Permission Letter

From

Date: 26.06.2023.

HOD of Chemistry
STSN GDC,
Kadiri.

To

The Principal
STSN GDC,
Kadiri.

Sub: Issue of permission to conduct certificate course reg…

Respected Madam,

I submit the following few lines for your kind consideration, Chemistry department is going to conduct Certificate course for II Year B.Sc Students from 01.07.2023 to 31.07.2023. Hence grant the permission.

Thanking you Madam

Permitted.

Yours faithfully,

(P. GURUPRATHAP REDDY)

26.06.23

CIRCULAR

The is to inform that Chemistry Department decided to conduct certificate on Bio-plastics from 01.07.2023 to 31.07.2023 for II nd B.Sc students. So enroll their names and pay the fee 100/- in the Department of Chemistry on or before 26.06.2023

Lecturer in Chemistry
S.T.S.N.Govt. Degree College
KADIRI - 515 591
Sri Sathya Sai Dist.

Dt 24-06-23

Resolution

It is resolved the Department of Chemistry unanimously decided, to conduct a 30 days certificate cource on "Bio-plastics" for IInd B.Sc students of this college. The course schedule will be from 01.07.2023 to 31.07.2023. After successful completion of course an exam should be conducted in certificate course and distribution of certificates to the students. The course syllabus is attached to this copy.

Lecturer in Chemistry
S.T.S.N.Govt. Degree College
KADIRI - 515 591
Sri Sathya Sai Dist.

Certificate course time table

S.No	Date	Topic Covered
1	01.07.2023	Inaugural function
2	03.07.2023	Introduction about certificate course
3	04.07.2023	Introduction of Bio-plastics
4	05.07.2023	Course objectives
5	06.07.2023	Course objectives
6	07.07.2023	Course outcomes
7	10.07.2023	Course outcomes
8	11.07.2023	Experimental part
9	12.07.2023	Experimental part
10	13.07.2023	Types of plastics
11	14.07.2023	Types of plastics
12	15.07.2023	Starch based bio-plastics
13	17.07.2023	Cellulose based bio-plastics
14	18.07.2023	Protein based bio-plastics
15	19.07.2023	Protein based bio-plastics
16	20.07.2023	Bio degradation of Bio-plastics
17	21.07.2023	Bio degradation of Bio-plastics
18	22.07.2023	Environmental impact of Bio-plastics
19	24.07.2023	Environmental impact of Bio-plastics
20	26.07.2023	Applications of Bio-plastics
21	27.07.2023	Applications of Bio-plastics
22	28.07.2023	Conduct on exam
23	29.07.2023	Evaluation
24	31.07.2023	Issue of certificates

1. Introduction :

Bioplastics are plastic materials produced from renewable biomass sources, such as vegetable fats and oils, corn starch, straw, woodchips, sawdust, recycled food waste, etc. Bioplastic can be made from agricultural by-products and also from used plastic bottles and other containers using microorganisms. Common plastics, such as fossil-fuel plastics (also called petrobased polymers) are derived from petroleum or natural gas. Not all bioplastics are biodegradable nor biodegrade more readily than commodity fossil-fuel derived plastics. Bioplastics are usually derived from sugar derivatives, including starch, cellulose and lactic acid.

2. Experimental : Follows **Five** steps

Step.1 : <u>Bioplastic Ingredients</u> :

i. 1 TBL Cornstarch
ii. 1 TPL Vinegar
iii. 1 TSP Glycerin
iv. 4 TBL Water

<u>Helpful Tools</u> :

Spatula
Measuring cups
Cooke Sheet
Aluminium foil
Hot plate

All these ingredients found in most kitchens, aside from glycerin. Glycerin is used as a plasticizer in this application, but is often an important additive in lotions and other skin care products because of it's hydrating properties. Different ingredients will affect the final outcome in different ways. For instance, glycerin will make the plastic more flexible. The acetic acid in vinegar helps the starch to dissolve easily, because it adds ions to the mixture. Vinegar is a much more readily available ingredient than ammonium acetate, which would be used in a larger scale commercial bioplastics operation. Water is used as a solvent, also to denature the starch. That way, a thin film can be created as a final product.

