ST. GREGORIOS COLLEGE KOTTARAKARA

FIELD VISIT

ST. GREGORIOS COLLEGE

(AN INSTITUTION ACCREDITED BY NAAC B GRADE)

KOTTARAKARA

FIRST DEGREE PROGRAMME

UNDER CBCSS 20 ..20..ADMISSION

REPORT OF FACTORY VISIT

YEAR....2020 - 23.....

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CLASS NO : .....29.....COURSE CODE....CH 1646.....

REG NO : ....23520126029.....OF : BSc CHEMISTRY.

Certified Bonafide Record of Practical work done in the Laboratory by the Candidate .....SNEHA S..... *with Reg No* : ....23520126029.....

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ST. GREGORIOS COLLEGE KOTTARAKARA DEPT. OF CHEMISTRY

Head of the Department

INDEX

SL NO	PAGE NO	NAME OF EXPERIMENT	DATE	REMARK
1	1	ACKNOWLEDGEMENT		
2	2-3	INTRODUCTION		
3	4	HISTORY OF CFSC		
4	5	PROFILE		
5	6	OBJECTIVES /MISSIONS OF CFSC		
6	7	VARIOUS DEPARTMENT AND MATERIAL PROCESSING		
I		RUBBER PROCESSING UNITS IN CFSC		
i)	9	RUBBER MIXING MILL		
ii)	9-10	HYDRAULIC PRESS MACHINE		
II		PLASTIC PROCESSING UNIT IN CFSC		
i)	11-12	INJECTION MOLDING		
ii)	12-13	BLOW MOLDING		
iii)	13-14	REPROCESSING EXTRUDER		
iv)	14	BLOWN FILM		
v)	14	GRINDER		
III	15	LABORATORY SERVICES		
a)	15	PHYSICAL TESTING LABORATORY		
i)	15-16	UNIVERSAL TESTING MACHINE		
ii)	16	PLASTOMETER		
iii)	16	ABRADER		

INDEX

SL.NO.	PAGE NO.	NAME OF EXPERIMENT	DATE	REMARK
iv)	17	ROSS FLEX TESTER		
v)	18	DIGITAL OPACITY TESTER		
vi)	19	RHEOMETER		
vii)	19	HARDNESS TESTER		
b)		CHEMICAL TESTING LABORATORY		
i)	20	MST APPARATUS		
ii)	20-21	AGEING OVEN		
iii)	21	PH METER		
iv)	22	CALORIMETER		
v)	23	BALL MILL		
7.	24	CONCLUSION		

ACKNOWLEDGEMENT

I wish to express my sincere gratitude to the authorities of Common Facility Service Center (CFSC), Changanassery, Kerala. giving an opportunity to visit their esteemed factory as a part of the factory visit programme of curriculum. I am indebted of our institution for accompanying us to all the units of the factory and explaining its functions in an interesting and informative manner.

I thank Principal of our college, Dr. Sumi Alex for permitting us to visit the institution.

I am extremely thankful to Dr. Francis Chacko, HOD of Dept of chemistry and other techers of the department for their sincere co-operation.

Finally, I wish to express my sincere gratitude to our teachers Dr. Remya. R and Dr. Binil. P. Sasidharan for their valuable guidance and for accompanying us to make our factory visit a great success.

INTRODUCTION

We have looked forward the study tour with great pleasure and enthusiasm. The knowledge which can be obtained from books and classroom is limited and being chemistry students, we have to learn a lot from visual observations. Considering this fact our department decided to plan a study tour.

Of course science has advanced considerably. No other branch of science is a broad as that of chemistry. Industries are applying principles of chemistry in large scale manufacture of different elements and compounds. Hence a chemical factory visit infact the more useful and encouraging for chemistry students. Considering this as the prime motive, our department arranged a visit to Common Facility Service Center, Changanassery.

We, the students of Final year BSc chemistry of St. Gregorios College, kottarakara visited the Common Facility Service Center,

changanassery on 20-1-2023 with various physical and chemical tests on rubber, plastics, rubber chemicals, raw materials etc as a part of our Syllabus.

Common Facility Service Center changanassery has been set up to promote polymer based industry especially plastics and rubber. This center is functioning under the control of the directorate of Industries and Commerce. CFSC, changanassery provides rubber and plastics related common facility.

