

Housing Characteristics in Developing Countries as Important Determinants of Household Indoor Dampness and Mould

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Housing characteristics are important determinants of indoor dampness and mould contamination, a risk factor known to be associated with an increased prevalence of respiratory symptoms. However, few efforts have been undertaken to assess the prevalence of dampness and mould in residential environments and finding its association with housing characteristics have not been explored in developing countries. Dampness was assessed in 710 households (408 rural and 302 urban) enrolled in a (The Tamil Nadu Air Pollution and Health Effects (TAPHE)) cohort study using a combination of questionnaires and quantitative measurements of moisture. Mould assessments were performed using standard gravitational settle plate technique. A subset of households was examined longitudinally for all the month in a year to find the seasonal impact on the mould prevalence. The prevalence of dampness and mould was examined in relation to a range of household level variables known to influence their distribution. The prevalence of the self-reported dampness was around 50% with moderate to severe levels of moisture percentage recorded in nearly 12-26% of households. Further, one or more species of mould were detected in 83.5% of households with *Aspergillus* being the most dominant (72.5%). Housing characteristics, such as location, poor housing construction, presence of animals, air conditioner, wall furnishing, high relative humidity and low wind velocity were found to be significantly associated with atleast one of the four selected mould genera as well as with one of the self-reported moisture indicators in the house. This study provides important baseline information for the prevalence of indoor dampness and mould and identified the housing characteristics that would influence the same in the households of southern India.

KEYWORDS

Housing characteristics, Indoor dampness, Indoor mould, Southern India

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Production of Dihydroxyacetone by *Gluconobacter Oxydans* from Crude Glycerol

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The availability of petroleum sources in the near future is constrained, so nowadays renewable energy resources are largely focused. One of the most paramount renewable energy resources is the biodiesel. During the biodiesel engenderment, excess crude glycerol is engendered which contains methanol, free fatty acids and salt. The biodiesel engenderment results in 10% of glycerol as byproducts. The carbon content in the waste glycerol can be used to serve as a cheap carbon source for the production of high value chemicals, like dihydroxyacetone (DHA), succinic acid, ethanol, citric acid, propanediol, etc. *Gluconobacter oxydans* is a gram-negative rod or oval-shaped non-motile bacterium belonging to the family *Acetobacter*, capable of producing DHA. Under optimized condition of 10% (v/v) substrate concentration, 5% (v/v) inoculum at pH 6 and temperature 30oC, maximum yield of 81.64% (v/v) was obtained. Glyceric acid was produced as a byproduct during DHA production was confirmed by qualitative test, FTIR and GCMS analysis.

Keywords

Crude glycerol, Dihydroxyacetone, glyceric acid, *Gluconobacter oxydans*, GCMS, FTIR

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Biomedical Waste Management in Selected Hospitals and Clinics in Chennai

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Biomedical waste though forms a small part of the total municipal waste generated, needs proper handling and management as it is capable of affecting the human as well as environment. It is produced as a result of the biological and medical activities involved in the diagnosis, prevention or treatment of diseases in healthcare facilities, also known as medical waste or clinical waste. 80% of these wastes are non-infectious while 20% is infectious and capable of affecting the human health. Hence, the Biomedical Waste Handling and Management Rules, 1998 was enacted by the Indian Government and amended to cater the emerging problems related to biomedical waste management. At present Biomedical Waste Management (BWM) Rules, 2016 is complied with which divides the waste into four broad categories based on colour coding, thereby improving the segregation of biomedical waste generated. This paper aims to analyze how far biomedical waste has been managed by hospitals and clinics in Chennai city as per the prescribed rules of BWM Rules, 2016. The study found that clinics have not given enough concern to biomedical waste management practices as per the BWM Rules, 2016. Although there are certain violations of the rules, there has been a significant difference after the enactment of the BWM Rules, 2016 on comparing with previous years.

Keywords

Biomedical waste, Management, Segregation, Labeling, Disposal

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The Water and Environmental Reality of the Marshlands of Southern Iraq

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The marshes in Iraq are a group of water bodies and are in the form of a triangle consisting of the cities of Al-Amara, Nasiriyah and Basra. The area of covered land can be filled with water at the time of the flood in the late winter, during the spring and the days of Chihod are reduced. The marshes are the most extensive ecosystem in the Middle East and West Asia with its freshwater bodies. The marshlands are an essential stopping point for migratory birds between Siberia and Africa as well as rare species of freshwater fish, wild animals, cows and buffaloes. The research included three axes as follows: the first axis is the development of the marshes which was concluded that the geological factor has a significant impact in the formation of the marshes through tectonic movements and geological times and frozen and warm ages. The second axis deals with the spatial and temporal variation of the water areas of Hawar Alhahmar and what has gone through in particular and the marshes of Iraq in general, from the environmental disasters that have caused high damage to it. The third axis presents the effect of variation in the water areas on the biodiversity of the marshes and their containment of aquatic plants of reeds and papyrus. There are floating plants with roots and others planted in the bottom and submerged plants are immersed in water, such as shamblin, zuhair duck and taurus. There are amphibious plants, such as golan, tail as well as animal niches of cows and buffaloes. Some conclusions were reached and some modest proposals were made to revive the marshes and make them a tourist attraction.