Step.2 : <u>Add All Ingredients to Pot</u> :

The order does no matter. Simply measure all ingredients and mix them together in the pot. Stir until combined, then turn on stove to low/medium heat.

Step.3 : <u>Heat Up the Mixture</u> :

After the heat is turned on, the mixture should regularly to avoid clumping. It will be a milky color at first, but will soon get thicker and turn slightly translucent. It is important to keep the heat low so that the heat is equally distributed throughout. This process happens fairly quickly, so keep stirring the mixture thickens.

Step.4 : <u>Turn Off the Heat</u> :

Once the mixture is easily scoopable, turn off the heat. Stir a few more times, then pour/scoop the mixture onto an aluminum foil lined cookie sheet. The foil is optional, but it will be easier to remove later when the plastic is dry.

Step.5 : Form the Plastic :

The mixture will feel similar to hair gel when it is first on the pan, and will need to cool a bit before it can be formed. Let it sit for a minute or so, then spread with a spatula on the foil. Over the next 15 minutes, the plastic will begin to harden and stick to fingers when touched, but it will still be soft. The plastic should be left alone for several hours, until completely set.

If you wish to form the plastic into a small bowl or other simple shape, it can be left on the foil for about an hour, then formed almost like playdoh. After forming, set it back on the foil and allow to dry for several hours or overnight. Resist the urge to touch the finished product thought the drying process, as it will be soft.

3. Types :

a. Starch based bioplastics :

Thermoplastic starch currently represents the most widely used bioplastic, constituting about 50 percent of the bioplastics market. Simple starch bioplastic can be made at home. Pure starch is able to absorb humidity, and is thus a suitable material for the production of drug capsules by the pharmaceutical sector. Flexibiliser and plasticiser such as sorbitol and glycerine can also be added so the starch can also be processed thermo-plastically. The characteristics of the resulting bioplastic (also called "thermo-plastical starch") can be tailored to specific needs by adjusting the amounts of these additives.

Starch-based bioplastics are often blended with biodegradable polyesters to produce starch/polylactic acid, starch/polycaprolactoneor starch/Ecoflex (polybutylene adipate-co-terephthalate produced by BASF). blends. These blends are used for industrial applications and are also compostable. Other producers, such as Roquette, have developed other starch/polyolefin blends. These blends are not biodegradable, but have a lower carbon footprint than petroleum-based plastics used for the same applications. Due to the origin of its raw material, starch is cheap, abundant, and renewable.

Starch based plastics are complex blends of starch with compostable plastics such as Polylactic acid, Polybutylene Adipate Terephthalate, Polybutylene Succinate, Polycaprolactone, and Polyhydroxyalkanoates. These complex blends improve water resistance as well as processing and mechanical properties.

Starch-based films (mostly used for packaging purposes) are made mainly from starch blended with thermoplastic polyesters to form biodegradable and compostable products. These films are seen specifically in consumer goods packaging of magazine wrappings and bubble films. In food packaging, these films are seen as bakery or fruit

and vegetable bags. Composting bags with this films are used in selective collecting of organic waste.

Further, a new starch-based film was developed by Agricultural Research Service scientists can even be used as a paper.

b. Cellulose based bioplastics

Cellulose bioplastics are mainly the cellulose esters, (including cellulose acetate and nitrocellulose) and their derivatives, including celluloid.Cellulose can become thermoplastic when extensively modified. An example of this is cellulose acetate, which is expensive and therefore rarely used for packaging. However, cellulosic fibers added to starches can improve mechanical properties, permeability to gas, and water resistance due to being less hydrophilic than starch.

A group at Shanghai University was able to construct a novel green plastic based on cellulose through a method called hot pressing.

c. Protein-based plastics

Bioplastics can be made from proteins from different sources. For example, wheat gluten and casein show promising properties as a raw material for different biodegradable polymers.

Additionally, soy protein is being considered as another source of bioplastic. Soy proteins have been used in plastic production for over one hundred years. For example, body panels of an original Ford automobile were made of soy-based plastic.