HISTORY OF CFSC

The Common Facility Service Center at changanassery functions directly under the Department of Industries and commerce, Govt: of kerala. to assist and aid upcoming entrepreneurs particularly in the fields of rubber and plastics. Center started functioning on 1969 as per GO (MS) NO 457/65/10 dated 13.10.1965. Common Facility Service Center, certified with ISO 9001: 2008 in the year of 2013.

CFSC, changanaserry is supported with different departments / divisions. It includes, Rubber, plastics, Tool room, physical and chemical testing departments in practise.

PROFILE

· The Common Facility Service centre has been setup at changanassery to promote polymer based industry especially plastic and Rubber. This has been functioning under the direct control of the Directorate of Industries and commerce. The centre has well equipped laboratories for conducting various physical and chemical tests on rubber, plastics, rubber chemicals, raw materials etc. These facilities can be used for rubber product development, problem solving in existing industries, research promotion etc. More than 2000 clients including industrialists, rubber farmers, students etc are utilizing the service of this centre every year. CFSC has been undertaking project works of research scholars and students in the field of chemistry, rubber technology etc also, conducting Entrepreneur Development training programs, awareness and seminars on rubber and plastics based industries and providing other relevant information applicable to the MSME units.

OBJECTIVES / MISSIONS OF CFSC

* To provide technical support to industrialists and entrepreneurs in rubber, plastic and Tool room based industries.

* To conduct training programmes and seminars for the upliftment of rubber and plastic based industries.

* To provide laboratory facilities for checking the quality of rubber chemicals and rubber products.

* To provide laboratory facilities for the development of new rubber products

* To provide technical support for the fabrication of tools, moulds and dies in tool Room.

The management of CFSC have identified and established the quality policy as,

"We are committed to achieve excellence in provision of various technical services and training to customers. We continually improve our service to enhance customers satisfaction by means of systematic reviews of our performance".

VARIOUS DEPARTMENTS AND MATERIAL PROCESSING

Common Facility Service Centre, changanassery which functions directly under the department of Industries and Commerce, Govt of Kerala has initiated several programs for strengthening its activities. Shortage of trained manpower in various fields is one of the major issues faced by industries today. To cater to this needs of the industries, we used to conduct skill up-gradation training programs on lathe and boring, Industrial Electrification, fabrication and CNC milling, x-ray welding etc. All these are satisfied by this centre. The centre have well equipped laboratories for conducting various physical and chemical tests on rubber, plastics, rubber chemicals, raw materials etc.

Common Facility Service Centre supported with following Departments / Divisions :

I) Rubber Department
II) Plastic Department
III) Physical Testing Division
IV) Chemical Testing Division

I) RUBBER PROCESSING UNITS IN CFSC

Rubber is an example of an elastomer type polymer, where the polymer has the ability to return to its original shape after being stretched or deformed. Technical advices, Rubber compound mixing, Rubber product manufacturing facilities and R&D etc are available at this section. The earlier Rubber Division has been revamped with a state of the art centralized Mixing plant. This was commissioned under the cluster Development programme with Financial assistance to the tune of about Rs 2.4 crore by way of grant from the DC, Central Ministry of Small and Medium Enterprises. This has facilitated bulk processing and mixing of rubber compounds with uniform and

consistent quality. Various machines included in this division are.

i) Rubber Mixing Mill

Mixing mills are used for the manufacture of rubber compounds. A rubber based material is mixed with several additives such as fillers, softners, processing aids and colourants here. The two rolls of the rolling mill rotate in the opposite direction. For the purpose of mixing, one roll runs faster than the other one. Therefore shearing forces act on the rubber in the nip between the two rolls. In this way, the rubber is mixed. Mixing mills are used to incorporate certain substance in very tough and resistant such as rubber. Furthermore, mixing mills are used for crushing rubbers and for refining mixtures from internal mixers.

ii) Hydraulic press Machine

A hydraulic press is a machine press that generate compressive force through the use of a hydraulic cylinder. It is used for crushing, flattening, compressing, moulding and coating materials.

The material to be processed are applied by placing them between plunger and Ram insider the press machine and a tiny amount of force is applied to the plunger which pushes the material beneath. This pressure is then spread evenly raising the Ram. The pressure created by the plunger and the Ram then crushes the item placed between them.