Keywords

Hammar marsh, Water, Iraq

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Strength and Durability Properties of High Performance Concrete Using Foundry Sand and Flyash as Replacement

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High performance concrete is very useful in modern construction process. A study was conducted investigate concrete strength parameter, like compressive, flexural and split tensile strengths, also durability parameters like acid attack, saturated water absorption and porosity of high performance concrete (HPC) of M75 grade by replacement of 20%, 40%, and 60% of foundry sand by fine aggregate and 10%, 20%, 30% of flyash by cement with water binder ratio of 0.3. In order to get better workability of HPC, the super plasticiser of base sulphonated naphthalene polymers are used. The HPC of M75 grade is designed as per ACI 211.4R-08 'Guide for selecting proportions for high strength concrete with Pozzolana portland cement and other cementitious materials'[1]. The mechanical properties, like compressive strength, split tensile strength, flexural strength characteristics of high performance concrete were analyzed and durability studies, such as saturated water absorption, porosity were also calculated. The results demonstrate the strength and durability parameters of high performance concrete with foundry sand and flyash. From the observation of results, the 40% replacement of foundry sand and 20% of flyash in addition of 3% of super plasticiser shows very high characteristics.

Keywords

Durability, High performance concrete, Foundry sand, Flyash, Special concrete, Super plasticizers

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Renewable Power in India: Growth, Policies and Future perspectives

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Energy has always held a very crucial place in the development of infrastructural growth in any economy. Energy determines the stature of a country in the global arena. Traditionally, energy has been produced from conventional sources, like coal, petrol, diesel, etc. Not only are these resources limited but also pose threat to the environment. Hence, renewable sources provide a much better alternative to producing energy. Renewable energy sources can be seen as the future of the energy sector and hence, countries are heavily investing in them. India is at par with the rest of the world. Many frameworks have been established for the purpose, like various laws, policies, institutions, etc. As a result, the share of renewable energy in the total energy has been increasing over the years. In this research paper, growth in installed capacity of renewable power, past initiatives of Government of India (GOI) to achieve them have been analyzed and it has been determined whether the past targets have been achieved. Alongwith this, it has been analyzed that given favourable conditions, whether the future target set by Government of India of reaching installed renewable power capacity of 175 gigawatt (Gw) by 2022 is achievable or not.

Keywords

Legal, Cess, Policy, Renewable, Sustainable, Tariff

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Optimization of Compression Ratio of Diesel Engine to Reduce its Effect on the Environment

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Diesel is one of the largest contributors to environmental pollution worldwide and will remain so, with a large increase in vehicle population causing ever increasing global emissions. So, it is mandatory to achieve a standard compression ratio of a diesel engine to have optimal performance. In this study, the effect of different compression ratios, injection timing and load on engine performance of diesel engine fuelled with diesel fuel was studied. The optimum compression ratio, injection timing and load were determined by using the design of experiments (DOE). These results for the diesel fuelled variable compression ratio diesel engine will be useful in fixing the optimal range of values for the input variables.

Keywords

Variable compression engine, Compression ratio, Design of experiments, Injection timing

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Energy Management System Control For Smart Homes

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To manage power flow in homes, energy management is essential to optimize the residential load demand profile. In this, optimization load profile and the solar irradiance plays a major role for smart homes. The optimization period may be day/month/year. The main focus of the future homes is to get zero net energy, that is nothing but a zero electricity bill for homes. To enable zero net energy consumption and optimal power management for future homes, the direct current electric distribution systems (DC nano-grid) is an excellent choice because it is simple to integrate various types of renewable energy source to the electrical grid. However, integrating solar and EB sources and loads is simple and reliable. This paper proposes an integration of solar PV array of power 100 W and EB grid (230 V, 50 Hz) are connected to the load (either AC or DC load). The simulation has been done by using MATLAB/Simulink.