There are difficulties with using soy protein-based plastics due to their water sensitivity and relatively high cost. Therefore, producing blends of soy protein with some already-available biodegradable polyesters improves the water sensitivity and cost.

4. Biodegradation of Bioplastics :

Biodegradation of any plastic is a process that happens at solid/liquid interface whereby the enzymes in the liquid phase depolymerize the solid phase Both bioplastics and conventional plastics containing additives are able to biodegrade. Bioplastics are able to biodegrade in different environments hence they are more acceptable than conventional plastics. Biodegradability of bioplastics occurs under various environmental conditions including soil, aquatic environments and compost. Both the structure and composition of biopolymer or bio-composite have an effect on the biodegradation process, hence changing the composition and structure might increase biodegradability. Soil and compost as environment conditions are more efficient in biodegradation due to their high microbial diversity. Composting not only biodegrades bioplastics efficiently but it also significantly reduces the emission of greenhouse gases. Biodegradability of bioplastics in compost environments can be upgraded by adding more soluble sugar and increasing temperature. Soil environments on the other hand have high diversity of microorganisms making it easier for biodegradation of bioplastics to occur. However, bioplastics in soil environments need higher temperatures

and a longer time to biodegrade. Some bioplastics biodegrade more efficiently in water bodies and marine systems; however, this causes danger to marine ecosystems and freshwater. Hence it is accurate to conclude that biodegradation of bioplastics in water bodies which leads to the death of aquatic organisms and unhealthy water can be noted as one of the negative environmental impacts of bioplastics.

5. Environmental Impact :

Materials such as starch, cellulose, wood, sugar and biomass are used as a substitute for fossil fuel resources to produce bioplastics; this makes the production of bioplastics a more sustainable activity compared to conventional plastic production. The environmental impact of bioplastics is often debated, as there are many different metrics for "greenness" (e.g., water use, energy use, deforestation, biodegradation, etc.). Hence bioplastic environmental impacts are categorized into nonrenewable energy use, climate change, eutrophication and acidification. Bioplastic production significantly reduces greenhouse gas emissions and decreases non-renewable energy consumption. Firms worldwide would also be able to increase the environmental sustainability of their products by using bioplastics

Although bioplastics save more nonrenewable energy than conventional plastics and emit less GHG compared to conventional plastics, bioplastics also have negative environmental impacts such as eutrophication and acidification. Bioplastics induce higher eutrophication potentials than conventional plastics. Biomass production during industrial farming practices causes nitrate and phosphate to filtrate into water bodies; this causes eutrophication which is the richness of the nutrients in body waters. Eutrophication is a threat to water resources around the world since it kills aquatic organisms, creates dead zones and causes harmful algal blooms. Bioplastics also increase acidification. The high increase in eutrophication and acidification caused by bioplastics is also caused by using chemical fertilizer in the cultivation of renewable raw materials to produce bioplastics.

Other environmental impacts of bioplastics include exerting lower human and terrestrial ecotoxicity and carcinogenic potentials compared to conventional plastics. However, bioplastics exert higher aquatic ecotoxicity than conventional materials. Bioplastics and other bio-based materials increase stratospheric ozone depletion compared to conventional plastics; this is a result of nitrous oxide emissions during fertilizer application during industrial farming for biomass production. Artificial fertilizer increase nitrous oxide emissions especially when the crop does not need all the nitrogen. Minor environmental impacts of bioplastics include toxicity through using pesticides on the crops used to make bioplastics. Bioplastics also cause carbon dioxide emissions from harvesting vehicles. Other minor environmental impacts include high water consumption for biomass cultivation, soil erosion, soil carbon losses and loss of biodiversity, and they are mainly are a result of land use associated with bioplastics. Land use for bioplastics production leads to lost carbon sequestration and increases the carbon costs while diverting land from its existing uses

Although bioplastics are extremely advantageous because they reduce non-renewable consumption and GHG emissions, they also negatively affect the environment through land and water consumption, using pesticide and fertilizer, eutrophication and acidification; hence one's preference for either bioplastics or conventional plastics depends on what one considers the most important environmental impact.

