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ECO SMART MATERIAL: A REVIEW

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ABSTRACT: Using ecomaterials is sustainable chemistry a chemical research and engineering concept that supports the creation of products and processes that reduce the use and production of hazardous substances. With global warming recognized as our biggest environmental challenge, the chemical industry must develop more energy efficient processes and reduce its reliance on fossil fuels. President Green Chemistry, which awards five awards each year in five categories: Education, Small Business, Greener Synthetic Roads, Greener Reaction Conditions and Designing Greener Chemicals.

KEYWORDS-Greener smart chemical, Eco-friendly materials, waste, biodegradable etc.

I. INTRODUCTION

"It works better, it works better, it looks better and it has better chemistry." Sustainability and environmental issues are important to the public and government. Chemistry and chemical engineering can provide solutions to many of these challenges, but chemistry can also be part of the problem. Green chemistry aims to provide environmentally friendly products from sustainable sources using processes that do not harm people or the environment. The 12 principles of green chemistry are:

1. After creating waste, it is better to prevent waste than to treat or clean it.
2. The synthesis process should ensure the integration of all materials used in the process into the final product.
3. Whenever possible, synthetic methods should be designed to use and produce chemicals that are not toxic to human health and the environment.
4. Chemical products should be designed to minimize toxicity while maintaining efficacy.
5. Take medication (eg. Solvents, release agents, etc.) should not be used as much as possible and should not cause problems during use.
6. The environmental and economic impacts of energy demand should be recognized and minimized. The synthetic method should be performed at ambient temperature and pressure.
7. Where technically and economically feasible, raw materials or raw materials should be renewable rather than consumed.
8. Reduced derivatives Unnecessary derivatives (blocking groups, protection/deprotection and temporary changes) should be avoided as much as possible.
9. Catalytic reagents (optional) are preferred over stoichiometric reagents.
10. Chemical products are designed in such a way that they do not remain in the environment and do not decompose into products that do not decompose at the end of their work.
11. Further development of analytical methods is required for real-time monitoring and control of hazardous materials before they are produced.
12. The materials used in the chemical process and the nature of the material should be chosen to minimize the potential for chemical hazards, including releases, explosions and fires

II. GREEN MATERIAL

Eco-friendly Chemicals contain ingredients like lemon, baking soda, water, plants, vinegar, which are and do not harm humans, animals and nature.

Eco friendly cleaners are far better to use on hard surfaces. This is because the compounds are less corrosive and will clean gently without being harsh and damaging. Eco cleaners are also far safer for human health. Non-biodegradable, chemical-based cleaners can be caustic, release irritating fumes and allergens.

1. Greener (Multipurpose Cleaner):

The oil stains and the appliances need a harmless, safe and efficient cleaner. The cleaner should be compatible with eco-friendly requirements. After cooking or preparing food preparation, the kitchen always results in a mess and leaves oil, grease, Tough stain on the marble, floor and other kitchen tools. The Oil and grease stains and the apparatus need a safe, effective and efficient cleaning agent.

2. Green-All (Glass Cleaner):

Greener is specially designed for Glass, stainless steel surface, which removes dirt & dust and does not leave anything behind. A unique fragrance, efficient cleaning performance and disinfectant calibre are the prominent features of glass cleaners. Cleaning with Greener is accessible and safe to the user because of the natural ingredients used in it. Eco-friendly glass cleaners give sparkling shine to the surface after using which do not remove dirt only but also make the surface shiny.

3. Green Air- (Air freshener):

The majority of air fresheners you buy in the supermarket do not destroy odour but mask them. These fresheners create a coating on your nasal membranes that tells your mind into thinking that the smell has gone. As for those air fresheners that promises to kill germs is leading us to kill good bacteria while creating strains of drug-resistant harmful bacteria. While anti-bacterial air fresheners have their place, and Green Fresh is specially made with natural **fragrances which include** ingredients like lemon, flowers, plants etc. which does not cause skin problems like the burning of eyes of itching or running nose because of the smell, its natural ingredients leave long-lasting mesmerizing aroma.