Keywords

Energy management system, DC nano-grid, Renewable energy integration, Smart homes

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Experimental Study on Partial Replacement of Fine Aggregate Using Medical Vial Waste in Conventional Concrete

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The amount of waste glass has gradually increased over the recent years due to urbanization and industrialization where most of the waste glass end up in a landfill while only small fraction can be recycled because of the high cost of cleaning and colour sorting. Since glass is not biodegradable, the landfill is not an environmentally friendly solution. Recent studies have shown that the waste glass can be effectively used in concrete either as an aggregate (fine or coarse aggregate) or as cement replacement. Being amorphous and containing relatively large quantities of silicon and calcium, glass is, in theory, pozzolanic or even cementitious in nature when the particle size is less than 75 micron. This paper discusses about the partial replacement of fine aggregates using medical vial glass waste in concrete. After the review, it is of considerable finding that more research is deserved on all fine aggregates replacing medical waste materials, which can give more certainty on their utilization in concrete.

Keywords

Medical waste, Glass waste, Alternative to fine aggregates, Reusing

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Performance Analysis of Evacuated Tube Collector Using Diffuse Reflectors

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Solar water heaters with evacuated tube collector (ETCs) are becoming more popularly used because of their efficient operation in collecting solar energy with minimum losses compared to other types of collectors. Still, they are deficient in one way that the top half of the cylindrical tubes are only exposed to solar radiation and bottom half become inactive due to lack of whipping solar radiation. If the bottom of the tube is given an opportunity to receive a portion of the radiation, the performance of the ETCs would be improved to a definite extent. In this present work, water in glass evacuated tube was fabricated with a built-in horizontal storage tank of 100 L capacity. The performance of the ETC has been evaluated with two different geometries of the diffuse reflectors, namely diffuse flat reflector (DFR) and diffuse corrugated reflector (DCR) in Coimbatore weather conditions. The experiments have been conducted from 6 am to 6 pm during the month of February 2018. The water temperature of collector tank was observed at the end of experiment day for three cases, namely without diffuse reflector, with DFR and with DCR. The result showed that the integration of diffuse reflectors improved the performance of the ETC of solar water heaters to a substantial level. The increment in tank water temperature was noted as 6.2°C and 8.8°C with DFR and DCR, respectively.

Keywords

Evacuated tube collector, diffuse reflector, Thermal performance

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An Attempt to Reduce *Prosopis juliflora* From Agricultural Land by Using Gasification Process

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Air gasification was conducted with waste biomass (*Prosopis juliflora*) in a newly fabricated fluidized bed gasifier to reduce the sterility of fertile land. In this work, the physical and chemical properties of biomass were measured and found that they achieve the standards. The various zone temperature and pressure were measured for finding the overall gasifier performance. The temperature of the oxidation zone was increased to 520°C during gasifier operation of 50 min, due to the continuous feeding of biomass (8.5 kg/hr) and the producer gas volume flow rate was achieved as 32.5 m³/hr. The calorific value of producer gas has reached in the range of 4.02-5.5 MJ/kg and the cold gas efficiency was in the range of 65-73%. When running just with gasifier, amount of producer gas is high yet the quality is less and its temperature run is 190-250°C. When running with gasifier and water scrubber plan, there is an insignificant change in quality and temperature run is 50-70°C. The flame temperature is increased by 60%, this will lead to increase the combustion performance of IC engine. Consequently, the outcomes propose that in the wake of utilizing all the three filter will increase the quality of producer gas which is fit to use in internal combustion engines.

Keywords

Gasifier, *Prosopis juliflora*, IC engine

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Design, Heat Transfer Modeling and Analysis Of Environmentally Benign Charcoal Kiln

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Charcoal making practices are empirical in nature with built-in traditional wisdom inherited from one's ancestors. A clear scientific study of the whole process with the interventions for controlling the influencing parameters is lacking. For long-term production of charcoal, using woody biomass seems to be ideal due to the possibility of producing them in wastelands and in a short time-frame. Moreover, the traditional method takes more time to produce a very small amount and low quality of charcoal. In this, we describe a practical method for manufacturing high quality charcoal from biomass that yields nearly 35-40% with a reduced reaction time than the traditional method of charcoal production. In this eco-friendly concept, we have designed a kiln and CFD analysis which will recirculate the carbon monoxide (CO) emitted due to drying of woody biomass (350-4000C) and further the same will be fired from an external source and it provides heat to the kiln without the help of anymore external firing. So the amount of wood burnt is reduced so that the efficiency of the kiln is increased (35-40%). Also, the time required for the process is reduced as 3-4 hr due to firing from four sides which leads minimum amount of unburnt inside the kiln. The temperature profiles at 450-6000C inside the kiln help us to understand the process of pyrolysis reactions to obtain charcoal in final form.

