Report Of
KHOJ- Course Code (PS-310)
Final Report

AUTUMN 2018

Topic -: Plant from Ganesha

Group no: 3

Faculty Mentor: Dr.Brijesh Shah

Program: BSc-BCA

Name of group members

ID	Name of student	Program
16163014	Himani Patel	B.Sc
16163015	Hardik Rami	B.Sc
16163017	Shreyash Kadam	B.Sc
16163018	Kishita Panchal	B.Sc
16163019	Nikita Shukla	B.Sc
16163020	Aakash Tiwari	B.Sc
16102009	Hiren Parghi	BCA
16162010	Megha Rathod	BCA

November 14, 2018

Navrachana University, Vasna Bhayli Road, Vadodara

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Chapter 1 -: Community Visit

Communities Selected:

1. **Railway Station**
2. For both POP murti and Air filter - **Gujarat Murti Art near hotel legand Tarsali chowkdi**
3. Waste Disposal – **Atladra**
4. Visited **GSFC Township** but authority didn't allow entering the township.
5. Visited **Dhiraj Hospital**

Roles and Responsibilities:

1. Himani: Took part in suggestion of places to visit for community visit, Asked questions to note the problems, Photographer, Observation of areas of visit.
2. Hardik: Only took part in suggestion of places to visit for community visit.
3. Shreyash: Took part in suggestion of places to visit for community visit, Help in preparation of questions to ask in community visit, Asked questions to note the problems, Photographer, Observation of areas of visit, Discussion for suggestions of making concept note, Prepared the whole concept note alone.
4. Kishita: Took part in suggestion of places to visit for community visit, Asked questions to note the problems, Photographer, Observation of areas of visit, Discussion for suggestions of making concept note.
5. Nikita: Took part in suggestion of places to visit for community visit, has noted the questions and the answers given by in the person, Observation of areas of visit, Discussion of making concept note.
6. Aakash: Took part in suggestion of places to visit for community visit, Help in preparation of questions to ask in community visit, Asked questions to note the problems, Photographer, Observation of areas of visit, Discussion for suggestions of making concept note.
7. Hiren: Has noted the questions and the answers given by in the person, Observation of areas of visit.
8. Megha: Took part in suggestion of places to visit for community visit, Help in preparation of questions to ask in community visit, Asked questions to note the problems, Observation of areas of visit.

Conduct of Community Visit:

Site 1 - Railway Station

Himani Patel	**PRESENT**
Hardik Rami	**ABSENT**
Shreyash Kadam	**PRESENT**
Kishita Panchal	**PRESENT**
Nikita Shukla	**PRESENT**
Aakash Tiwari	**PRESENT**

Hiren Parghi	**ABSENT**
Megha Rathod	**PRESENT**

Date visited: 17/8/18 **Day:** Friday

Duration of Visit: 1-2 hours

Frequency of Visit: 01-02

- **Person(s) Interviewed:**

1. Name - The persons doesn't wanted to revel their identity.
2. Role and Experience – Shopkeeper {15 years}, Coolie {25 years}.

- **Questions asked:**

1. Are there enough sanitation facilities?
   Answer: - Yes there are washrooms at every platform but no washrooms for handicap people.
2. Are there Escalators on every platform for old peoples?
   Answer: - No escalators are on platform 1 only.
3. Do authorities trouble you while selling goods at station?
   Answer: - No authorities don't trouble.
4. If there would be a small baby and if he/she would be hungry would you provide real milk not flavored?
   Answer: - Yes they provide.
5. Do electronic transition preferred?
   Answer: - Yes they prefer.

- **Problems identified:**
  - Escalators not sufficient on platforms.
  - Sanitation facilities for handicap people.
  - Lack of seating facilities.

Site 2 - For both POP murti, Household waste disposal and Air filter - **Gujarat Murti Art near hotel legand Tarsali chowkdi**

Himani Patel	**ABSENT**
Hardik Rami	**ABSENT**
Shreyash Kadam	**PRESENT**
Kishita Panchal	**ABSENT**
Nikita Shukla	**ABSENT**
Aakash Tiwari	**PRESENT**
Hiren Parghi	**PRESENT**
Megha Rathod	**ABSENT**

Date visited: 21/8/18 **Day:** Tuesday

Duration of Visit: 2 hours

Frequency of Visit: 01

- **Person(s) Interviewed:**

1. Name – Sunesh Prajapati.
2. Role and Experience – Owner {27 years}, Worker {14 years}.

- **Questions asked:**

1. What are steps which you take for POP waste disposal of broken murtis?
   Answer: - They dumb the murtis inside the land or throw in open area.
2. Do you prefer sand murtis of Lord Ganesha?
   Answer: - Yes they prefer sand murtis nut due to cost the buyers don't prefer.
3. Did government do anything to support sand murtis?
   Answer: -Yes government supported very much then provided instruments [spray, color], taught them how to make murtis, gave sand at half rate etc but people should support.
4. Time required for preparing sand and POP murtis?
   Answer: - In time when they prepare one sand murti they make 10 POP murtis.
5. Do electronic transition preferred?
   Answer: - Yes, but they prefer mostly cash transaction.
6. Does color which you spray on murtis affect your health?
   Answer: - No not much it doesn't affect.
7. Do you take any precaution of color particles as you leave at this place only?
   Answer: - No they don't take.
8. Do you get enough LPG gas cylinders which is sufficient for your family?
   Answer: - No, because of this they use illegal cylinders.
9. Where do you throw your household waste?
   Answer: -In open area, then some animal come and eat it or may rarely be cleaned by government persons.
10. If we would provide any alternative will you be interested to use it?
    Answer: - Yes they will use it.

- **Problems identified:**

- Particulate matter in air.
- POP murti disposal in water.
- LPG Gas cylinders.

Site 3 - Waste Disposal – **Atladra**

Himani Patel	**PRESENT**
Hardik Rami	**ABSENT**
Shreyash Kadam	**PRESENT**
Kishita Panchal	**PRESENT**
Nikita Shukla	**PRESENT**
Aakash Tiwari	**PRESENT**
Hiren Parghi	**PRESENT**
Megha Rathod	**PRESENT**

Date visited: 25/8/18 **Day:** Saturday

Duration of Visit: 1 hour

Frequency of Visit: 01

- **Person(s) Interviewed:**

1. Name - The persons doesn't wanted to revel their identity.
2. Role and Experience – Persons leaving near about that area.

- **Questions asked:**

1. Do you face problems by the garbage accumulated here?
   Answer: - Yes they face.
2. Does anyone come here to clean or remove the garbage collected here?
   Answer: - No it is cleaned very rarely.
3. Do you face any problems regarding mosquitoes?
   Answer: -Yes they face and malaria, dengue etc diseases also occur.
4. Do you have sufficient amount of portable drinking water?
   Answer: -No we face this problem also.
5. If we would do something of this garbage problem will you support us?
   Answer: -Yes they would support.

- **Problems identified:**
  - Waste accumulation in open area
  - Unhygienic living conditions:
  - Mosquitoes

Site 4 - Visited **GSFC Township** but authority didn't allow entering the township.

Himani Patel	**PRESENT**
Hardik Rami	**ABSENT**
Shreyash Kadam	**PRESENT**
Kishita Panchal	**PRESENT**
Nikita Shukla	**PRESENT**
Aakash Tiwari	**PRESENT**
Hiren Parghi	**ABSENT**
Megha Rathod	**PRESENT**

Date visited: 17/8/18 **Day:** Tuesday

Duration of Visit: 3 hour

Frequency of Visit: 01

- **Person(s) Interviewed:**
  1. Name - The authority didn't allow to entering the township.
  2. Role and Experience – The authority didn't allow to entering the township.

Site 5 - Visited **Dhiraj Hospital**

Himani Patel	**PRESENT**
Hardik Rami	**ABSENT**
Shreyash Kadam	**PRESENT**
Kishita Panchal	**PRESENT**
Nikita Shukla	**PRESENT**
Aakash Tiwari	**PRESENT**
Hiren Parghi	**ABSENT**
Megha Rathod	**PRESENT**

Date visited: 17/8/18 **Day:** Tuesday

Duration of Visit: 2 hour

Frequency of Visit: 01

- **Person(s) Interviewed:**

1. Name - The persons doesn't wanted to revel their identity.
2. Role and Experience – Patients, Auto-Rikshwalas, Visitors of Hospitals.

- **Questions asked:**

1. Does the hospital staff treat you well?
   Answer: - Yes they treat well.
2. Is the availability of food quality good?
   Answer: -No food given to not only to visitors but even to patient also is worst.
3. Does other facilities given are good?
   Answer: - Yes they are ok but not up to the mark which other hospitals provide.
4. Is there cleanness?
   Answer: - Yes but not often.
5. Is there availability of public transport?
   Answer: -Yes but there is union of them and they charge whatever they like at night and if they find that person is from other state then they cheat them very much. Also we can't leave public transport as this hospital is on outer side where there is no other transportation available.

- **Problems identified:**
  - Unhygienic food for patient as well as for visitors:
  - Public transport.
  - Proper cleanness.

Problem Identified:

- **Waste Accumulation:**

1. **Manure**: - Ease of conversion to manure as there is abundant biodegradable waste, Plastic Recycle, Develop web portals for calling in volunteers, raising awareness and funds and to identify other areas with similar problems through web portal.
2. **Bio-Gas/Bio-Fuel**: - Ease of conversion to bio gas as there is abundant biodegradable waste, it can be prepared by use of biodegradable waste which can be stored in a container for a time interval which generates fuel, plus the left over content stored in container after total removal of bio-gas can be use as manure for nursery or in small household farming, Develop web portals for

calling in volunteers, raising awareness and funds and to identify other areas with similar problems through web portal.

- **Air Filter:**
  To sieve out suspended particulate matter because it causes breathing problems, Develop web portals for calling in volunteers, can also be sold at various dusty areas.
- **Degradation/Replacement of PoP**
  By observing the waste generated by PoP in water bodies we have decided to select this topic also there is abundant PoP waste generated at time of Ganesh Chaturti festival so it would be huge benefit to society

Chapter 2 -: Description of the Problem Identified

Some Issues related to Plaster of Paris [PoP]

- PoP comes under inorganic waste
- Idols made out of PoP is a big problem as it doesn't degrade for a long time so this makes it major pollutant for water bodies.
- Aquatic ecosystems like, ponds and lakes face immersion of Idols every year that are made out of PoP.
- POP increases the hardness of water due to calcium present in it which causes respiratory problems while high sulphate composition increases laxative effect.

By observing the all above issues related to PoP we have decided to do Degradation of PoP, but if the degradation of PoP wouldn't be possible or there would be come trouble, then only we will work on replacement of PoP. Also the replacement would be in such a way that it will not only harm the society but it will somehow benefit the society.

Chapter 3 -: Literature survey

1	REVIEW OF SOCIAL INNOVATIONS			
	ID	**Name of Student**	**Program**	**Title of social innovation presented/ quoted**
	16163014	Himani Patel	B.Sc.	• **Alum Ganesha** • **Thermal Decomposition Of Calcium Sulphate**
	16163015	Hardik Rami	B.Sc.	• **Making idols made of chocolate** • **Thermal Decomposition of Calcium Carbonate**
	16163017	Shreyash Kadam	B.Sc.	• **Plant from Ganesha** • **Degradation of POP by using concentrated HCL**
	16163018	Kishita Panchal	B.Sc.	• **Substitutes for POP idols by sugarcanes** • **Rice husk ash as an alternative to POP**
	16163019	Nikita Shukla	B.Sc.	• **Fish-friendly Ganesha** • **THERMAL DECOMPOSITION OF CALCIUM SULFATE IN CARBON MONOXIDE**
	16163020	Aakash Tiwari	B.Sc.	• **Making idols made of clay** • **Thermal Decomposition of Calcium Sulphate**
	16102009	Hiren Parghi	B.CA	**Not Submitted**
	16102010	Megha Rathod	B.CA	• **Thermochemical reduction of pelletized gypsum mixed with carbonaceous reductants** • **Made from Recycled Paper, These Ganesh Idols Are Safe Environmentally to Immerse in Water Bodies**
2	**IMPLICATIONS FOR PROPOSED SOCIAL INNOVATION DECOMPOSITION/ REPLACEMENT OF POP IDOLS BY ANOTHER MATERIAL**			

Himani Patel

First Social Innovation: - Alum Ganesha

- **Developed by:-**

Concerned about environment, many people have been doing their bit for its conservation. As the trend of eco-friendly ganpati is catching up in various cities, few years ago, Pune-based friends Ramesh kher and Vivek kamble came up with an idea to sculpt an idol out of alum.