Hydraulic press

Rubber mixing mill

II PLASTIC PROCESSING UNITS IN CFSC

Plastics have become common materials of our everyday lives. Many of their properties, such as durability versatility and light-weight, can be a significant factor in achieving sustainable development. CFSC is dedicated to give various services in the area of plastics. Some of them are:

* Various testing facilities to determine quality and properties of plastic products/materials.
* Services of plastics processing Machineries.
* Technial advices to setup manufacturing units and recyeling units.
* Providing training to Entrepreneur and students on plastics.
* Advices on converting waste plastics in to value added products.

Various machines and processing techniques involved in plastic processing unit are:

i) Injection Molding

Injection Molding is a technique for creating Moulded items by heating plastic materials until they are molten, then injecting

them into a mold where they cool and solidify. The technique plays a significant role in the field of plastic processing and is appropriate for the mass manufacture of goods with complex shapes. Injection Moulding is used mainly for Thermoplastics, but elastomers and Thermosets are also may be extruded.

ii) <u>Blow Molding.</u>

Blow Moulding is a manufacturing process for forming hollow plastic parts. Inorder to generate a hollow component, air is blasted into a mould cavity during manufacture. It is frequently used in

variety of industries including packaging, automotive, medical, industrial and construction similar to traditional plastic injection molding it uses softened plastic pellets that are forced into cavity of the mould to take the desired shape. The difference is the addition of compressed air that forces the plastic outwards and produces the hollowed out effect.

iii) Reprocessing Extruder.

Extrusion is a process of manufacturing long products of constant cross-section forcing soften polymer through a die with an opening. Here the waste plastic materials are cleaned and washed with water before further processing. The cleaned plastic materials are put in a cutting machine and converted to small pieces. The cut

pieces are put in an extruder where it melts to give granule lumps.

iv) Blown film

A blown film process is used for producing a wide variety of products, ranging from simple monolayer films for bags to complex multilayer structures used in food processing. This manufacturing is great for producing products that require uniform properties along the length and width of products.

v) Grinder

plastic grinding machine is used to grind flexible or rigid materials with or without water. The grinder placed under the screw press is used to obtain better clay on the film

III LABORATORY SERVICES

a) PHYSICAL TESTING LABORATORY

A well equipped Testing laboratory is available at the centre for conducing various physical tests on rubber, plastics and other essential product. These facilities are absolutely essential for rubber products development, problem solving in existing industries, research promotion etc.

A wide range of practical methods, which can be tailored to our needs. Tests includes UV/VIS spectrophotometry, DSC, TMA, DMTA, TGA and HDT. This division includes, universal testing machine, Rheometer, Plastimeter, Abrader etc for physical testing.

i) Universal Testing Machine.

A universal testing Machine (UTM) also known as a universal tester, materials testing machine or materials test frame is used to test the tensile strength and compressive strength of materials. An earlier name for a tensile testing machine is a 'tensometer'. The 'universal' part of the

name reflects that it can perform many standard tensile and compression tests on materials, components and structures.

ii) <u>Plastometer</u>

Plastometer measures the plasticity or viscosity of unvulcanised rubber. The method of test is simple, clean and quick. The instrument is used to determine Plasticity Retension index (PRI) of raw, natural rubber.

iii) <u>Abrader</u>

Basically, Abrasion Tester determines abrasion quality of flexible materials like rubber, tires, leathers etc. It complies with various international standards. To test, abrade

the test sample which is cylindrical in shape.

iv) <u>ROSS Flex Tester</u>

Ross flux Tester is designed to determine the resistance of vulcanised or synthetic elastomers to cut growth. The system does so under continuously bend flexing in 90°. This digital system has a memory function and is suitable for PU, PVC, TPR foams. It is particularly used for shoe soles because it is capable of testing virtually any flexible sheet like material. After continuous bending, the damage and cracking degree is examined.

v) Digital Opacity Tester

Opacity Testers are widely used to measure the light reflection/ absorption intensity and transparency of various materials like plastic films, packageing materials etc. The opacity of the plastic sheet is decided as per the thickness, kind of filler, the degree of bleaching of fibers, coatings and other parameters. This instrument also helps to determine the opacity level of laminations, printed packaging, films etc. With the single transmission of light through the object, the testing instrument measures the light conductivity that determine the transparency of a product to a highly dense material.

vi) Rheometer

A rheometer is a precision instrument that contains the material of interest in a geometric configuration, controls the environment around it, and applies and measures wide range of stress, strain and strain rate.

vii) Hardness Tester.