4. Green Shine (Toilet & bathroom Cleaner):

Toilet and bathroom are a significant part of any home, office, industries or any public area. Toilet & bathrooms have to be clean to avoid contact with germs, bacteria and various health problems. Cleaners available in the market for toilets and bathrooms are made up of toxic chemicals or phenols which will clean your sanitary surface but will not clean it thoroughly, and the inclusion of harmful toxic chemicals will cause damage to the surface. Eco-friendly Cleaners kills 99.9% of microbes efficiently, and with its green methodology, it does not affect the surface where we are applying cleaner.

5. Green-Flo (Floor Cleaner):

The floor is the base of everything in our home, public place or office. The floor contains the toughest stains, dirt because of daily work, which takes place there; that's why the floor needs a deep cleaning. Eco-Friendly floors cleaners are excellent in removing the toughest stain affecting its surface and maintain the shine and durability of the floor surface. It kills 99.9% of bacteria and leaves a magical aroma to the user due to its unique fragrance and efficient cleaning performance.

III. GREEN CHEMICAL

Green chemical supplies are environmentally safe cleaning solutions derived from plants. Unlike conventional chemical detergents, they do not contain harmful ingredients. This natural composition ensures the solution will not harm the environment, the user, or the surface being cleaned. But are green cleaning products as powerful as hazardous, chemical-based alternatives?

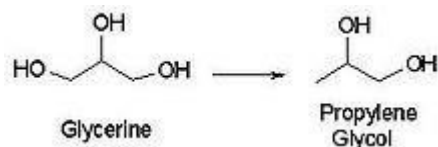
The Power behind Green Chemicals

Real herbal products contain herbal or herbal ingredients that make the soil and oil look like commercial herbs. The unique formulation of this cleaning solution contains nanoparticles. These particles are so small that they quickly penetrate and dissolve dirt deposits and stains. This removed dirt can be easily wiped off, washed or dried with a vacuum cleaner.

Natural cleaners from reputable pharmacies remove many organic types such as oil, grease, protein and petroleum derivatives.

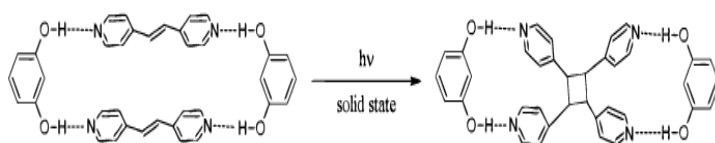
Herbs are known for their ability to remove hydrocarbon deposits that often cause problems for cleaning professionals. Perhaps the best reason to use herbs from chemical companies is to protect the area from re-contamination. The encapsulation and emulsification process prevents dirt, dust and oil molecules from re-adhering to the clean surface. Simple example of preparation of green chemical-

In 2006, Professor Galen J. Suppes, from the University of Missouri in Columbia, Missouri, was awarded the Academic Award for his system of converting waste glycerin from biodiesel production to propylene glycol. Through the use of a copper-chromite catalyst, Professor Suppes was able to lower the required temperature of conversion while raising the efficiency of the distillation reaction. Propylene glycol produced in this way will be cheap enough to replace the more toxic ethylene glycol that is the primary ingredient in automobile antifreeze.



Glycerine to propylene glycol
Supramolecular chemistry

Research is currently ongoing in the area of supramolecular chemistry to develop reactions which can proceed in the solid state without the use of solvents. The cycloaddition of *trans*-1,2-bis(4-pyridyl)ethylene is directed by resorcinol in the solid state. This solid-state reaction proceeds in the presence of UV light in 100% yield.



IV. NANO DRY LUBRICANT POWDER

Tungsten Disulfide (WS₂), Molybdenum Disulfide (MoS₂), Hexaboride (HBN), Graphite Nano lubricant additive powder specially formulated to improve lubricity and save energy. Lubricates industrial engines and machinery to reduce friction between moving parts. Friction causes energy loss due to its electrical and mechanical properties. Due to the large amount of oil used in the economy, even if oil consumption is reduced by a few percent, the business will be greatly reduced. According to Ali Erdemir, a senior scientist at Argonne, oil consumption can be reduced by 5% by using the new nano-lubricant.

Boric acid is formed by stacking crystal layers. Each layer has a very tight bond within itself, but there are also weak bonds between layers. This combination of strong and weak forces allows molecules to move easily, giving particles a low level of friction.

Ali Erdemir added that mineral oils are more economical and environmentally friendly. These new oils are safer and safer than traditional oils that often contain special chemicals.