- **Place**

Pune, Maharashtra

- **Site Source**

https://www.dnaindia.com/india/report-taking-eco-friendly-ganpati-to-new-level-pune-duo-carves-idol-of-alum-2247600

https://www.thebetterindia.com/65505/ganesha-idols-eco-friendly/

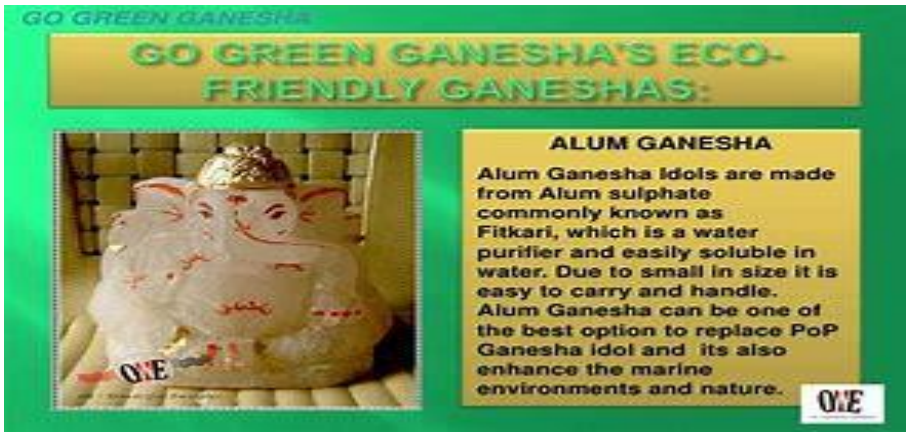


Figure 1

- **Description of the social Innovation**

- Alum is used by various corporations to clean potable water and remove polluting particulate matter from it. According to them, their aim is to help with the water pollution during immersions of the idols. As alum easily dissolves in water, this initiative will reduce the pollution level.
- Civil engineer Ramesh Kher ties up with sculptor friend Vivek Kamble to create Ganpati idols from alum, a substance used by PMC to rid potable water of polluting particulate matter
- The size and weight of the idol, Kamble, said, "The size of the idol depends upon the size of the alum stone. Maximum size is of 10 inches. While, the weight will be approximately 1 to 1.5 kg depending upon the carving done on the alum.
- Food colour is used for decoration and beautification of idols. Since alum does not come in a particular design, it is one of the uniqueness of alum idols.

How Implication for proposed social innovation by your group:

- Our group will try to spread the awareness about this social innovation. We will also work on the defects of this social innovation such as - Alum has different layers, so if carve one wrong step and will have to start all over again with on another alum, another is as we immerse alum the whole murti in water the aluminium will be extracted and its excess is harmful to water bodies. We would try to solve these problems.

Second social innovation - Thermal Decomposition of Calcium Sulphate:

Developed by: Walter Michael Bollen Iowa State College

Place: FINLAND, EUROPE

Site : https://lib.dr.iastate.edu/rtd

Chemical Engineering Commons

Description of the social innovation:

- They studies on analytical grade calcium sulphate and on anhydrite gypsum and phosphogypsum in carbon monoxide atmosphere.
- The decomposition temperature and mechanism are infused by the mineral impurities of the sample and the heating rate as well as the CO content of the gas atmosphere.
- The thermal decomposition of calcium sulphate has been studied in oxidizing and inert and reducing atmospheres. However, reductive decomposition under controlled conditions is potentially because it would allow the conversion of CaSO4 into CaS and/or CaO at temperatures significantly below those required for the oxidative process.
- Solid as well as gaseous compounds may act as reducing agents and, in a carbon-containing system, the role of carbon monoxide will be dominant. The interaction of carbon monoxide with calcium sulphate may be described by the following equations:

  $CaSO4 + CO \rightarrow CaO + SO2 + CO2$ ……(1)

  $CaSO4 + 4\ CO \rightarrow CaS + 4\ CO2$ ……(2)
- At 1100degree reaction number(1) is endothermic with an enthalpy value of 181.6 k J/mole while reaction number(2) is exothermic with a value of 202.5 k J/mol.

Application of calcium oxide:

- Calcium oxide (CaO), commonly known as quicklime or burnt lime, is a widely used chemical compound.
- The major use of quicklime is in the basic oxygen steelmaking (BOS) process.
- Small quantities of quicklime are used in other processes; e.g., the production of glass, calcium aluminate cement, and organic chemicals
- Cement: Calcium oxide is a key ingredient for the process of making cement.

Application of sulfur dioxide:

- Sulfur dioxide is sometimes used as a preservative for dried apricots, dried figs, and other dried fruits. As a preservative, it maintains the colorful appearance of the fruit and prevents rotting.

- Sulfur dioxide was first used in winemaking by the Romans, when they discovered that burning sulfur candles inside empty wine vessels keeps them fresh and free from vinegar smell.
- Sulfur dioxide is also a good reductant. In the presence of water, sulfur dioxide is able to decolorize substances. Specifically, it is a useful reducing bleach for papers and delicate materials such as clothes.
- Being easily condensed and possessing a high heat of evaporation, sulfur dioxide is a candidate material for refrigerants.

Application of carbon dioxide:

- Electronic Applications. Carbon dioxide gas is used in the electronics industry for circuit board assembly, to clean surfaces and in the manufacture of semiconductor devices.
- Health Care Uses: Carbon dioxide is used as an additive to oxygen for medical use as a respiration stimulant.
- Carbon dioxide is used by the food industry, the oil industry, and the chemical industry. The compound has varied commercial uses but one of its greatest use as a chemical is in the production of carbonated beverages; it provides the sparkle in carbonated beverages such as soda water, beer and sparkling wine.

How Implication for proposed social innovation by your group:

- We will also work on the defects of this social innovation such as thermal decomposition of calcium sulphate and anhydrite gypsum. This work demonstrates that sulphur or sulphur dioxide can be produced from the unlimited supply of natural calcium sulphate without the use of addition agents.
- This process might be competitive with other sulphur producing process, particularly if there existed a market for the by-product lime product.

Shreyash Kadam

First Social Innovation: - Plant from Ganesha

- **Developed by:-**

Established in the year **2005** at **Mumbai, Maharashtra,** we **"Eco Shree Ganesha Arts"** are a **Partnership** based firm, engaged as the foremost **Manufacturer** of **Ganesha Idol, Ganesha Statue, God Statue, etc.** Our products are high in demand due to their premium quality, seamless finish, different patterns and affordable prices. Furthermore, we ensure to timely deliver these products to our clients, through this we have gained a huge clients base in the market.

Phone**:** 09870263556

Email:ecoshreeganeshaarts@gmail.com

- **Place**

4, Lokhandwala Complex Rd, Sahayog Nagar, Bhudargarh Colony, Andheri West, Mumbai, Maharashtra 400047

- **Site Source**
  - ✓ Video link of this social innovation:-https://www.youtube.com/watch?v=cuFb1xL2DXg https://www.youtube.com/watch?v=oQCp4tN4Mzk
  - ✓ http://www.ecoshreeganeshaarts.com/
  - ✓ https://www.indiamart.com/ecoshreeganeshaarts/profile.html
  - ✓ GIF of the desolation of idol https://giphy.com/gifs/rvlujV5xDS3PW

- **Description of the social Innovation**
  - ✓ This organization makes eco-friendly Ganesha idols with plant seeds in them. You can place the idol in a pot with soil at the end of the festival. Water it and the idol begins to dissolve. Soon, the seeds take root in the soil.
  - ✓ The procedure for making the idols is :-
    1. First of all the mixture of red soil and organic fertilizer is prepared and then it is mixed well and a clay is made from it.
    2. After this then clay is filled in the mould and the shape is given to the ganesha.
    3. Then as shape is given from outer side inner side is empty now soil mixture is filled inside and then some seeds of small plants are inserted inside the idol.
    4. Then idol is place in the pot.
    5. Colours on idol are organic colours.
    6. At the end of the 10-day festival, the idols undergo a symbolic immersion. Instead of being immersed in a water body, the idol is placed in an accompanying pot and watered until it dissolves
    7. Just pour some water regularly at some intervals for 3-4 days the idol will dissolve and a new plant will grow from seeds which were inserted in idol.

- **How Implication for proposed social innovation by your group**

Our group will try to spread the awareness about this social innovation. We will also work on the defects of this social innovation such as – time taken for idol to dissolve in water, try to achieve or add fertilizer which is cheaply available in order to reduce the cost of murti that we will make bio fertilizer. We would try to solve these problems.

Figure 2

Second Social Innovation: - Degradation of POP by using concentrated HCL

- **Developed by:-** Experiments done by various scientists
- **Place:-** In various labs of world
- **Site Source:-**
  - ✓ https://www.enotes.com/homework-help/what-net-ionic-equation-this-caso4-hcl-379680
  - ✓ Can. J. Chem. Downloaded from www.nrcresearchpress.com by 219.91.213.186 on 09/25/18
  - ✓ http://www.softschools.com/formulas/chemistry/calcium_chloride_uses_properties_structure_formula/296/
  - ✓ https://www.youtube.com/watch?v=T7KX7qBiKo4
  - ✓ https://www.youtube.com/watch?v=L_wd2YzCsJA
- **Description of the social Innovation**

  Since many naturally occurring gypsum deposits which are used as raw material for the commercial production of Plaster of Paris and building plaster. The experiments have done for degradation of this POP by using HCL i.e. Hydrochloric Acid. When we react anhydrous calcium sulfate with conc HCL we will get H_2SO_4 and $CaCl_2$ as a product. Calcium Sulfate is a solid which does not readily dissolve in water while Calcium Chloride Sulfuric Acid is highly dissolved in water. So at the end insoluble gypsum is dissolved in water by using acid.
  So we get the Chemical equation as -

$CaSO_4 \cdot 1/2H_2O + HCL \longrightarrow H_2SO_4 + CaCl_2$

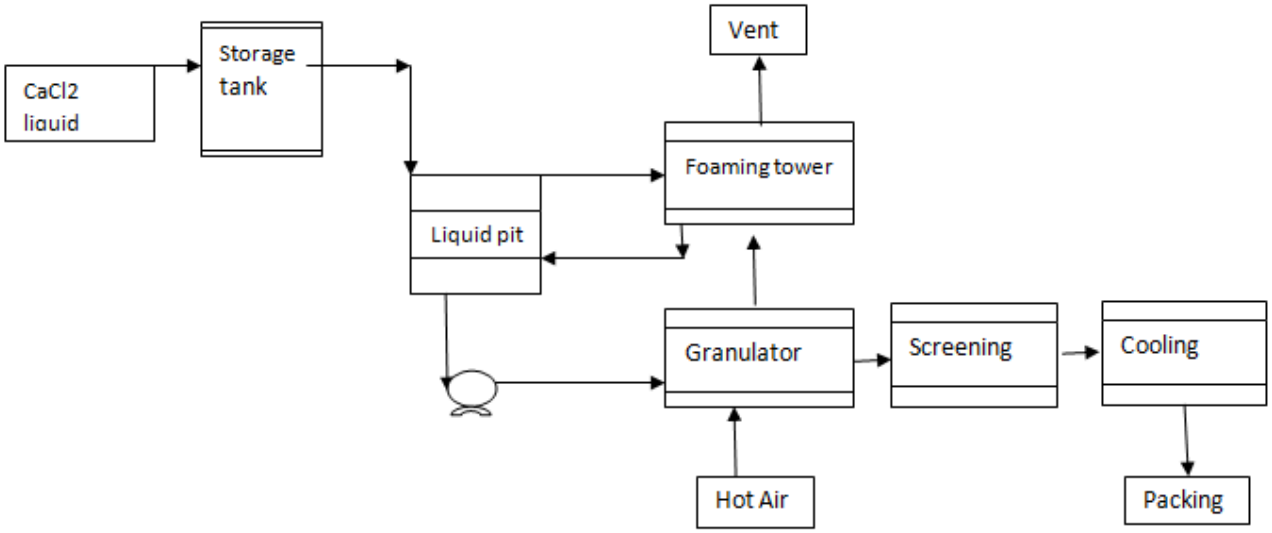
Also there are various uses of $CaCl_2$ are it is used as food preservative, for de-icing roads in winter, and as brine in refrigeration plants, used as a swimming pool chemical, in water treatment plants, and for desiccating purposes, also has applications in metallurgy, oil-well drilling, and rubber, paper, dye and paint industries and H_2SO_4 for industry purpose.