Another issue with bioplastics, is that some bioplastics are made from the edible parts of crops. This makes the bioplastics compete with food production because the crops that produce bioplastics can also be used to feed people. These bioplastics are called "1st generation feedstock bioplastics". 2nd generation feedstock bioplastics use non-food crops (cellulosic feedstock) or waste materials from 1st generation feedstock (e.g. waste vegetable oil). 3rd generation feedstock bioplastics use algae as the feedstock.

6. Applications :

Bioplastics are used for disposable items, such as packaging, crockery, cutlery, pots, bowls, and straws. Few commercial applications exist for bioplastics. In principle they could replace many applications for petroleum-derived plastics, however cost and performance remain problematic. As a matter of fact, their usage is financially favourable only if supported by specific regulations limiting the usage of conventional plastics. Typical is the example of Italy, where biodegradable plastic bags and shoppers are compulsory since 2011 with the introduction of a specific law. Beyond structural materials, electroactive bioplastics are being developed that promise to be used to carry electric current.

STSN Govt. Degree College, Kadiri

Department of Chemistry

Attendance sheet

S.No	Name of the student	Group	Signature	Remarks
1	K sofiya	II B.Z.C	K. Sofiya	
2	Maviti anil kumar	II B.Z.C	M. anil kumar	
3	Nadendla nazuma	II B.Z.C	N. nazuma	
4	Nalle keerthi	II B.Z.C	N. keerthi	
5	Pulakunta bhagyasree	II B.Z.C	P. bhaggasree	
6	Ramavath gangadhar naik	II B.Z.C	R. gangadhar naik	
7	Seeram maruthi	II B.Z.C	S. Maruthi	
8	Shaik jaheda	II B.Z.C	S. jaheda	
9	S. K afrin	II B.Z.C	S. k. afrin	
10	Shaik siddik	II B.Z.C	S. Siddik	
11	Shaik tasleema	II B.Z.C	S. tasleema	
12	S md sabeer basha	II B.Z.C	S. md. sabeer basha	
13	Talari jyothi	II B.Z.C	T. jyothi	
14	Thammisetty ganasudha	II B.Z.C	T. ganasudha	
15	Varakula manikanta	II B.Z.C	V. manikanta	
16	V purushotham	II B.Z.C	V. purushotham	
17	Yanumala anusha	II B.Z.C	Y. Anusha	
18	Budagala venu	II B.Z.C	B. venu	
19	Jadeni sirisha	II B.Z.C	J. Sirisha	
20	Jerripothula harish	II B.Z.C	J. harish	