Hardness testing enables to evaluate a material's properties, such as strength, ductility and wear resistance, and so helps you determine whether a material or material treatment is suitable for the purpose of you require.

b) CHEMICAL TESTING LABORATORY

A well equipped testing laboratory is available at the CFSC for conducting various chemical testing on rubber, plastic and other related chemicals. Many apparatus like pH meter, MST apparatus, calorimeter, Ball mill, ageing oven etc are available in this centre division for chemical testing.

i) MST apparatus

Mechanical Stability Tester (MST) is used to determine the mechanical stability of rubber latex concentrate, also suitable for prevulcanized rubber latex concentrate. It is an essential instrument required to improve the quality of rubber latex. It conforms to ISO 35 and the equivalent.

ii) Ageing Oven

Ageing oven heats up plastic and rubber

products, artificially aging them to simulate what would happen over years of use. An ageing oven is very different from a regular lab oven. Some factors decide whether the ageing of a material done artificially in a lab is close enough to natural ageing. There are.

- Temperature stability over space and time.
- Replacing fresh air inside the oven.
- Maintaining a very low air velocity inside the oven when replacing air.

Many industries also use these ovens to test and finish aluminium parts. The standard ~~ter~~ maximum temperature rating for the aluminium age oven is 500°F.

iii) pH meter

An electronic pH meter is used to obtain more accurate pH measurements. A pH meter is an instrument used to measure hydrogen ion activity in solution. The degree of hydrogen ion activity is ultimately expressed as pH level, which generally ranges from 1 to 14. The general breakdown of pH level is listed as:

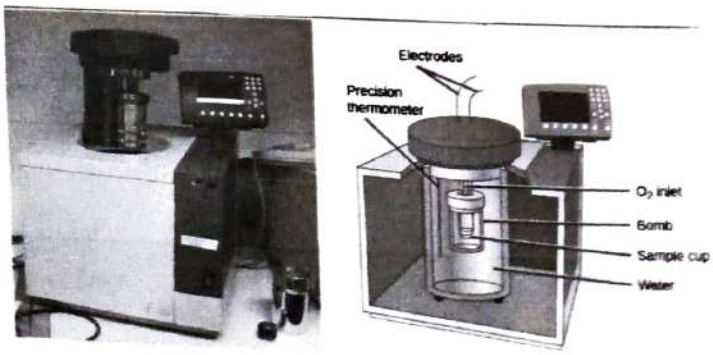
Neutral solution ; $pH = 7$

Acidic solution ; $pH < 7$

Basic solution ; $pH > 7$.

iv) <u>Calorimeter</u>

A calorimeter measures the change in heat. Simple calorimeters are made with a metal container of water, positioned above a combustion champer. A thermometer is used to measure the heat change in the amount of water. The temperature of liquid changes when it loses or gains energy. The calorimeter measures the mass of liquid along with the temperature change, to determine the amount of energy change. It is different from a thermal analysis in that thermal analyzers measure properties of a material at various temperatures.



v) Ball mill

A ball mill is a type of grinder used to grind or blend materials for use in mineral dressing processes, paints, pyrotechnics, ceramics, and selective laser sintering. It works on the principle of impacts and attrition: size reduction is done by impact as the balls drop from near the top of the shell. A ball mill consists of a hollow cylindrical shell rotating about its axis. It ~~consists~~ is partially filled with balls. The grinding media are the balls, which may be made of Steel, rubber or ceramics. The inner surface of the shell is usually lined with an abrasion resistant material such as manganese steel or rubber lining. Less wear takes place in rubber lined mills.

CONCLUSION

Common facility service centre, changanassery is one of the best facility service centre of Kerala. It provides many facilities such as technical support to industrialists and entrepreneurs in rubber, plastic based industries, laboratory facilities for the development of new rubber products testing facilities for checking the quality of rubber chemicals and rubber products. A visit to this centre increased our interest in rubber, plastics etc based processing and industries. Rubber and plastic based materials are valuable products which has many more application in our day to day life.

Dr. SUMI ALEX
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