Manufacturing of $CaCl_2$

Process name – Process for preparing powder and granular calcium chloride products

Brief Description of granulation process

Cacl2 solution about 35% is stored in storage tank .It is then transferred through filtration system to the Liquid collection pit. This Cacl2 solution is circulated through Foaming tower and concentrated solution is return back to the pit. The concentrated solution about 40% is fed to the granulator through nozzles and granules are produced in granulator in presence of hot air. This hot air is produced by coal fired furnace. The vent gases mainly contain water vapours transferred to foaming tower and released to atmosphere through process chimney. The Final product, Calcium chloride granules were screened through specified screen and cool down. Then the product is shifted to the product bin through bucket elevator and packing is done through packing machine in bags .The packed bags were shifted in storage area for dispatch to customers.



PROCESS OF GRANULATOR BLOCK DIAGRAM

OR

Separation of H_2SO_4 and $CaCl_2$ by addition of CuO

Reaction is -

$H_2SO_4 + CaCl_2 + CuO \longrightarrow CuSO_4 + HCL + H_2O$

In this by addition of CuO in H_2SO_4 and $CaCl_2$ solution forms copper sulfate and HCL.

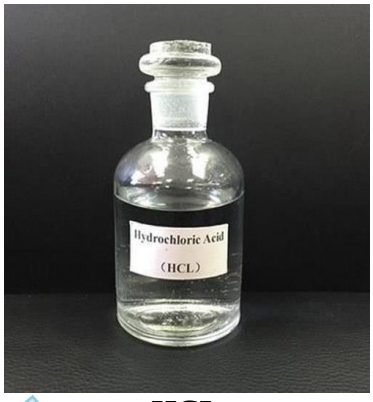
Now this solution of $CuSO_4$ and HCL can be easily separated by boiling off of HCL as its boiling temperature is low i.e. 110*C. And then HCL is collected into another container and sold to market. Similarly blue solution of $CuSO_4$ can also be sold readily to market. Both HCL and $CuSO_4$ have various industrial uses

- **How Implication for proposed social innovation by your group**

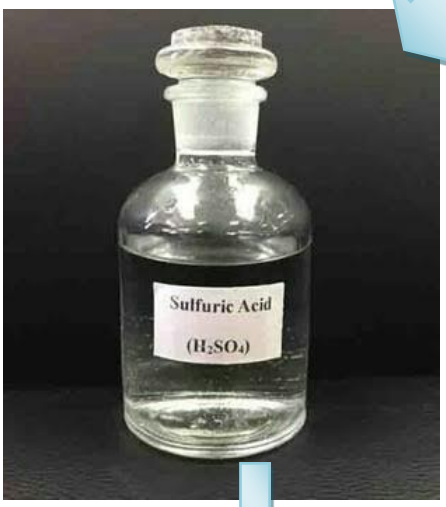
Our group will try to spread the awareness about this social innovation. We will also work on the defects of this social innovation. We try reducing accident while causing while working with acid which will reduce wastage and reduce cost.

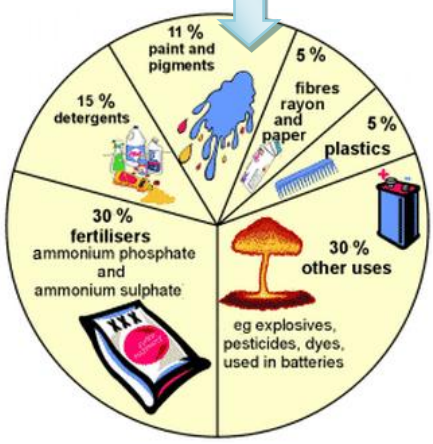
Degradation of PoP by-products

POP



HCL





Uses of H_2SO_4

Uses of $CaCl_2$

Kishita Panchal

Social innovation 1-Substitutes for POP idols by sugarcanes

Developed by- Pratapbhai
Place- Mulund
Cite source- www.huffingpost.in

Description of Social Innovation:

While going green might be a new trend for many Ganpati followers, one family in Mulund has been minimizing their carbon footprint during the festival for over a quarter century. According to a report in the *Times of India*, the family worships a pyramid of sugarcane sticks that represents the pandal, and is distributed on the day of the immersion as *prasad* to friends and family members. Last year, in an attempt to avoid plastic materials and chemical colours in Tamil Nadu, 20 workers produced a 2-tonne Ganpati made entirely of sugarcane sticks.

IMPLEMENTATION BY OUR GROUP:

We will try to spread awareness for making the ganesha from this type of substitutes.

Figure 3

Social Innovation 2 - Rice husk ash as an alternative to POP.

Developed by- C. N. Ezugwu, L. A. Uneke, P. P. Akpan
Place- Nigeria
Cite source- https://ijesm.co.in

Description of Social Innovation:

Rice husk ash (RHA) is a good substitute for gypsum, the popular white cement with trade name of molda 3 used in producing plaster of Paris (POP) ceiling boards. The research showed how rice husk (RH), an industrial waste materials is optimized by substituting it for gypsum used for producing ceiling board, hence converting waste to wealth. Gypsum is an expensive material used for manufacturing POP boards. RH is an industrial waste that pollutes the environment and causes enormous difficulty of disposing appropriately without causing any form of occupational health, safety and environmental hazard. Its organic property is converted to inorganic pozzolanic substance when burned at a very high

temperature. The ashes exhibited an inorganic pozzolanic property that makes it to behave like cement and hence a good substitute for gypsum. 10%, 20%, 30% and 40% of the molda 3 was replaced with RHA and tested for setting time, hardness and compressive strength at each substitution. Each new percentage mix was used in the production of POP-RHA boards. The crushing strength of each mix was determined in 7, 14, 21, and 28 days respectively and the result compared to that of 0% RHA control mix. The results showed a correspondingly steady increase in strength according to the percentage mix. The density of the POP-RHA boards reduced as the percentage of the RHA increased. The aesthetics was relatively good. Improved resistance to fire, chloride and sulphate attacks is expected. The setting time of the new mix increased with increase in RHA content. Ultimately, minimization of cost and resources to maximise profit is achieved from the industrial waste materials.

The research investigated the possibility of producing POP-RHA boards. The method was to produce the board type using the normal constituent materials to serve as control and then to replace the essential material with RHA. A mixture of RHA and molda 3 at determined percentages was used to produce the boards. The crushing strength of each percentage mix was determined in the laboratory and compared with the control to determine the optimum RHA percentage suitable for the purpose. The research optimises the waste material for aesthetics and structural benefit thus enhancing its economic viability and usage. The research aims at producing the best of ceiling board with good aesthetics and designs of the different components of the POP, namely POP board, rosette and conies with RHA as alternative/ substitution material. Durability, strength and aesthetics, reduced porosity, resistance to fire, chloride and sulphate attacks, should be reasonably high to achieve economic aim .

POP is a white cementicious powder which set to a hard solid when mixed with water. Large deposits were originally found outside Paris in France, hence its name. When gypsum is heated to about 1500C it losses water and produces the powder used in making POP. During the heating process, there is usually evolution of heat which generates a large amount of steam, leaving the residue which is ground to powder. The chemical equation is as follows:

$2CaSO4{\cdot}2H2O \text{ heat} \rightarrow 2CaSO4{\cdot}½H2O + 3H2O$

(1) Addition of water to Plaster of Paris results in production of Gypsum

$2CaSO4{\cdot}½H2O + 3H2O \rightarrow 2CaSO4{\cdot}2H2O + \text{heat}$

The chemical formula for plaster of Paris is $CaSO4{\cdot}½H2O$.

Rice husk ash

RHA is the after-mill waste product of rice found in large quantities in south-eastern Nigeria and some parts of Nigeria's middle-belt where rice is milled. In Niger State, Nigeria, about 96,660 tonnes of rice grains were produced in year 2000. Rice husk is one of the most widely available agricultural wastes in many rice producing countries around the world. Globally, approximately 600 million tons of rice paddy is produced each year. On average 20% of the rice paddy is husk, giving an annual total production of 120 million tones. In majority of rice producing countries much of the husk produced from processing of rice is either burnt or dumped as waste. Burning of RH in ambient atmosphere leaves a residue, called rice husk ash. For every 1000 kg of paddy milled, about 220 kg (22 %) of husk is produced, and when this husk is burnt in the boilers, about 55 kg (25 %) of RHA is generated. RHA is a source of Silica and Silicon compound. It is actually a Super-Pozzolan having about 85% to 90% silica content. A good way

of utilizing this material is to use it for making „High Performance Concrete", which means high workability and very high early strengths and longterm durability of the concrete. Compressive strength of concrete can be increased by up to 30%, Water permeability, chloride penetration, and heat of hydration can be reduced by up to 60%, and 25 % respectively with 10 % replacement of cement in concrete. During heat treatment of RH in inert atmosphere, organic compounds decompose and partly change to H2O, CO, CO2, and volatile compounds, leaving carbon and SiO2. The technological trend towards waste utilization and cost reduction in industrial processing has attracted use of Rice Husk as a value added material. Rice Husk Ash (RHA) has been found suitable for wide range of domestic as well as industrial applications. Considering the importance and increasing demand of this material, a systematic study based on properties and industrial applications has been carried out.

Test conducted on rice husk ash with concrete showed that rice husk used as a replacement for cement results in the following:

1. Increase in compressive strength.
2. Decrease in chloride iron penetration as a result of reduction in the volume of large pores.
3. Low permeability when mixed with a super plasticizer.
4. Improved resistance to sulphate and alkali attack due to the presence of high amount of silica.
5. High resistance to acid attack.

Tested as an alternative to silica fume, RHA possesses a small particle size that lowers the porosity of concrete and is a highly reactive pozzolan. However, previous experience has shown that silica fume decreases the initial set time of concrete and increases the amount of shrinkage in the mix. Rice husk ash does not possess these undesired characteristics. Furthermore, RHA has a greater amount of surface area per unit weight than silica fume, helping to increase the overall strength of the mix. Research showed that RHA has High silica content when burnt at 6500 c-7000 c that it reduces its carbon content and increases its surface area. Research into the possibilities of improving residual soil properties by mixing RHA and cement in suitable proportions as stabilizing agents has shown positive results .Rice husk ash has been widely used in various industrial applications such as processing of steel, cement, ceramic and other refractory industries, silica source, etc .

Compressive strength The results of the compressive strength tests revealed that the zero percent RHA mix developed the highest strength for the seventh, fourteenth, twenty-first and twenty-eighth day crushing test. There was initial drop in strength for the various percentage RHA content in the mix. Then there was a steady rise in strength proportional to the various percentages of RHA content. The increase in strength was observed in all mixes for the seventh, fourteenth, twenty-first and twenty-eighth day crushing test with the 40% RHA content mix developing the highest strength. The 10% RHA content dropped in strength as a result of reduced concentration of Tricalcium silicate C3S in RHA. The high proportion of Silica present in RHA gives it an unusual ability to develop strength much better than molda 3. Tables show that the higher the percentage of RHA in the specimen, the higher the strength gained with time. Research has shown that the strength will develop further with time until it exceeds that of the control mix by up to thirty percent.

Table 1: Results of load at varying percentage of rice husk ash content

	LOAD				
S/NO	% OF RHA	DAY 7	DAY 14	DAY 21	DAY 28
1	0	12.1	52.3	62.4	65.6
2	10	5.3	6.8	12.4	22.7
3	20	6.0	7.0	16.0	24.0
4	30	6.0	14.0	21.0	31.0
5	40	31	31.1	32.0	42.0

Table 2: Results of stress at varying percentage of rice husk ash content

S/NO	% OF RHA	STRESS			
		DAY 7	DAY 14	DAY 21	DAY 28
1	0	0.040	0.160	0.193	0.202
2	10	0.020	0.020	0.038	0.070
3	20	0.020	0.020	0.050	0.074
4	30	0.020	0.040	0.064	0.096
5	40	0.096	0.096	0.099	0.130

Conclusion

It has been established experimentally that RHA is a good alternative to Gypsum. The various percentages of rice husk ash introduced into the molda 3 in their varying proportions showed that the higher the RHA content the higher the initial and final setting time and the lower their initial penetrations respectively. The result of the final penetration is not conclusive. The initial and final setting time and their respective penetrations are higher than that of ordinary Portland cement. However, maximum hardness is achieved with time. The inference from the result showed that 40% RHA developed the highest strength and with time will exceed the strength of the 0% mix. The strength of the RHA can exceed that of molda3 by up to 30%. The aesthetics of the products are reasonably good. Fire resistance is expected to improve and porosity reduced. The addition of rice husk ash results in increased resistance to chloride and sulphate attacks. A mixture of RHA and molda 3 gives a better board strength-wise and hence higher durability than that of standard molda3 alone. It is obvious that a new, more economical and stronger ceiling board has been produced without compromising aesthetics.