STSN Govt. Degree College, Kadiri

Department of Chemistry

Attendance sheet

S. No	Name of the student	Group	1/7	3/7	4/7	5/7	6/7	7/7	10/7	11/7	12/7	13/7	14/7	15/7	17/7	18/7	19/7	20/7	21/7	22/7	24/7	26/7	27/7	28/7	29/7
1	K sofiya	II B.Z.C	/	/	/	a	/	/	a	/	/	/	/	/	/	/	/	/	/	a	/	/	/	/	/
2	Maviti anil kumar	II B.Z.C	/	/	/	/	/	/	/	/	/	/	/	a	/	/	/	/	/	/	/	/	/	a	/
3	Nadendla nazuma	II B.Z.C	/	/	a	/	/	/	/	/	/	/	/	/	a	/	/	/	/	/	/	/	/	/	/
4	Nalle keerthi	II B.Z.C	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	a
5	Pulakunta bhagyasree	II B.Z.C	/	/	a	/	/	/	/	/	a	/	/	/	/	/	/	/	/	/	/	/	/	/	/
6	Ramavath gangadhar naik	II B.Z.C	/	/	/	a	/	/	/	/	/	/	/	/	/	/	/	/	a	/	/	/	/	/	/
7	Seeram maruthi	II B.Z.C	/	/	/	/	a	/	/	/	/	/	/	/	/	a	/	/	/	/	/	/	/	/	/
8	Shaik jaheda	II B.Z.C	/	/	/	/	/	/	/	a	/	/	/	/	/	a	/	/	/	/	/	/	/	/	/
9	S. K afrin	II B.Z.C	a	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	a	/	a	/
10	Shaik siddik	II B.Z.C	/	/	/	/	/	/	/	/	a	/	/	/	/	/	/	/	/	/	/	/	/	/	/
11	Shaik tasleema	II B.Z.C	/	/	/	/	/	a	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
12	S md sabeer basha	II B.Z.C	/	/	/	/	/	/	/	/	/	/	/	/	/	/	a	/	/	/	/	/	/	/	/
13	Talari jyothi	II B.Z.C	/	/	/	/	a	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
14	Thammisetty ganasudha	II B.Z.C	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	a	/	/	/	/	/
15	Varakula manikanta	II B.Z.C	/	/	/	/	/	/	/	/	a	/	a	/	/	/	/	/	/	/	/	/	/	a	/
16	V purushotham	II B.Z.C	/	/	/	/	/	/	a	/	/	/	/	/	/	/	/	/	a	/	/	/	/	/	/
17	Yanumala anusha	II B.Z.C	/	/	/	/	a	/	/	/	/	/	/	/	/	/	/	/	/	/	a	/	/	/	/
18	Budagala venu	II B.Z.C	a	/	/	/	/	/	/	a	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
19	Jadeni sirisha	II B.Z.C	/	/	/	/	/	/	/	/	/	a	/	/	/	/	/	/	/	a	/	/	/	/	/
20	Jerripothula harish	II B.Z.C	/	/	/	/	/	/	/	/	a	/	/	/	/	/	/	/	/	/	/	/	/	/	/

Contents :

1. Introduction
2. Experimental
3. Types of bioplastics
4. Bio degradation of bioplastics
5. Environmental Impact
6. Applications

Course Objective :

- To understand the whole process of bioplastics.
- To know the types of bioplastics.
- To describe the applications of bioplastics.
- To understand the degradable nature of bioplastics.
- To know how it will protect the Environment.
- To describe the applications of bioplastics.
- To understand how the bioplastics are alternative to traditional plastics.

Course Outcomes :

- After successful completion of this course they are able to know, how to made bioplastics with less expense.
- To describe difference between plastic materials and bioplastics.
- To understand how it will helpful to the nature.
- Develop their innovations in the area of green chemisty.

STSN Govt. Degree College, Kadiri

Department of Chemistry

Examination on Certificate Course

Time: 1Hour Max.Marks: 20

I.Answer the following questions 5X3=15

1. What are Bio-plastics?
2. Which Chemical makes plastic more flexible?
3. What are the types of Bio-plastics?
4. Write the applications of Bio-plastics?
5. Which substitute Fossil fuels?

II. Fill up the blanks 5X1=5

1. A bio-plastics production reduces _____.
2. Bio-plastics are used for _____.
3. “International world Environmental day” was celebrated on _____.
4. “World Ozone Day” was celebrated on _____.
5. Father of green chemistry _____.