Keywords

Biomass, Charcoal kiln, CFD, Conventional method, Eco-friendly concept, Reheating process, Less retention time

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Application Of Energy Efficient Machining For Sustainable Production Of Component: A State Of The Art

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Green manufacturing and sustainability are the important issues for the manufacturing industries in the 21st century. In the industrial scenario, sustainability is a part of optimizing the product/process to achieve overall efficiency for the company in terms of economic, environmental and social aspects. The environmental concern is mainly concerned with safe working condition and energy saving and associated CO₂ emission has become important for greener production. Thus, the need for energy efficiency in machining becomes a serious issue to the manufacturing industries. This study reviews the existing work to minimize the impact of machining processes on the environment.

Keywords

Hard turning, Green machining, Sustainable production, Minimum quantity lubricant (MQL)

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Mechanical Properties Of Concrete Made With Partial Replacement Of Fine Aggregate By Rice Husk Ash

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This experimental study aimed to analyze the effect of rice husks as fine aggregate in concrete and to compare the results in terms of concrete compressive strength, split tensile strength, flexural strength with conventional concrete. The other objective of the study is to help the industry to make use of the waste rice husk ash as useful engineering product rather than dumping in the roadside which leads to environmental pollution and cause health hazards. The results of the study will provide knowledge to the building contractors and developers to improve the construction industry methods and services by using rice husk and to sustain good product performance and meet recycling goals. Results were recorded from the test conducted on the concrete in the laboratory where precise data were gathered and completely attained. Rice husk was partially replaced as fine aggregate in concrete and the percentage replacement was 0%, 5%, 10% and 20%. The grade of concrete used for the study is M40. Mechanical properties (compressive strength, split tensile strength and flexural strength) was determined on hardened concrete cubes after 7 and 28 days curing period and the results revealed that the strength of concrete decreases as the percentage replacement of sand increases with rice husk when compared to conventional concrete. The results also revealed that there is the possibility of replacing fine aggregate with rice husk in the production of structural concrete.

Keywords

Mechanical properties, fine aggregate, rice husk ash

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Smart Crop Based Irrigation System

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Irrigation is a major problem faced by farmers today. So automated irrigation system must be employed to overcome this. In India, agriculture plays an important role in development of food production. In our country, agriculture depends on the monsoons which are not sufficient source of water. Although there is much automated irrigation system, it cannot be implemented for fields having different crops. This proposed system implements the farmers need by incorporating soil moisture sensor and an embedded controller. This system can be implemented for fields having different crops that can be cultivated in a region. Farmers can monitor and control the field from remote locations using GSM technology.

KEYWORDS

Soil moisture sensor, PIC microcontroller, GSM, Zigbee

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Effect Of Degradation Of Solar PV Module Due To Aging : A Case Study***N. Kamalimeera, M. Aarthi Pooja, S. Priyadharshini, M. Abirami, S. Anitha and V. Kirubakaran****The Gandhigram Rural Institute-Deemed to be University, Centre for Rural Energy, Gandhigram- 624 302*

Power generation through solar photovoltaic has grown at a faster rate in India. The estimated target by 2022 through solar PV rooftop as well ground mounted system is 100 GW. The life of the panel is 20 years. Many researchers have focused on increasing power output as well as panel size optimisation. The literature shows that the panel degrades 1% of the rated power every year. However, limited study is only available for degradation of panel on Indian climatic conditions. Many parameters, like dust, temperature, humidity have a role in the degradation of the panel. The paper has carried out a detailed investigation of the degradation of solar panel which has been put in use for the year 1998, 2007 and 2016. The degradation of power from its rated power has been estimated and reported. Also, thermal imaging of the panels on same operating condition has been recorded.

Keywords*Solar PV, Degradation, Climatic parameters***REFERENCES**

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Estimation Of Embodied Energy On The Replacement Of Conventional Wall Material With Bison Sheet

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Nowadays building occupies major energy share for its construction and operation. Many studies have been carried out on the enhancement of efficiency of the devices which in turn reduces operating energy consumption. However, the construction materials play a major role. The embodied energy for the building material, like brick, cement has increased day by day. Several investigations have already been made on the point of strength of alternate building materials. This paper analyses the embodied energy consumption of conventional wall and a bison wall. Also, the paper studies the thermal profile of a conventional wall and the bison wall building which is recently constructed. The internal and external thermal profile has been continuously recorded using thermal imager and reported. The temperature rise alone will lead to increased operating energy consumption in the building.

Keywords

Embodied energy, Bison wall, Thermal imaging

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