Nikita Shukla

Social innovation: Fish-friendly Ganesha

Replacement of plaster of paris:-

Developed by:- Anand Pendharkar

Place :-mumbai

City source:- https://www.huffingtonpost.in/2016/09/05/9-innovative-ganpati-idols-that-give-an-eco-friendly-touch-to-ga_a_21465601/

Descripition:

- For the second year in a row, Mumbai-based NGO Sprouts Environmental Trust is making idols that fish can eat. The brainchild of ecologist Anand Pendharkar of the Sprouts Environmental Trust, the statues are made with clay and stuffed with fish-friendly food such as corn, spinach, wheat and vegetable powder. The team has also reduced the size of the idols and decorated them with biodegradable, organic colours such as turmeric, chandan and gerua. **How**
- **Implication for proposed social innovation by your group:**
  Our group will try to spread the awareness about this innovation.

Figure 4

Social innovation: THERMAL DECOMPOSITION OF CALCIUM SULFATE IN CARBON MONOXIDE

Developed by:- R. Kuusik , P. Saikkonen and L. Niinist5 DEPARTMENT OF CHEMISTRY, HELSINKI UNIVERSITY OF TECHNOLOGY,

Citesource:- **https://link.springer.com/article/10.1007/BF02128129**

- Besides occurring in tremendous deposits in nature as gypsum or anhydrite, calcium sulfate is produced in excess of demand as a by-product in several industrial processes, especially in phosphoric acid production from apatite and phosphorite. Thus, calcium sulfate constitutes a potential source of cheap raw material for the production of sulfur based chemicals, most notably sulfuric acid.
- Thermal decomposition of calcium sulfate has been studied frequently, in oxidizing, inert and reducing atmospheres. The studies performed in oxidizing and inert media have been reviewed in detail by Colussi and Longo, who also discussed the effect of certain added compounds. However, reductive decomposition under controlled conditions is potentially more interesting from the industrial point of view because it would allow the conversion of CaSO 4 into CaS and/or CaO at temperatures significantly below those required for the oxidative process. Solid as well as gaseous compounds may act as reducing agents and, in a carbon containing system, the role of carbon monoxide will be dominant. The interaction of carbon monoxide with calcium sulfate may be described by the following equation.

CaSO 4 + 4 CO ~ CaS + 4 CO2

This study has investigated pelletization of waste gypsum mixed with carbonaceous reductants as a means of improving handling of gypsum during thermal reduction to recover caS, as well as promoting better conversion the feed material.

Figure 5

Application of calcium sulfide:

Calcium sulfide decomposes upon contact with water, including moist air, giving Milk of lime, $Ca(OH)_2$, reacts with elemental sulfur to give a "lime-sulfur", which has been used as an insecticide.

Applications of CO_2

- **Carbon dioxide is used by the food industry, the oil industry, and the chemical industry.**

➢ Metals Industry:

Carbon dioxide is used in the manufacture of casting molds to enhance their hardness.

➢ Chemicals, Pharmaceuticals and Petroleum Industry Uses:

Large quantities are used as a raw material in the chemical process industry, especially for methanol and urea production.

➢ Rubber and Plastics Industry Uses:

Flash is removed from rubber objects by tumbling them with crushed dry ice in a rotating drum.

➢ Food and Beverages Uses for Carbon Dioxide:

Liquid or solid carbon dioxide is used for quick freezing, surface freezing, chilling and refrigeration in the transport of food.

Carbon dioxide gas is used to carbonate soft drinks, beers and wine and to prevent fungal and bacterial growth.

- **How Implication for proposed social innovation by our group:**

we will try to spread awareness for this process in various industry.

Aakash Tiwari

Social innovation: Making idols made of clay

Developed by:- Government

Place: - Gujarat

Site source:-Newspaper
Description:-
Concerned about environment many people have been doing there bit for its conservation. As the trend of eco-friendly ganpati is catching up in various cities. Few years ago in 2012 government of Gujarat attempt to ban the idols made of Plaster of Paris but was turned down by NGT – National Green Tribunal. The government also tried to spread awareness regarding the idols made of clay. The government also provided them clay at cheaper prices to the idol makers and teach them how they can make their idols with clay. Because Plaster of Paris is cheaper and it is easy to make use of it for making the idols the makers as well as the devotees go for Plaster of Paris idols.

Figure 6

Social innovation: Thermal decomposition of calcium sulphate

Developed by: - DOE's Office of Scientific and Technical Information (OSTI)

Place: - United States

Site source:-
https://www.osti.gov/biblio/7224692/

Description :-

$$2CaSO_4 \longrightarrow 2CaO + 2SO_2 + O_2$$

The thermal decomposition of calcium sulfate to produce calcium oxide, sulfur dioxide and oxygen. This reaction takes place at a temperature of 1350 – 1400`C.

Uses of SO_2 as a reagent and solvent in laboratory.

Calcium oxide – It is a key ingredient for process of making cement.

Hardik Rami

Social innovation 1 - Making idols made of chocolate:

Commercial designer turned baker Rintu Rathod has been adding a sweet touch to the festival with her chocolate Ganeshas. Five years ago, the sight of half-dissolved Ganpati statues cluttering Mumbai beaches made Rathod determined to minimise her carbon footprint. She began making chocolate Ganeshas which, upon immersion in milk, became the perfect recipe for milkshakes, much to the delight of children in different orphanages where the milkshake is then distributed.
This year, Rathod has upped the ante: she has baked a five-feet tall chocolate Ganpati that weighs a whopping 50 kg. She toiled for over 60 hours on the Ganpati, and will eventually dissolved it in milk to create a chocolate-shake prasad that will be distributed to children across Mumbai.

Figure 7

Social innovation 2 - Thermal Decomposition of Calcium Carbonate:

Calcium carbonate is strongly heated until it undergoes thermal decomposition to form calcium oxide and carbon dioxide. The calcium oxide (unslaked lime) is dissolved in water to form calcium hydroxide (limewater) .

$CaCO_3$ **(s)** ---> CaO (s) + CO2 (g)

Limestone is mainly calcium carbonate, $CaCO_3$. When it is heated, it breaks down to form calcium oxide and carbon dioxide. Calcium oxide reacts with water to produce calcium hydroxide. Limestone and its products have many uses, including being used to make mortar, cement, concrete and glass.

Co2 gas is used by the consumer products that require pressurized gas because it is inexpensive and non flammable , and high concentration of carbon dioxide can also be used to kill pests.

Implication for proposed social innovation by your group

The idea, the process or the material from the social innovation presented above that can be used in the social innovation proposed by your group.

Megha Rathod

Social innovation 1: Thermochemical reduction of pelletized gypsum mixed with carbonaceous reductants

Developed by: SR Motaung1,3*, JN Zvimba2, JP Maree3 and AV Kolesnikov4
1 DST/CSIR National Centre for Nanostructured Materials, Council for Scientific and Industrial Research, Pretoria 0001, South Africa
2 CSIR Natural Resources and the Environment, Council for Scientific and Industrial Research, Pretoria 0001, South Africa
3 Department of Environmental, Water and Earth Science, Tshwane University of Technology, Pretoria 0001, South Africa
4 Department of Chemical and Metallurgical Engineering, Tshwane University of Technology, Pretoria 0001, South Africa
Place: South Africa
Cite Source:
https://www.ajol.info/index.php/wsa/article/viewFile/116166/105696
Description of the social innovation:
The recovery of better-quality waste gypsum during acid mine drainage (AMD) neutralization is one step closer to achieving downstream waste gypsum beneficiation for recovery of valuable materials. This can facilitate recovery of treatment costs and prevention of environmental pollution from gypsum waste-dumps. Thermal reduction using rotary kilns to recover valuable materials from waste gypsum remains a critical and controversial process because of waste gypsum handling problems, environmental pollution due to dust and gaseous emissions and poor conversion yields. In order to mitigate these problems and improve waste gypsum conversion yields, pelletization of waste gypsum in the presence of binders (starch and cellulose) was investigated. A laboratory-scale disc pelletizer was used to produce pellets from a mixture of coal and commercial gypsum or waste gypsum, generated during AMD neutralization, with starch and micro-crystalline cellulose used as binders. The pellets were subjected to high-temperature thermal treatment in a tube furnace to generate calcium sulphide (CaS), an important intermediate for waste gypsum beneficiation.
Keywords: waste gypsum, binders, pelletization, tube furnace

INTRODUCTION

- CaSO4 formed during pre-treatment of acid mine drainage (AMD) with hydrated lime is a resource that can be converted to CaS, an important intermediate for synthesis of a number of calcium compounds including CaCO3, which is a feed stock for AMD neutralization. Other saleable products such as sulphur may also be produced downstream and the recovery of these feed materials promotes the cost effectiveness of AMD treatment.
- Thermal decomposition is the process used for the conversion of waste gypsum (hydrated CaSO4) to CaS, from which saleable products such as CaCO3, MgCO3 and S can be recovered. Starch is composed of carbon, hydrogen and oxygen in the ratio 6:10:5, respectively. pelletized gypsum, coal and laterite mixtures and compared the effects of starch, bentonite and sodium silicate as binders. The authors found that starch and bentonite improved the strength of the pellets. The current study investigated waste gypsum pelletization and the effects of using binders as well as binder content during thermal reduction in a tube furnace.

The kinetic data were measured and a macrokinetic model of the CaSO4 thermal reduction by a mixture of carbon-containing components, formed as pellets, was proposed.

- **MATERIALS AND METHODS**

- **Feedstock**
- Waste gypsum (95.54 %) precipitated during AMD neutralization and commercial CaSO4 (Merck; 98.5%) were used as feed-stocks in this study. Bituminous coal (60% carbon content) of particle size <750 µm from Mpumalanga Province (South Africa) was used as reducing agent by preparing a sample mixture of 2.5:1 C:CaSO4·2H2O molar ratio in the case of commercial CaSO4 and 1.9:1 C:CaSO4·2H2O in the case of the precipitated gypsum. Food-grade starch (Protea Chemicals) and commercial microcrystalline cellulose (Fluka) were used as binders.
- **Equipment**
- A disc pelletizer (Fig. 1) operated at 20 r/min was used to prepare the pellets. An Elite tube furnace with a quartz protective tube was used for the thermal reduction tests. Reagents were introduced in quartz boats into the tube furnace.
- **Experimental procedure**
- A sample made up of coal and commercial CaSO4 in the molar ratio 2.5:1 was divided into 6 portions. The 6 portions were mixed with 0%, 1%, 2%, 4%, and 8%, by mass, corn starch or microcrystalline cellulose (MCC), respectively. These mixtures were pelletized using a disk pelletizer with tap water simultaneously sprayed onto the sample to aid pellet formation. The average moisture content of the pellets was 25%. The moisture content was determined by drying the pellets to a constant mass in an oven with a temperature pre-set at 105°C in an oven.
- The pellets were weighed into quartz boats before subjecting them to high-temperature thermal reduction in the tube furnace. Samples were heated for 5, 10, 15, and 20 min. All of the samples were tested at 900°C, 1 000°C, 1 050°C and 1100°C. Waste gypsum, precipitated during AMD neutralization, was also mixed with coal and 2.9% (by mass; based on the results in Fig. 2) starch and heated in the tube furnace at 900°C, 1 000°C, 1 050°C and 1 100°C. The time intervals were 5, 10, 15, and 20 min for each temperature range.

RESULTS AND DISCUSSION

- **Feedstock characterization**
- Waste gypsum was characterized by XRD and was found to be composed of 95.5% gypsum, 1% calcite and 3.5% hydrated MgSO4 (Epsomite) 1. As much as the carbon content is the main driving force of the carbothermal reduction process, the volatile matter is also expected to influence this reaction since most of the volatiles are composed of hydrocarbons and some sulphur.
- **Starch and cellulose as thermal reduction additives**
- The carbon content of both starch and MCC appear to be beneficial in terms of increasing the conversion of waste gypsum to CaS during thermal decomposition. Therefore, one can conclude that, in addition to improving the pellet's compactness, the two binders, starch and MCC, may also have catalytic effects on the decomposition reaction. In this regard, the addition of starch and MCC as binders is observed to have a positive effect on the conversion of waste gypsum to CaS. thermal reduction of waste gypsum pellets using starch as an additive instead of MCC.