In addition, boron is an abundant material that reduces production costs. New lubricants must pass environmental and safety tests before they can be produced and sold on a large scale.

In 2004, the Israeli company ApNano Products created the first lubricant based on nanotechnology. ApNano's Nano Lub is made from nanospheres of an inorganic compound found at the Weizmann Institute of Science in Israel. One of the most important advantages of Nano Lub is that it can be used even on unpolished surfaces.

Most parts need to be mechanically polished to achieve the smoothest possible surface to reduce friction. However, thanks to the shape of the nanoball bearing, the NanoLub is effective at reducing friction even with rough contact.

V. HEALTH

Companies like Smith & Nephew and De Puy are developing smart implants, such as bone implants, that can detect whether bone has healed and relay that information to surgeons. Small-scale trials of such fields have been completed and may be available in the next five years. Other possible uses include replacing joints that communicate when loose or infected. Current technology prevents these devices from responding to the information being sent, but they may respond in the future by directly pinching themselves or releasing antibiotics. This can reduce the need for invasive procedures.

Biosensors made of smart materials can be used to monitor blood sugar levels in diabetics and to communicate with insulin pumps when needed. However, the human body is a harsh environment and sensors are easily damaged. Researchers at Queen Mary University of London are working on a data barrier to protect the sensors.

VI. THE AGEING POPULATION

There are now more people over 60 than children in the UK, creating a new market for products that make life easier for older people. Many of them can use smart data and systems to do additional work. For example, memory sensitive ma



materials can be used in food packaging that can be opened when heated for people with arthritis. Researchers at the University of Bath have developed a smart home for people with mental illness that uses sensors to monitor behavior and keep building occupants safe.

VII. REDUCING WASTE

Legislation is forcing producers to consider the entire life of a product at the design stage and customers are increasingly demanding more environmentally sensitive products. Innovative use of smart materials has the potential to reduce waste and to simplify recycling.

VIII. ELECTRONIC WASTE

Electronic waste is the fastest growing component of domestic waste in the UK. The EU Directive on waste electronic and electrical equipment (WEEE) requires that it be processed before disposal to remove hazardous and recyclable materials. Manual disassembly is expensive and time consuming but the use of smart materials could help to automate the process. Research in this new area of 'active disassembly' has been carried out by UK Company, Active Disassembly Research Ltd. One example uses fasteners constructed from shape memory materials that can self-release on heating. Once the fasteners have been released, components can be separated simply by shaking the product. By using fasteners that react to different temperatures, products could be disassembled hierarchically so that materials can be sorted automatically. The company has collaborated with Nokia and believes that this technology could be in use in the next two years.

IX. ENGINEERING

Structures such as buildings, bridges, pipelines, ships and aircraft must be robustly designed and regularly inspected to prevent 'wear and tear' damage from causing catastrophic failures. Inspection is expensive and time consuming, while designing to prevent damage can compromise performance. With some modern materials, damage can be internally serious but leave very little surface evidence. Researchers at institutes such as the Universities of Bristol and Sheffield are working on systems that can diagnose and repair this type of damage automatically in both defense and civil applications.

X. STRUCTURAL HEALTH MONITORING

Embedding sensors within structures to monitor stress and damage can reduce maintenance costs and increase lifespan. This is already used in over forty bridges worldwide.

XI. SELF REPAIR

One method in development involves embedding thin tubes containing uncured resin into materials. When damage occurs, these tubes break, exposing the resin which fills any damage and sets. Self-repair could be important in inaccessible environments such as underwater or in space. The European Space Agency is collaborating on work in this area.

XII. BIODEGRADABLE PLASTIC

Biodegradable materials can be chemically degraded (broken down into simpler products) by biological processes (such as soil bacteria, air, plants, animals). The process by which materials biodegrade is called biodegradation.

Biodegradable materials usually include wood, wool, cotton, animal manure or other organic materials that can be broken down into carbon dioxide, methane or other organic molecules with the help of bacteria.

They are often referred to as "biological waste".

plastic has many advantages over metal and paper. They do not require much energy in production, require little maintenance, corrosion resistance, light weight and durability make them ubiquitous. For example, polymer foam insulation increases the building's energy efficiency by 200.7 times. Plastic packaging in food products extends the shelf life of products without the use of antibiotics.