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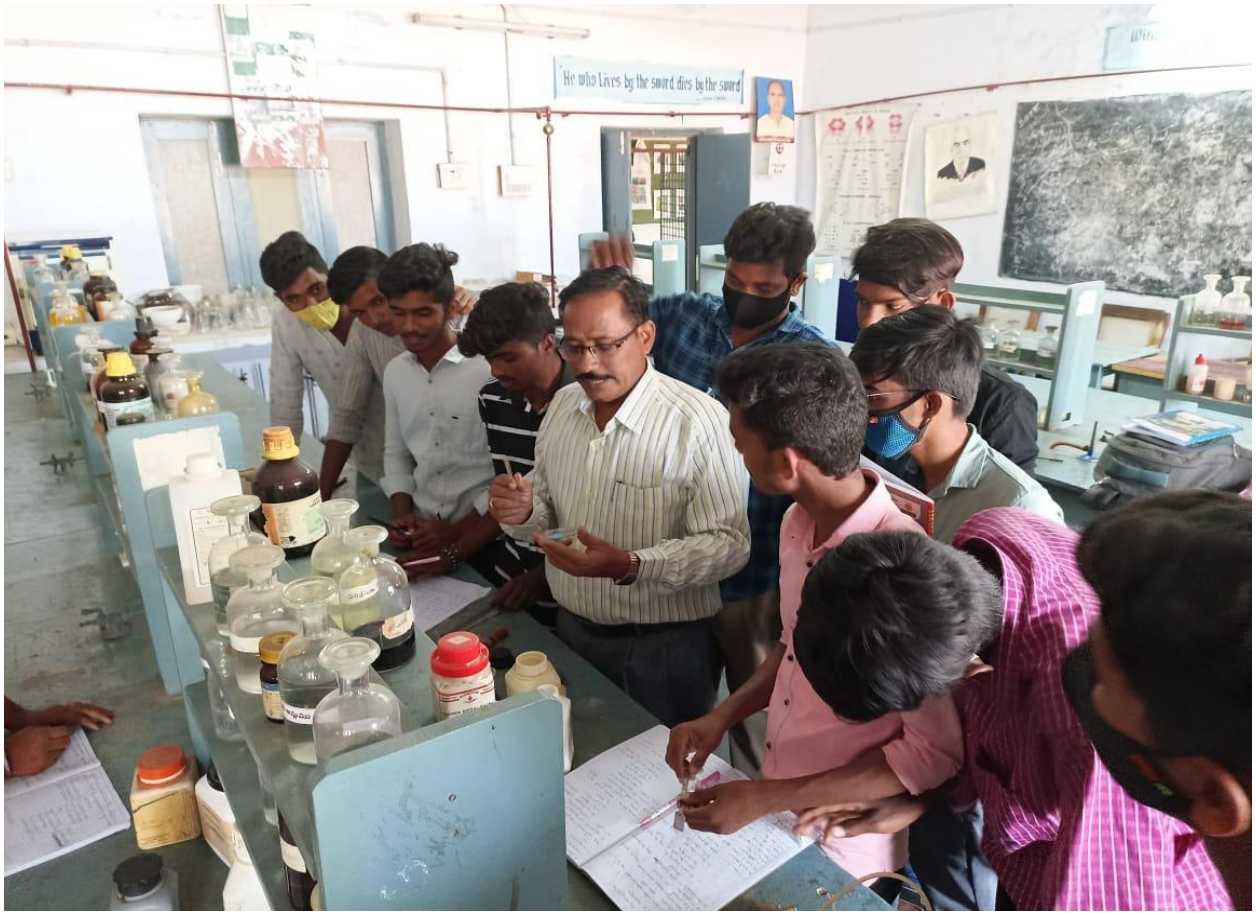
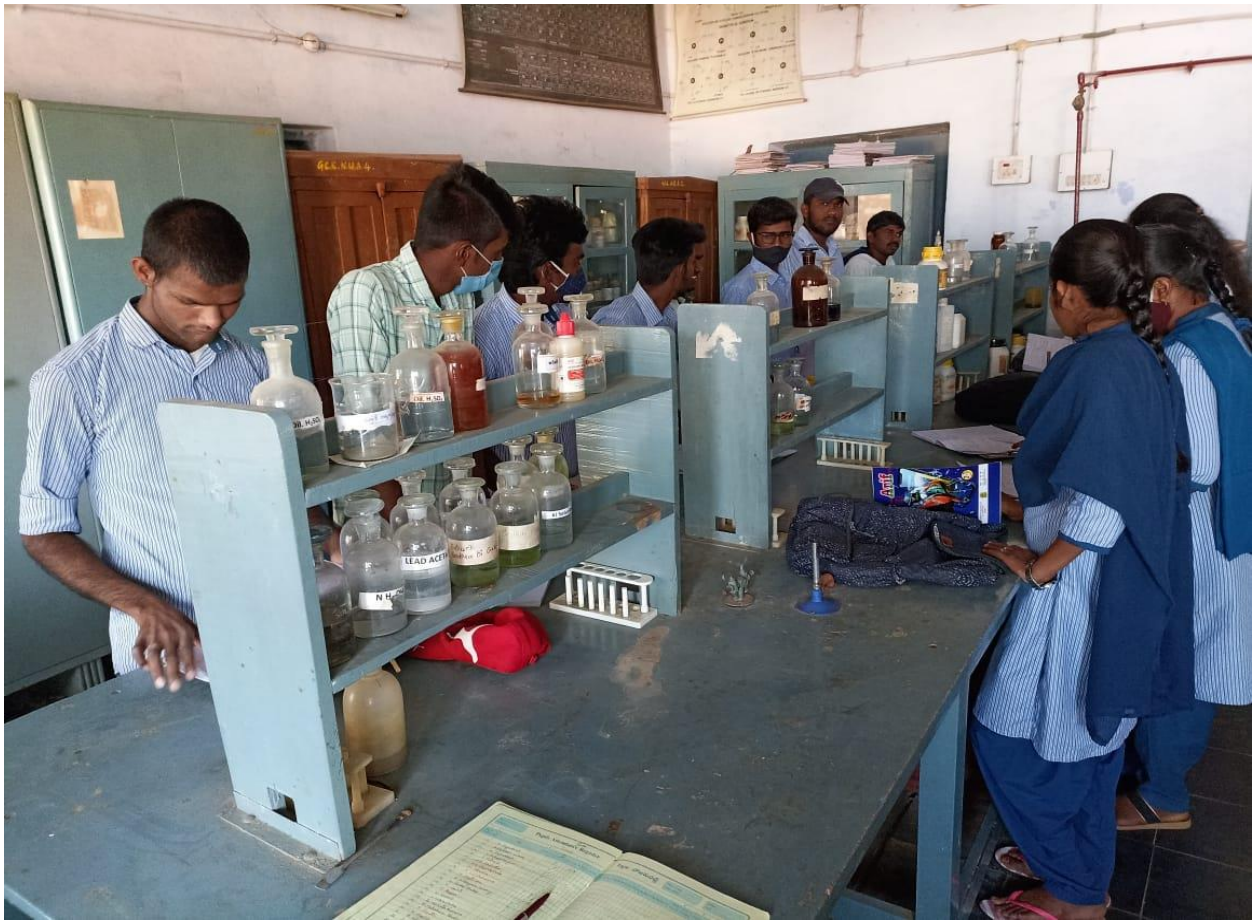
Certificate course on bio-plastics