Figure 1
Pelletization of waste gypsum in a disc pelletizer

Table 1
Proximate analysis of coal sample

Parameter	Coal
Inherent moisture (%)	2.9
Ash (%)	12.3
Volatile matter (%)	23.7
Fixed carbon (%)	61.1

Figure 8

- **Macro Kinetic model of gypsum reduction by coal in the presence of starch and cellulose**
  - It was assumed that reduction of CaSO4 to CaS in the pellets, where the mixture of coal starch and cellulose serves as carbon source, takes place in the matrix of carbon-containing materials during gasification of these materials:
- $CaSO4 + 4C \rightarrow CaS + 4CO$ (1)
- $CaSO4 + 4CO \rightarrow CaS + 4CO2$ (2)
- $C + CO2 \rightarrow 2CO$ (3)
- **CONCLUSIONS**
  - This study has investigated pelletization of waste gypsum mixed with carbonaceous reductants as a means of improving handling of gypsum during thermal reduction to recover CaS.In this regard, starch and MCC were observed to exhibit synergistic effects on the thermal reduction of the gypsum-coal pellets.
  - Starch was more effective compared to MCC in terms of improving the conversion rate of waste gypsum to CaS. The study also confirmed that pelletization of waste gypsum is possible and therefore facilitates waste gypsum handling.

Implication for proposed social innovation by your group

- In first social innovation may be our group will take that gypsum pallets and then what chemical equation we get $CaSO4 + 4CO \rightarrow CaS + 4CO2$ (2)

So, we proceed this with water: -

$CaS (s) + H2O + CO2 (g) \rightarrow H2S (g) + CaCO3 (s)$

So, we use CaCo3 for further usages like: -

- Industrial applications
- Health and dietary applications
- Agricultural use
- Household use
- Environmental applications

And we use h2s: -

- Production of sulfur, thioorganic compounds, and alkali metal sulphides
- Analytical chemistry
- Precursor to metal sulphides
- Miscellaneous applications

Social innovation 2: Made from Recycled Paper, These Ganesh Idols Are Safe Environmentally to Immerse in Water Bodies

Developed by: Mumbai-based artist MR. Vaste

Place: Mumbai

Cite Source: https://swachhindia.ndtv.com/made-recycled-paper-ganesh-idols-safe-environmentally-immerse-water-bodies-11206/

Description of the social innovation:

- A Mumbai-based artist is sculpting Ganesh idols using paper waste that doesn't leave behind toxic debris in water bodies after immersion, like the conventional idols made from Plaster of Paris (PoP) do

- 38-year-old Rohit Vaste, a Mumbai-based artist started sculpting eco-friendly Ganesh idols. He uses clay, organic glue and waste paper to build these non-polluting idols.Mr Vaste wanted to sculpt idols which weren't fragile, were light-weight so that people do not face difficulty in handling them and were even environmental friendly. I had heard somewhere that paper when mixed with an organic binder can turn into a hard substance and thus decided to use this method in making paper Ganesh idols, says Mr Vaste.

Paper Ganesh In the Making

- Papers used for making these idols are procured from the local kabadiwalas. So, the process from the very start follows an environment friendly approach by recycling paper. The paper is divided into bits and then mixed with clay to make the dough.
- This dough is then moulded and once the sculpture takes shape, a layer of recycled paper is draped over it again to bind the materials firmly using organic glue. Even the paint used for coating these idols are not toxic in nature.

- The size of paper Ganesh idols can vary between 1 feet and 3 feet and the prices range from Rs 2,100 to Rs 20,000. Consumers can find the product on the artist's online venture 'paperganesh.com'.
- Till now he has sold 350 paper Ganesh idols and has used up about 50 kilos of recycled paper. Currently, these idols are even being exported to other countries.

Advantages of Using Paper Ganesh Idols

- Though the idols are made from paper, the binding is quite strong and the idols are durable and easy to handle. On immersion these paper idols do not leave sludge behind like the PoP ones and it dissolves easily within 5-6 hours. The only residue these idols leave behind is paper pulp, which can easily be collected.
- Rohit Vaste's work has found support from Udaykumar Shirookar, Assistant Commissioner of BMC Ward B.
- He further added, I have also pitched to get CSR (Corporate Social Responsibility) funding for this initiative and people are already coming forward. 1 acre of land in

Figure 9

Mr Vaste sculpting paper Ganesh idol

These paper Ganesh idols can easily dissolve in water within 5-6 hours

- Bhiwandi has been promised to us by one of our beneficiaries as we would need a larger space to build these idols in large number.
- Paper Ganesha idols may not have gained mainstream acceptance to scale up production just yet, but given the urgent need to make our festivals environmentally sustainable, it may be one of the alternatives worth considering.

Implication for proposed social innovation by your group

We will try to spread awareness about this topic.

Degradation of Plaster of Paris

Name	Weight Taken	Time Interval	Results	Uses
HCL [Solid]	10 gm in 13ml HCL Solution	3 weeks	No Decomposition If it is degraded then also its product separation is difficult	Industrial use
HCL [Powder]	10 gm in 13ml HCL Solution	3 weeks	No Decomposition If it is degraded then also its product separation is difficult	Industrial use
Ammonium Carbonate [Solid]	1:1 i.e. 15 ml in 15ml solution and water till dissolved	2-3 Days	Degrades fully	Calcium Carbonate can be used as chalk and ammonium sulphate as fertilizer
Ammonium Carbonate [Powder]	1:1 i.e. 15 ml in 15ml solution and water till dissolved	1-2 Days	Degrades fully	Calcium Carbonate can be used as chalk and ammonium sulphate as fertilizer
Sodium bicarbonate [Solid]	1:1 i.e. 15 ml in 15ml solution and water till dissolved	3 weeks 1 week -: 13.257 2 week -:10.750 3 week -:9.952 4 week -:9.952	Degrades partially but very slow i.e. 1 or 0.5 gm in a week	Landfills
Sodium bicarbonate [Powder]	1:1 i.e. 15 ml in 15ml solution and water till dissolved	3 weeks 1 week -: 12.936 2 week -:9.983 3 week -:9.946	Degrades partially but very slow i.e. 1 or 0.5 gm in a week	Landfills

		4 week -:9.946		

Chapter 4 -: Social innovation to solve the problem identified

By observing all the above social innovation proposed by members of group and by doing group discussion we have decided that we are going to select topic **PLANT FROM GANESHA** on which we would be working on in future. We have decided replacement as it is cost effective and degradation would require very high cost also there are various issues that are if we are degrading POP is generates various other substance which will harm our environment. Our idea Plant from Ganesha is also sold costly in the real market but we will try to make it cost effective by using bio fertilizer or organic also at the end plant is grown which is environment friendly and this will be easily accepted by all people in real world, it will be implemented which is our main goal so that it can benefit society.

Our process for this innovation is as follows;-

- First of all the soil and organic fertilizer is mixed well and then it is moulded into a shape of Ganesha
- Inner side of the idol is empty now, so soil mixture is filled inside and then some seeds of small plants is kept inside the idol.
- Then this idol is placed in a pot.
- Organic colours are used to colour the idol.
- At the end of the 10^{th} day of the festival, the idols undergo a symbolic immersion. Instead of being immersed in a water body, the idol is placed in an accompanying pot and watered until it dissolves
- Just pour some water regularly at some intervals for 3-4 days the idol will dissolve and a new plant will grow from seeds which were inserted in idol.
- Also many of us feel sad after the immersion(visarjan) of Ganesha so due to this idea we can also make Ganesha part of our family even after 11 days

Chapter 5 -: Learning from KHOJ

Name: Himani Patel **ID: 16163014**

Program: BSC

Ever since my first day at the university, the course "KHOJ' had been much hyped. At our orientation all the faculty members and the provost mentioned KHOJ at least once in their respective speeches and why not? After all KHOJ is the pride and trademark of the university along with the ID courses.

At the start of this semester I was very apprehensive about KHOJ having heard all the horror tales from our seniors and thinking about all the work that was going to be in front of me. Now as we have almost reached the end of the semester and our Journey of KHOJ has neared its end. And I am glad to say my initial thoughts about KHOJ were for naught.

The journey was full of ups and downs, for some it was tiring for the others it was a breath of fresh air but in my opinion there is one thing we can all agree upon that is it was very informative and it taught us a thing or two, so here is a list of things that I learned from KHOJ:

1. **Things learned from community visit:** The very first task for KHOJ was community visit. That is choosing an area, identifying the problems in that area and selecting any one problem to solve amongst them, for me this task presented plenty of learning opportunities as I have a reserved personality interacting with people and leaving my comfort zone is difficult for me. The real challenge was interacting with the people of community. Although initially we got no response we eventually struck up a conversation with a passerby living in vicinity that's where I made an attempt to converse although i kept on stuttering with the help of my group members I was able to get the information I needed, Also community visit was an eye opener to the conditions that the people still live-in in modern India.
2. **Things learned from developing social innovation:** Thinking about all the possible solutions to a problem made me realize just how many approaches there can be to the same concept, it reignited the scientific curiosity in me which was buried deep by the years of theoretical classes. The drive to find the most effective and innovative solution. To find the perfect solution we had to do a lot of reading on the topic
3. **Skills learned through KHOJ:** The thing I liked most about KHOJ was that it was full of learning opportunities and I got to know and even learn various skills like:

Teamwork: A group of 8 individuals, having different personalities, believes and views the main thing I learned was setting aside the differences to work as one single unit.

Responsibility: And I'd say all the group members had their own responsibilities, the work they were assigned in a way all giving something for the group , The individual took responsibility of his/her actions regardless of the outcome.

4. **Challenges Faced:** As enjoyable as KHOJ was it wasn't always a bed of roses there were many hurdles across the way, and I am glad we sailed through them.
5. **'How will such social engagements help you and society?":** The main idea behind KHOJ was to create a social innovation that will help society as well as develop something new and innovative, our social innovation aims helping people. Social engagement such as this can help us make a better tomorrow for future generation by using clean eco-friendly sources.

Name: HARDIK RAMI **ID: 16163015**

Program: BSC

1. **Things learned from community visit:** we were divided in groups for our KHOJ project with BCA students. The very first step of learning was interaction with other program students. We communicated and tried to select a place for our community visit. I learned how to keep other members choice in mind while working. We selected Tarsali area for our community visit. From the community visit I learned that how the idols made of plaster of paris were extensively made and sold in the market without thinking about the environment and what harm it is causing to the water bodies. Out of so many problems which all seems genuine and needed attention we had to pick one problem. So I learned how to identify a community's problem and its causes. I learned how to interact with people in that particular area and how to convince them to open up with us and share their problems.
2. **Things learned from developing social innovation:** The problem we picked was the idols made of POP and what can be the alternative of POP. POP being very easily available and due to its easy making these idols are widely used. So we decided to make a idol made of black soil. During the process of making the idol made of black soil we decided that we will put some seeds into the idol and some fertilizer in the soil while making the idol. While interaction with our mentor I learned how to think for the formulation and give ideas.
3. **Skills learned through KHOJ:** There were many things I have learned from the KHOJ project. It really helped me to enhance my way of thinking and to put my ideas into work. Managing time was one of the factor I have learned very well.

Groupwork: The major learning throughout the KHOJ was working in a group. Agreeing with the rest of the members. I have learned how to distribute the work among the group members according to their capability. I also learned how to cooperate with the members and to let them know if I was not satisfied something they suggested in a good way. The project which we done wouldn't be possible if we didn't worked well as a group, as a team properly.

Going through research paper: we studied and went through so many research paper which guided a lot for our work. I learned how the formulations were already made and the skills and idea they used to make their product much more unique from the rest of the ideas.

Managing the products quantity: we had limited quantities of every product we decided to use for making our formulation. So I learned how to manage the quantities while making the formulation with the help of other members.

4. **Challenges Faced:** using our brain in a right direction was a real task. We firstly decided that we would go with the red soil but after some research we came to know that red soil is not appropriate as the black soil so we decided to go with the black soil. Then we have to make something which was new and innovative so we put the seeds into the black soil while making. At first we made a trail by all the things we mentioned above then we came to know that we are on the right track.

Then came the immersion of the idol part, which was quite challenging for us. Black soil used for making the idol was easily dissolving in water so we decided to take a plant pot and we added normal soil into it and then we put the idol in it and poured water on the idol due to this the seed already present in the idol were mixed with the soil present in the pot and by regularly giving water to that seed we were able to see a small plant growing from it.