However, people's long love affair with plastic seems to be waning. Today, traditional plastics are subject to public scrutiny.

utiny due to their impact on human health and the environment. The industry is looking for ways to manufacture plastic s with new products or raw materials to grow the multi-billion dollar business. The magic words for this are "bio based" and "biodegradable". This new type of plastic will replace plastic currently used in packaging, disposables, agric ulture and fisheries.

All plastics undergo some degree of physicochemical and/or biological degradation. Physicochemical processes include decomposition (degradation by sunlight, wind, or waves) and hydrolysis/oxidation. This process affects all plastics and is the main cause of micro

plastics. Plastics designed to degrade by oxidative or hydrolytic processes are referred to as oxo- degradable plastics and water-degradable plastics, respectively. Most are non-biodegradable and must be replaced.

Oxodegradable plastics are mostly fossil carbon plastics (eg polyolefins) containing various additives. These additives are both pro-oxidants and antioxidants, and their combination causes time-controlled oxidation. The most common pro- oxidant is iron stearate (eg.

For example, it is stabilized with iron stearate) and phenolic or phosphite antioxidants. Photodegradable plastics are a g roup of ox

degradable plastics in which the oxidation process is caused by ultraviolet light (about 4% of natural sunlight). Hydrod egradable plastics are usually blends of petroleum-

based plastics with natural polymers such as starch. Polyacrylamide (PA) is considered a hydrodegradable plastic becau se it can retain water and eventually convert to biomass. These plastics rely on the hydrophilicity of the polymer to brea k down into smaller oligomers. However, both oxo-degradable and water- degradable plastics are expected to produce micro plastics at the end of their useful life.

XIII. FUTURE

The future of smart products and models is clear. The use of smart devices in products and the types of smart models th at can be created are limited only by people's skills, abilities, and abilities to "think outside the box."

In previous work, there was a discussion about future decisions based on lecturing short courses. Many brains that emer ged from these efforts are now Still others in the concept stage are progressing.

Take a look at the distance covered by the car, the information and comfort it provides with smart products and models.

We were able to take the car to the garage for repair, it hooked up to the diagnostic computer and the mechanic said the car was bad. Or we have a light on the dashboard that says "maintenance needed". Isn't it better to let the light show us the reality and seriousness of the problem? The approach follows a cartoon published a few years ago that shows an air mechanic on his shelf approaching an airplane.

The plane said "ah", the mechanic "where did you get hurt?" said. The potential of ideas is huge. Sounds great if we no longer learn how to run Smarter.

The major uses of GREEN CHEMISTRY

XIV. ENERGY

Most of the energy produced in the world of today comes from non-renewable sources that harm the environment.

- └ Carbon Dioxide
- └ Depletion of Ozone Layer
- └ Mining, Drilling etc. Effects
- └ Toxic Substances

Energy

Green chemistry is important for creating alternative ways of generating energy (photovoltaic s, bio- hydrogen, fuels, cells, etc.) and continuing the path of using electricity through cutting- edge catalysis and generation.

BIO-BASED FUEL

1. Gasoline or motor alcohol:

Gasoline and ethanol 10:90 blend {Brazil}

2.

Oil Mill: Produces liquid milk that can be broken down into petroleum. For example. Euphorbia

3. Petroleum or Energy Products -

Plants in the Sunflower family produce oils and terpenoids that are used as diesel substitutes in engines.



All above examples are good alternatives for fossil fuel.

Green chemistry is developing:

* Fertilizers and fertilizer additives are designed to reduce usage while increasing efficiency.

For example. Bio composts, rhizomes

* Pesticides which only affect target organisms and degrade to innocuous by-products. E.g. Neem oil.

* Methods of using agricultural wastes for beneficial and profitable uses.

Increasing Greenness Means Prevention & Reduction, Recycling & Reuse.

XV. CONCLUSION

The environment must be protected to ensure a sustainable environment for current and future generations. Green products are products that are produced with sustainability in mind. From materials to production, the goal is always to reduce our environmental impact.

Green products range from food and beverages to technology products such as computers and mobile phones. The use of environmental packaging can have a significant impact.

Good returnable and reusable packaging can reduce supply chain and logistics costs.

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