Feed back

1) The course content was highly relavant to cuggent Envigonmental concegns and the increasing demand fog sustainable attegnatives.
2) Leagning about bio-plastics felt like a meaningful contribution to addressing global plastic pollution.
3) The course mategials wege well-ogganized and presented in an engaging manneg.
4) This course bridged the gap between theogy and application.
5) The hands-on lab sessions were a highlight of the course.
6) Being able to expegiment with creating jobs bio-plastics allowed us to see the principles.
7) While the instructog was knowledgeable, a bit mogg integaction during lectures would have enhanced the leagning expegience.
8) Mogg opportunities fog questions and dissussions could have helped clarify certain concepts
9) This bio plastics certificate course provided a solid foundation in undegstanding the principles, applications, and challenges of bio-plastics.
10) This course was a valuable addition to our undergraduate curriculum.

N. Keerthi & Team

STSN GOVERNMENT DEGREE COLLEGE

KADIRI, SRI SATHYASAI Dt.AP.

Re-Accredited With 'B' Grade by NAAC

An ISO 9001:2015 Institution

DEPARTMENT OF CHEMISTRY

CERTIFICATE OF COURSE COMPLETION

This is to certify that Mr/Miss_____ II B.Sc has successfully completed 30 days certificate course on "BIO-PLASTICS" Organised by Department of Chemistry from 01.07.2023 to 31.07.2023.

P.Guruprathap Reddy	M.Dasaradha Ramaiah	Dr.S.Smitha
HOD of Chemistry	Lecturer in Chemistry	Principal