5 **'How will such social engagements help you and society?" :** The main idea behind KHOJ was to make something innovative. So by keeping in mind that we had to make something innovative we decided to make a idol made of black soil which contains some seeds in it which is ecofriendly and doesn't harm any surrounding. We haven't used any such chemical which can be a threat to any one and specially to the environment. We have tried to make our idol free from harm.

The social innovation helped me to utilize the theoretical knowledge in to practical work.

Name: Shreyash Kadam **ID: 16163017**

Program: BSC

1 What have you learned from community visit?

- How to talk to various persons of various profession and gain knowledge from them
- Understand nature and behavior of different people
- New experiences and increase interest in finding solution of problem on common topic which we face in our day to day life
- Broader understanding of society
- How to frame questions on the spot according to problem

2 What have you learned in the process of developing social innovation?

- Many innovation happened in our society which are very brilliant but due to lack of knowledge didn't know of them got to learn about them
- We also can implement those happened innovation but to do that we need to work little hard but in front of that we will get huge benefit without harming our environment
- Gain knowledge on various topics
- Got inspiration of doing innovation just need to think in little out of the way

3 Name some skills that you got to know about and learned as you worked on Khoj.

- **Team management**
- **Time management**
- **Work Distribution** - Identifying the skills of people and work should be allotted accordingly so that they do it by enjoying the work in given time
- Most of time there is a person in a group who don't do any work just sit and listen so how to motivate that person **how to get our work done** from them I got that skill
- **Goal Planning**
- **Enhance Report making skills**

4 Name some challenges that you faced and how you overcame the challenges.

- Thinking of every person is different in group, also not done any work with anyone of them so there are always mismatch of views and conflicts arise. To solve this many times we have sit long back and discuss and explain the views again and again.
- Some person come just to attend or just to pass away the class not to get deep learning or to score high marks so to solve this challenge I have taken help so my superior or mentor.
- Problems in free slot or free time as our group i.e. BSc was paired with BCA so there whole timing and schedule is different so to overcome this issue we have to meet in lunch break, after college or in weekends

5 How will such social engagement help you and the society?

- This subject is not theory based it is practical based it will benefit us in our day to day life.
- This will definitely help us and society as the Khoj's main aim is to create a innovation that will not harm society as well as benefit our society or environment somehow

- So because this type of teaching this subject it will be beneficial for us as it will develop or create a habit for to think something new.
- Our selected project is also on similar factors only as after immersion the plant is grown which will benefit the society.
- So finally to say that if we learn from this subject and develop our thinking habit to do innovation for society it will be helpful for everyone.

Program: BSC

Learning from the visit.

- Khoj is a course in our university in which we are supposed to visit community, identify the problem and find the solution. I have learnt many things from this course like how to interact with people, how to convince them to open up about their problems.
- I learnt how to keep other people choices in mind while working with them.
- I learnt about many social problems and their living conditions

Learning in process of developing social innovation.

- In developing social innovation I have learnt how to think creatively and innovatively in order to find out the solution to the problem, how to work out things and distribute things equally in the group.

Some skills that I got to know about and learned as worked on khoj.

- The major learning throughout the khoj was working in the group
- It really helped me to enhance my way of thinking and to put my ideas into work.
- Managing time was one of the factors in learned very well in working with group and how to coordinate with every member of the group

Some challenges that we faced and how we overcome challenges.

- The biggest challenge was the time management that all of faced during the community visits and social innovation as there are people from different fields who have different college timings so we distributed the work amongst every member in the group this is how we overcome the challenge.

How will such social engagement will help you and the society?

- As our topic is eco friendly ganesha made of red soil which can be used as biofertilizer it will help society as idols made of POP doesn't decompose in the water after visarjan it also harms the environment so this is the best substitute as we can grow plants after visarjan at our home and it is also affordable and it also represents our culture.

Name: Nikita shukla Id : 16163019

Program : BSC

1 What have you learned from community visit?

Community visit is our 1st task for KHOJ. That is we have to go any slums area and asking them the problems which they are suffering. And try to solve that problem. that was amazing experience for me because I did it first time. There are so many things that I learned In community visit. I interact with new people and try to understand them try to understand their problems etc. we were going to danteshwar area and asking problems to makers of ganpati about ganpatis idol of POP. They are also interact with us very politely. I really enjoy this task.

2 What have you learned in the process of developing social innovation

For complete this task and find to perfect solution of our problem we really had to do hardwork we had a lot of reading and we also gain a lot of knowledge and its good thing in the task. We leaned so many types of eco-friendly ganpatis idol innovation. And also we did the laboratories work for this innovation.

3 Name some skills that you got to know about and learned as you worked on Khoj.

We learned so much things in KHOJ session but mainly the most important is **GROUPWORK** I learnd how our group is handle this all things and do work on time and also we learned **TIME MANAGEMENT** how to complete our work in particular time and yes we did it sincearly and submit all our project on timing.

The another thing which I learned that is **RESPONCIBILITY** and **DOCUMENTATION**

4 Name some challenges that you faced and how you overcame the challenges.

Firstly Our project on decomposition of pop In water.but its too difficult to find we try to find innovation on this but we can't we did so many reagent we took HCL, ammonium carbonate and sodium bicarbonate but not getting a perfect result so this was I think challengeable for me and my group members

5 How will such social engagement help you and the society?

The main thing about KHOJ is to make something innovative. So our idea is making black soil ganpatis idol rather than pop's idol because pop is harmful for environment and animals so we took black soil and seeds of tulsi and make a ganpati. At the end of the 10-day festival, the idols undergo a symbolic immersion. Instead of being immersed in a water body, the idol is placed in an accompanying pot and watered until it dissolves. And that is good for environment.

Name: Aakash Tiwari **ID: 16163020**

Program: BSC

- **Things learned from community visit:**

We were divided in groups for our KHOJ project with BCA students. The very first step of learning was interaction with other program students. We communicated and tried to select a place for our community visit. I learned how to keep other members choice in mind while working. We went to a place where idols of lord Ganesha`s were made near Tarsali Bypass. There we observed that the idols made of Plaster of Paris were extensively made and sold while the idols made of soil were very few in numbers and some where they were not made only because plaster of paris can easily be moulded in any shape and it is not affected by the heat of the sun and other climatic change happening around. So we decided that we will make idol made of soil which will be cost effective and we will do something innovative in that idol which will be helpful to the environment. So I learned how to identify a community's problem and its causes. I learned how to interact with people in that particular area and how to convince them to open up with us and share their problems.

- **Things learned from developing social innovation:**

The problem we picked was the idols made of POP and what can be the alternative of POP. POP being very easily available and due to its easy making these idols are widely used. So we decided to make a idol made of black soil. During the process of making the idol made of black soil we decided that we will put some seeds into the idol and some fertilizer in the soil while making the idol. While interaction with our mentor I learned how to think for the formulation and give ideas.

- **Skills learned through KHOJ:**

There were many things I have learned from the KHOJ project. It really helped me to enhance my way of thinking and to put my ideas into work. Managing time was one of the factor I have learned very well.

Groupwork: The major learning throughout the KHOJ was working in a group. Agreeing with the rest of the members. I have learned how to distribute the work among the group members according to their capability. I also learned how to cooperate with the members and to let them know if I was not satisfied something they suggested in a good way. The project which we done wouldn't be possible if we didn't worked well as a group, as a team properly.

Going through research paper: we studied and went through so many research paper which guided a lot for our work. I learned how the idols of soil were already made and the skills and idea they used to make their product much more unique from the rest of the ideas.

Managing the products quantity: we had limited quantities of every product we decided to make very carefully. So I learned how to manage the quantities while making the idols with the help of other members.

- **Challenges Faced:**

We firstly decided that we would go with the red soil but after some research we came to know that red soil is not fertile as the black soil so we decided to go with the black soil. Then we have to make something which was new and innovative so we put the seeds into the black soil while making. At first we made a trail by all the things we mentioned above then we came to know that we are on the right track.

Then came the immersion of the idol part, which was quite challenging for us. Black soil used for making the idol was easily dissolving in water so we decided to take a plant pot and we added normal soil into it and then we put the idol in it and poured water on the idol due to this the seed already present in the idol were mixed with the soil present in the pot and by regularly giving water to that seed we were able to see a small plant growing from it.

- **'How will such social engagements help you and society?"**

  The main idea behind KHOJ was to make something innovative. So by keeping in mind that we had to make something innovative we decided to make a idol made of black soil which contains some seeds in it which is ecofriendly and doesn't harm any surrounding. We haven't used any such chemical which can be a threat to any one and specially to the environment. We have tried to make our idol free from harm.

The social innovation helped me to utilize the theoretical knowledge in to practical work.

Hiren Parghi **Id - 16102009**

Program B.C.A

1. What you have learned from the visit?

I have learned about many social problems and living conditions of people from the community visit.

We came to know that people are living in a very harmful and dangerous environment. Some people have not to access to safe drinking water. We came to know that our surroundings should be taken care of.

2. What you have learned in the process of developing social innovation?

- I came to know about the work, ethics and overall process of social innovation
- How first the problem is identified and what are the possible outcomes for that
- Is it the developing product is affordable or has any side effects
- The product or service we are offering is it doing it a job?

3. Name some skills that you got to know about and learned as worked on Khoj?

- As a part of a team member in Khoj, I came to know about some chemistry work that how one substance is mixed with another to make an output.
- How to interact the other people living in totally different conditions than ours.

4 .Name some challenges that you faced and how you overcame the challenges?

We as the whole team had faced a few challenges

- As going on community visit we were much feared to talk to people about their surroundings and problems and we overcome that challenge by really talking to them
- We were not able to decide whether which mixture should be used to make repellent as we have so many choices and we overcame that by experiment and on the basis of cost-effectiveness.

5 .How will such social engagement will help you and society?

I came to know about the social conditions which are ongoing in the same city where I live and by knowing their problems the society can also get help from this dangerous condition.

In the future, I can help people with this type of situation which beneficial for both.

Megha Rathod **Id - 16102010**

Program - B.C.A

1 What have you learned from community visit?

The first task for KHOJ was community visit. That is choosing an area, identifying the problems in that area and selecting any one problem to solve amongst them the people those who are living in the community are having many problems especially in the rural areas. There were many such problems identified such as poor roads, blocked drains and also including the problem on which we are working. And also, railways station and hospital condition we see that they actually need to attempt some new ideas for people. We also visit area where people make Ganpati idol. Where I made an attempt to converse although i kept on stuttering with the help of my group members I was able to get the information I needed, also community visit was an eye opener to the conditions that the people still live-in in modern India.

2 What have you learned in the process of developing social innovation?

Thinking about all the possible solutions to a problem. The drive to find the most effective and innovative solution. To find the perfect solution we had to do a lot of reading on the topic and now I think I know more about POP and Ganpati idols and how to degrade POP and use of soil idols. I learned that why people prefer pop idols but now people change their mentality and moving for eco-friendly solution.

3 Name some skills that you got to know about and learned as you worked on Khoj.

As a part of a team member in Khoj, I came to know about some chemistry work that how one substance is mixed with another to make an output. How to interact the other people living in totally different conditions than ours.

Time management: Everything had a definite time limit so it was really necessary to organize work in such a way that it was manageable in the given time.

Team work : In KHOJ as we were divided into a group of 8 individuals, having different personalities, believes and views.

Responsibility :I'd say all the group members had their own responsibilities, the work they were assigned in a way all giving something for the group , The individual took responsibility of his/her actions regardless of the outcome. This is what KHOJ thought me.

4 Name some challenges that you faced and how you overcame the challenges.

We as the whole team had faced a few challenges

- As going on community visit, we were much feared to talk to people about their surroundings and problems and we overcome that challenge by really talking to them

- We were not able to decide whether which mixture should be used to make repellent as we have so many choices and we overcame that by experiment and on the basis of cost-effectiveness

5 How will such social engagement help you and the society?

The main idea behind KHOJ was to create a social innovation that will help society as well as develop something new and innovative, our social innovation aims at protecting nature as well as helping people. Social engagement such as this can help us make a better tomorrow for future generation by using clean eco-friendly sources.

The innovations like KHOJ can help us progress in that way.

Our social innovation will help environment.

It will help me by giving me satisfaction at finally having contributed something to society.

