and other living organisms in certain concentrations. Some of the most common heavy metals include lead, mercury, cadmium, arsenic, and chromium. Heavy metals can enter the environment through a variety of sources, including industrial and agricultural activities, transportation, and waste disposal. They can contaminate soil, water, and air, and can accumulate in the food chain. Humans can be exposed to heavy metals through various pathways, including inhalation of polluted air, ingestion of contaminated food and water, and dermal contact with contaminated soil or water. Once inside the body, heavy metals can cause a variety of health problems, including neurological damage, developmental delays, kidney damage, and cancer. Preventing exposure to heavy metals is important for protecting public health and the environment. This can be achieved through a variety of strategies, including regulations on industrial and agricultural practices, proper waste disposal, and monitoring of air, water, and soil quality (Sudharshan Reddy et al., 2020a; Sudharshan Reddy et al., 2020b). Heavy metals are dispersed into the biological field through anthropogenic activities; like as industrial activity, mining, agriculture, and transportation activities. In this case, waste materials containing metal-rich sulfides from mining activities have been stored or discarded. Annoying activities such as urbanization, industrialization, transportation, misuse of fertilizers, pesticides, improper disposal of sewage and toxic chemical solid waste, and natural processes like precipitation, erosion, and weathering of crustal materials increase the heavy metals in soil and water (Abraham and Susan, 2017; Prathap et al.,2019). Certain

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Hydrogeochemical Investigation and Groundwater Quality Assessment in Patancheruvu Area Sangareddy District, South India

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ABSTRACT

The current research was conducted to assess the groundwater quality in the Patancheruvu area of Sangareddy District, South India. To analysis physicochemical parameters, 16 groundwater samples were collected for the month of May and November, 2020. The chemical analysis results show that the ground water nature in the study area is alkaline to basic and is classified very hard water. High TDS concentrations in the study area is due to various industries and anthropogenic activities. In both seasons, the order of major cations and major anions is in the following order: Na > Mg > Ca > K and Cl > SO_4> HCO_3> NO_3> F respectively. The majority of the EC, TDS, Na, TH, Mg, Ca, Cl, HCO_3, and SO_4 samples exceeded the desirable limit, and some samples also exceeding the permissible limit. In both seasons, the dominant hydro chemical facies identified by the Chadha diagram were Na-K-HCO_3 and Ca-Mg-HCO_3. Water quality analysis said that most of the data in both seasons fell into poor to very poor category. The research tells that around Patancheruvu groundwater quality is poor, thisis attributed due to both anthropogenic factors and geogenic processes.

Keywords: chemical analysis; groundwater; Patancheruvu; physicochemical; water quality.

INTRODUCTION

Water is the most essential part for every living organism which is also a main fragment of earth's rivulet, lagoons, and oceans. Water is completely tasteless, odourless and free from any chemical constituents but yet it is vital for all known animal kingdom, starting from fairy flies to leptotyphlops. Although 71% of total earth's surface is covered by water yet 96.5% of these are hold by the oceans and for the remaining 2.5%, two-third is frozen (Mtoni et al., 2012). So ultimately there is not much fresh water left for civilization uses currently. Taking the world's total population as 7.5 billion, so it is a vital matter of concern to use the total accessible water wisely and effectively with minimum wastage. It is only the 8% of the planet's fresh water those are used for domestic purpose and rest 80% are being used for cultivation and industrial purposes (Aher et al., 2019). Due to the scarcity of fresh water, over a billion people deficits to clean drinking water. Currently, surface and groundwater quality issues are much more severe in densely populated, heavily industrialised areas, excessive use of pesticides and fertilisers in rural areas, and shallow ground water tablets (Alphayo and Sharma, 2018). There is no substitute for the drinking water sources therefore, it is highly recommended to have a disciplined management if available water and timely