Chapter 6 -: Bibliography

- ✓ **Video link of this social innovation:-**
  https://www.youtube.com/watch?v=cuFb1xL2DXg
  https://www.youtube.com/watch?v=oQCp4tN4Mzk

- ✓ http://www.ecoshreeganeshaarts.com/

- ✓ https://www.indiamart.com/ecoshreeganeshaarts/profile.html

- ✓ **GIF of the desolation of idol**

  https://giphy.com/gifs/rvlujV5xDS3PW

- ✓ **https://www.enotes.com/homework-help/what-net-ionic-equation-this-caso4-hcl-379680**
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- ✓ **https://www.huffingtonpost.in/2016/09/05/9-innovative-ganpati-idols-that-give-an-eco-friendly-touch-to-ga_a_21465601/**
- ✓ **https://timesofindia.indiatimes.com/city/pune/Scientists-find-green-solution-for-PoP-idols/articleshow/48474877.cms**
- ✓ **https://www.youtube.com/watch?v=Uu1HwQ-xY6I**

Concept Note

Khoj – Autumn, 2018

Group 12

Faculty Mentor: Dr.Brijesh Shah

Sr no.	Name of the student	Enrolment Id	Program
1.	Meet Patel	16163079	Bsc
2.	Minurani Jadhav	16163080	Bsc
3.	Mansi shah	16163081	Bsc
4.	Darshita Patel	16163083	Bsc
5.	Dhaval Parmar	16163084	Bsc
6.	Nikita Mehta	16163085	Bsc
7.	Urvil Patel	16102031	BCA
8 .	Abhishek Patel	16102032	BCA

- **COMMUNITY SITES VISITED:-**

Sr. No.	Site	Day/Date	Duration	Members
1.	Akota slum	15/08/2018 Wednesday	3hr	Darshita , Mansi, Nikita , Meet
2.	Aashapuri village, Gotri Sevasi	19/08/2018 Sunday	2hr 30min	Meet, Mansi, Darshita, Minurani, Nikita, Abhishek, Urvil, Dhaval
3.	Cattle Herd, Ajwa	18/08/2018 Saturday	1hr	Mansi, Meet, Darshita, Nikita, Minurani
4.	Jamnabai Hospital, Mandvi	22/08/2018 Wednesday	1hr	Nikita, Darshita, Mansi, Minurani, Dhaval, Abhishek, Urvil, Meet
5.	GIDC Makarpura	22/08/2018 Wednesday	45 mins	Meet, Minurani, Mansi, Nikita, Dhaval, Darshita,
6.	Nursery, Jail road	19/08/2018 Sunday	30 mins	Meet, Mansi, Darshita, Minurani, Nikita, Abhishek, Urvil, Dhaval

- **ROLES AND RESPONSIBILITIES OF EACH MEMBER:-**

Sr no.	Roles Of Member	Name Of Member
1	Interview	Nikita , Mansi, Darshita
2	Observations	Darshita, Mansi, Nikita, Meet, Minurani, Dhaval
3	Notes	Mansi, Darshita, Meet, Nikita
4	Photography	Darshita, Abhishek, Urvil, Dhaval, Minurani, Mansi, Nikita, Meet

- **CONDUCT OF COMMUNITY VISIT:-**

VISITED SITE: - AKOTA SLUM

- **Number of stakeholders interviewed**- 10
- **Duration of interview per person**- Each interview was around for 10mins.
- **List of question asked:-**
  1. How long do you stay here?
  2. How many members are there in your house?
  3. Where do you dispose your garbage?
  4. Is there any garbage pit near this area?
  5. Is there any proper drainage system?
  6. Does your drainage system overflow? And if happens, does it long time to get settle on?
  7. Does municipal water come regularly?
  8. Is that water drinkable or not?
  9. How do you store it? And for what purpose you use that water?

VISITED SITE: - AASHAPURI VILLAGE

- **Total person interviewed**: - 15
- **Duration of interview**: - 5 to 10 mins per interview
- **LIST OF QUESTIONS**:-

1. How long have they lived in that area?
2. Do they have proper drainage system?
3. Is there any proper garbage disposal done?
4. Does every house have gas connection?
5. Does every house have municipal water connection?
6. Do any of them have bore system or hand pump?
7. Do you have drinkable water?
8. Does anyone get diseases due to puddle water causing growth of insects?

VISITED SITE:- CATTLE HERD, AJWA

- **Total person interviewed**:- 5
- **Duration of interview:-** 10 to 15 mins per interview
- **List of question:-**

1. How many cows are being sheltered here?
2. Do you order food from outside or you have your own farm?
3. Which type of food you give them?
4. How many times you feed them?
5. Do you have proper drinkable water system for them?
6. How do you collect and where do you use cow dunk?
7. Do you proper cow urine collection?
8. How do you take care of injured cows or cows having diseases?

VISITED SITE:- NURSERY, JAIL ROAD

- **Total person interview:-** 1
- **Duration of interview:-** 15 min
- **List of questions**

1. From where do these plants come from?
2. Do you add any additional fertilizers in your pests?
3. Where do you dispose the dead plants?

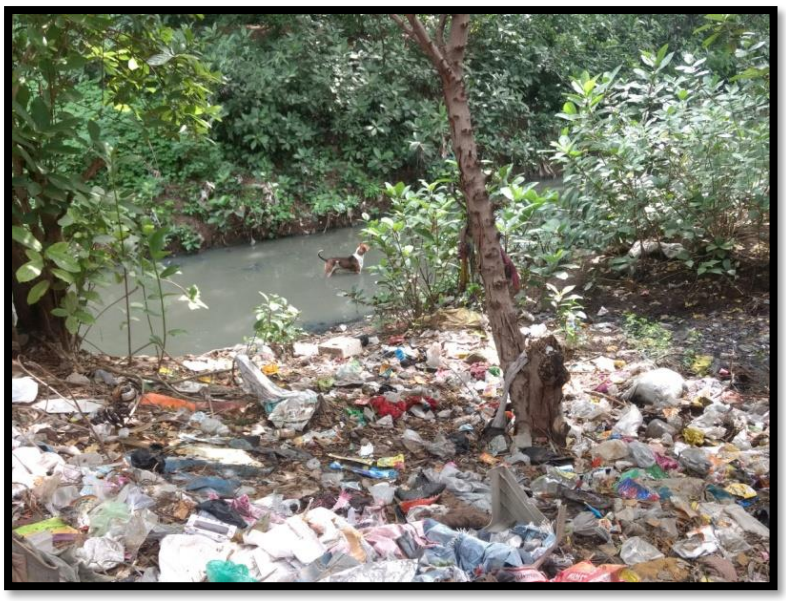
- **PROBLEMS IDENTIFIED IN AKOTA SLUM : -**

1. Lack of proper disposal of waste

- Interview: By the interaction with the following stakeholders, we got to know that there was no proper system for dumping the garbage.

- Observations:
  I. We observe that there was open garbage system.
  II. Wet waste and dry waste were disposed together.
  III. There was no personalized garbage pits. They used to burn the garbage altogether.

- Photographs:



INTERACTIONS:

2. Impurities present in water making it unhygienic for any kind of usage.

- Interview: Even with intermittent supply of water, the water that was received had many particulate suspensions, impurities, and was hard water. They thus used to store that water in containers from which more solid impurities were added to the water. The same water was then used for multiple uses in the house.

- Observations:

  I. Due to lack of proper water facility, they used to store and use same water for household purpose, toilet purpose, and moreover for drinking purpose too.
  II. These cause the addition for various diseases like typhoid, cholera and dengue.
  III. Boiled water was not preferred though the water was undrinkable.
  IV. Water overflow was observed.

- Photographs:

3. Issue caused due to cattle:

- Observation:-
  I. Cattle sitting on narrow lanes excreting out their dung causing bad smell.
  II. Flies sitting on their dung spread unhygienic to the nearby place.

- Photographs:

- **CONCLUSION:**

  Hence, from the above problems we get to know that the common problem occurring was the unhygienic conditions caused due to various issues of water, dung, and waste leading to several chronic and acute diseases to the localized. As water fulfils all the daily necessities to the people, moreover the issue of water more prevailing amongst the other issues it should be taken into consideration.

- **PROBLEM SELECTED:**

  IMPURITIES IN WATER MAKING IT UNHYGIENIC TO BE USED ON A DAILY BASIS

  We have selected this problem because water is a basic necessity in our daily life and most of disease and deficiency root back their origination to dirty and polluted water. This impure water issue is noticed prominently in most of villages and slum areas. Though it is a common issue, it is often overlooked and no solution to it brought. Hence, it is of prime importance to find ways to remove the impurities from the polluted water in parts or as a whole to make the water fit for use in one or all of its applications.

Title: All-Natural Mosquito Repellent Eco Gel

Report

For KHOJ (PS310) Autumn 2018

Concept Note: (GROUP 9)

Faculty Mentor: Dr. Amit Patwa

Sr. No	**Name**	**ID**	**Program**
1.	Hetvi Patel	16163063	BSc
2.	Rajvi Joshi	16163061	BSc
3.	Dhruvi Patel	16163062	BSc
4.	Dhairya Buch	16163065	BSc
5.	Priyanka Parte	16163057	BSc
6.	Dilshadbanu Mahida	16163059	BSc
7.	Bhargav Borse	16102023	BCA
8.	Swapnil Patel	16102024	BCA

Table of Content:

COMMUNITY VISIT

Chapter 1: Community Visit

SITE 1: L&T Circle

A Lane beside LINDE Company, near L&T circle, Karelibaugh Vadodara

15th August, Wednesday

DURATION OF HOURS: 1 HRS

NO. OF TIMES VISITED: 1 TIME

SITE 2: SAMA-SAVLI

Farmland near Dumaad Chokdi, Sama-Savli, Vadodara

21st August, Wednesday

DURATION OF HOURS: 2 HRS

NO. OF TIMES VISITED: 3 TIMES

SITE 3: VASNA GAAM

Indira Colony (Baawdi) Vasna, Bhayli

24th August, Friday

DURATION OF HOURS: 2 HRS

NO. OF TIMES VISITED: 1 TIME

All Field visit done by: Hetvi Patel, Rajvi Joshi, Dhruvi Patel, Dhairya Buch, Priyanka Parte, Bhargav Borse

ROLES AND RESPONSIBILITY OF EACH MEMBER:

INTERVIEW: Hetvi Patel, Rajvi Joshi, Dhairya Buch

PHOTOGRAPH: Dhruvi Patel

NOTES FROM INTERVIEW: Priyanka Parte, Bhargav Borse

CONDUCT OF COMMUNITY VISIT:

QUESTIONS ASKED:

1. How long have they been living in that place/area?
2. What comprises of their daily routine?
3. What kind of problem they face on daily basis?
4. What have they done to overcome these problems?
5. Have those problems really worked?
6. How many children live there?
7. Do they go to school?
8. How often they get power cuts/water cuts?
9. What most people do there for a living?
10. What do they do to maintain personal hygiene?

STAKEHOLDERS (PERSON) INTERVIWED: 4-5 people on each site were interviewed for about 15-20 minutes.

SITES PHOTOGRAPHED: Damp Roads, Stagnant water in the Drains, Filthy Living Conditions, Housing Conditions, Dumped Garbage, Insect Fuss and Unwanted Weeds

PROBLEM IDENTIFIED:

SITE 1: L&T Circle (Lane beside Linde)

Problem 1: Mosquito Problem, Garbage Dumping, Odd Water Timings

Basis of Identifying this Problem: Through Observation we noticed that due to the dumping ground in front of the houses, mosquitoes prevailed a lot. Due to this the people living there got sick frequently. People living there are prone to a range of potentially fatal diseases.

SITE 2: Farmland, Sama-Savli

Problems: Unwanted growth of weed, Farmer Illiteracy

Basis of Identifying this Problem: When we visited Rameshbhai Vaghela's Farmland, we noticed excess growth of weeds on the land. On interaction with the farmer, we came to know that these weeds have been growing double the amount each time he cuts them. Also, he has no knowledge about that weed or its uses. He told us that he cannot afford chemicals that would eradicate these weeds hence, he just lets them grow.

SITE 3: Indira Colony (Baawdi), Vasna, Bhayli

Problems: Poor Housing Condition, Insect fuss

Basis of Identifying this Problem: Due to Poor Housing Conditions they complained about suffering from severe weather changes such as, during summer as their houses are rooftops were made of metal plates the houses heated up and they had to face harsh summer. Also, the most common problem i.e. Insect fuss. There is a major mosquito problem in the area. Due to stagnant water on roads, a lot of insects create problem there. Therefore, residents are prone to potentially fatal diseases.

Description of the Problem Identified

Chapter 2: Description of the Problem Identified

PROBLEM SELECTED:

Mosquito Problem and Natural Use of Weed:

We decided to combine the two problems that we saw among the residents. Therefore, we thought to make an “Eco Gel” using the same weed that the farmers want to eradicate and don’t know any use of.

REASON OF SELECTING THE PROBLEM:

As, we know the most common problem people face today is of Mosquitoes and diseases like Dengue and Chikungununya are spreading like a wild fire. Therefore, to make a small contribution to this problem to those who cannot afford to buy products like Odomos or Good-night, we thought to make an all-natural product.

Literature Survey

Chapter 3: Literature Survey

Name of Student: Rajvi Joshi

ID: 16163061

Program: BSc Biochemistry

Title of Social Innovation:

1. Mosquito Repellent:

Concept by: Dhara shukla, Samudrika Wijayapala and Padma S Vankar

Materials and Method: Collection of leaves of Lemon grass (Cymbopogon citrates L.), Lantana, Calotropis and Neem were collected from Horticulture Department of IIT Kanpur, India. 175 gms of air dry lemon grass material were taken, after soxhlet extraction and evaporation of the solvent yielded 57 gms of the extract .Maddar (Calotropis procera) plant leaves were taken as a raw material weighing 175 gm. Neem (Azadirachta indica) plant leaves and Tulsi (Ocimum sanctum L.) plant leaves, flowers, branches and stem (except root) were taken as a raw material weighted 227 gm. extraction of these raw materials was carried out in methanol (3 cycles).Methanol was removed through rotavapour bath at 80 °C. Compound recovered was 90 ml. The calculation was done by the time elapsed by repellent application and the first mosquito bite for each dose. Aedes aegypti mosquito was the species which was used in the study.

2. Chickweed:

Chickweed is excellent for the skin both internally as a demulcent and externally as an emollient. It has a cooling and drying effect on wounds and skin eruptions. Minor burns respond nicely to chickweed's care. It is best used to soothe itchy and sore skin conditions. Modern herbalists prescribe it for skin diseases, bronchitis and period pain. The weed was used by the "Ainu" for treating bruises and aching bones. Stems were steeped in hot water before being applied externally to affected areas.

Advantage of the New Solution:

- It has no side effects on skin.
- It is cost effective.
- The raw materials used in the preparation of gel are easily available.
- The preparation method and duration is very straightforward and less time consuming.

References:

http://www.dipterajournal.com/pdf/2018/vol5issue1/PartA/4-6-17-974.pdf

https://www.thepracticalherbalist.com/holistic-medicine-library/chickweed-skin-rejuvenator/

Name of Student: Hetvi Patel

ID: 16163063

Program: BSc Biochemistry

Title of Social Innovation:

1. Catnip repels Mosquito more effectively:
   Concept by: Chris Peterson, Ph.D. and Joel Coats, Ph.D. (Iowa State University)

Researchers report that nepetalactone, the essential oil in catnip that gives the plant its characteristic odour, is about ten times more effective at repelling mosquitoes than DEET — the compound used in most commercial insect repellents.

Method: Peterson put groups of 20 mosquitoes in a two-foot glass tube, half of which was treated with nepetalactone. After 10 minutes, only an average of 20 percent — about four mosquitoes — remained on the side of the tube treated with a high dose (1.0 percent) of the oil. In the low-dose test (0.1 percent) with nepetalactone, an average of 25 percent — five mosquitoes — stayed on the treated side. The same tests with DEET (diethyl-m-toluamide) resulted in approximately 40 percent to 45 percent — eight-nine mosquitoes — remaining on the treated side.

Nepetalactone is about 10 times more effective than DEET because it takes about one-tenth as much nepetalactone as DEET to have the same effect. Most commercial insect repellents contain about 5 percent to 25 percent DEET. Presumably, much less catnip oil would be needed in a formulation to have the same level of repellency as a DEET-based repellent.

2. Violas (Edible with medicinal uses):

Violet is cooling and moistening, and is used internally as a blood cleanser and lymphatic stimulant. It is taken as a tea or syrup, and can also be eaten for its medicine. The exact dosage is not especially important since it can safely be consumed in large quantities. As a gentle food herb, violet is generally safe for elders, youngsters, and people who are taking pharmaceuticals. Violet has a rich tradition in Europe, where it has been used for centuries as a pulmonary remedy for dry hacking cough. It is often recommended for bronchitis and whooping cough, along with the roots of marshmallow (*Althaea officinalis*) and licorice (*Glycyrrhiza glabra*). Violet can also be used as a tonic for chronically swollen lymph nodes. As with many other herbs with an action on the lymphatic system, it has a long tradition of use in the treatment of cancer.

Topically, violet is used as a poultice, compress, infused oil and salve in the treatment of dry or chaffed skin, abrasions, insect bites, eczema, varicose veins and haemorrhoids. It is cooling, soothing and anti-inflammatory.

Advantage of the New Solution:

- A gel based product are compatible with most skin types.
- Some people prefer a gel moisturizer texture over a cream or oil due to its lightweight consistency and refreshing feel on skin.
- The weed is not allergic to most of the skin types.
- It soothes skin from itching, rashes etc. by providing a cooling effect on skin.

References:

https://www.sciencedaily.com/releases/2001/08/010828075659.htm

https://chestnutherbs.com/violets-edible-and-medicinal-uses/

Name of Student: Dhruvi Patel

ID: 16163062

Program: BSc Biochemistry

Title of Social Innovation:

1. Weed as Mosquito Repellent:

Weed plants like Citronella grass has been serving from years as a mosquito repellent in the field of ancient and modern medicine. Commercially available mosquito repellents are chemical based and disastrous to human health. An attempt has been made to prepare a 100% herbal product based on Citronella leaf remains which is left out and of no use after steam distillation. It is cheap, effective and environment friendly. It is a first and preliminary work based on formulating and evaluating herbal mosquito repellent cakes using natural binders such as neem powder, potato starch, corn starch, coconut shell powder, wood powder and cow dung. The efficacy of prepared citronella leaf cakes were evaluated on three different parameters such as flammability, burning time and mosquito repellency test. Also, the cakes were sprayed with different concentrations of Citronella oil. Based on the results obtained from these parameters, the residual percentage of each combination of cakes was calculated and it suggested that Neem powder cake has the most effective repellency activity when impregnated with 10% Citronella oil. There are other plants which are used as naturally mosquito repellent are: Lemon Balm, Catnip, Marigold, Basil, Lavender, Peppermint, Garlic, Pennyroyal, Rosemary, Geraniums. By breaking the leaves of these plant and rubbing their oils directly on

the skin can amplify their positive effects on beating mosquitoes, plus some plants like lavender are good in smell.

2. Medicinal value of some weeds:

Gumma (Leuclas aspera) Used in snake bite
Oil of Piwals dhotra – Useful against skin disease.
Maka (Eclipta erecta) - Against cough and as hair oil.

Advantage of the New Solution:

It is easy to prepare.

The gel based formulation works as a coolant for skin.

It is cost effective.

References:

http://www.agriinfo.in

http:/www.researchgate.net/

Name of Student: Dhairya Buch

ID: 16163064

Program: BSc Biochemistry

Title of Social Innovation:

1. Mosquito Shoo Geranium:

Mosquitoes kill more people every year than any other creature (including humans-murderers). And every person who prepares for an epidemic breakout should take into consideration at least some protection against these disease carriers.

When a leaf is crushed and rubbed on the skin, it smells wonderful and helps naturally repel mosquitoes. You can also just cut some and place them on your doorstep to repeal mosquitoes from entering your house, and enjoy a summer breeze.

2. Bog-Myrtle (or Sweet Gale)

The foliage has a sweet resinous scent and is a traditional insect repellent, used by campers to keep biting insects out of tents. Ageratum also known as Floss flowers, Ageratum emits a smell which mosquitos find particularly offensive. Ageratum secretes coumarin, which is widely used in commercial mosquito repellents.

Advantage of the New Solution:

- Cost will be less
- Less time consuming preparation.

References:

http://www.askaprepper.com/mosquito-repelling-weeds-that-you-can-plant-this-spring-in-your-backyard/

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Name of Student: Priyanka Parte

ID: 16163057

Program: BSc Chemistry

Title of Social Innovation:

1. Weeds:
    - Horsetail—primeval plant that produces its own vitamin D & is high in silica; tops are very similar to & may be eaten like asparagus
    - Lamb's quarters—leaves and shoots, raw, also prevents erosion, also distracts leaf miners from nearby crops
    - Blackberry—blackberries are delicious but they form thorny thickets when dead, and their thorn punctures can induce sickness; appropriate medical treatments may thereafter be costly.
    - Borage—all parts have various medicinal purposes, with the edible flowers being used in desserts.
    - Burdock—roots are edible (as are the stalks, but particularly the young leaves.

2. Lavender:

Crushed lavender flowers produce a fragrance and oil that can repel mosquitoes. An animal study on hairless mice found lavender oil to be effective at repelling adult mosquitoes. Lavender has analgesic, antifungal, and antiseptic qualities. This means that in addition to preventing mosquito bites, it can calm and soothe the skin.

Advantage of the New Solution:

- It’s a gel that respells mosquitoes and soothes the skin from rashes and itching.

Name of Student: Bhargav Borse

ID: 16102023

Program: BCA

Title of Social Innovation:

1. Weeds used:

Clover—its leaves can be eaten, but not in great numbers due to their natural acidity.

Cornflower—various colours; can be served as edible garnish to decorate salads

Certain Weeds have Nematicidal Properties (Control of Nematodes**):** Crotalaria spp; Calotropis spp, Parthenium etc. when incorporated in to the soil help for control of nematodes.

2. Weeds consumed:

While some the weeds are high in protein and can be consumed by living organisms. Such as Aegopodium podagraria, Allium vineale, Capsella bursa-pastoris, Cardamine species, Chenopodium album etc.

Advantage of the New Solution:

- These weeds can also be used for medical terms in manufacturing particular drugs.
- Sometimes farmers fire up the weeds and create unwanted air pollution when they find no way to use the weeds. Therefore, this solution helps avoid air pollution.

References:

https://pfaf.org/user/cmspage.aspx?pageid=44

http://www.agriinfo.in/default.aspx?page=topic&superid=1&topicid=2174

Social Innovation to Solve the Problem Identified

Chapter 4: Social Innovation to Solve the Problem Identified

Proposed Idea:

The leaves of Cocculus Villosus contain high amount of mucilage consisting of polysaccharides and gelatinous type of material which is not absorbed in the Castro intestinal tract and passes through the system undigested. When the leaves are soaked in water in fresh or dry form, they coagulates water to form jelly which has a cooling effect on the body. Due to this property, the aqueous extract of the leaves could be used to soothe the skin from the itching (rashes) caused from mosquito bites. Alternatively, it can be used as a mosquito repellent. Adding extracts of lavender and neem plant to the gelatinous extract of the leaves could work as an excellent mosquito repellent for the skin. The formulation as a whole has antimicrobial and mosquito repellent properties. The gel based formulation is preferable due to its light weight consistency and refreshing feel on skin.

Why Lavender and Neem?

The odour of Lavender is intolerable to mosquitoes, flies and other unwanted insects. Lavender has analgesic, antifungal, and antiseptic qualities. This means that in addition to preventing mosquito bites, it can calm and soothe the skin. And as we know, that neem oil is the best known natural mosquito repellent.

Benefits of Gel as a Formulation:

The formulation of the Gel proposed helps to soothe the skin from itching and rashes caused due to mosquito bites. Moreover, on addition of lavender and neem extracts to the gelatinous mixture, it acts as mosquito repellent. A gel based formulation are compatible with most skin types and offer a unique set of benefits. Gel is preferred as it hydrates, soothes, and refreshes the skin.

Learning from KHOJ

Rajvi Joshi

BSc Biochemistry

1. What have you learned from community visit?

The community visits we did in regards to khoj had been crucial for our innovations. While it taught us a lot. Firstly, it helped me developed the skills required for conversing with strangers. I also learned how people suffer from several problems on a daily basis and find short easy solutions by themselves. The adaptability factor of the people we encountered during the community visit was something that shined through for me.

2. What have you learned in the process of developing the social innovation?

During the process of developing the social innovation, I learned how we needed to see the problems through different perspectives and then come to the solution like the affordability, effectiveness of the innovation etc. I understood how just focusing on one factor will not be enough. For example, in our social innovation we had to make our gel affordable as well as make it effective for the use. Thus, seeing things from several views and then coming to a solution was learnt.

3. Name some skills you got to know about and learnt as you worked for khoj?

Khoj taught me a lot while some of the skills I developed and learnt about was how to work in a team. How to take all the ideas and choose the best one. I also learnt time management. As we were given a certain timeline for every part of the khoj submissions I learnt the skill of planning, prioritizing and completing my work in that time duration.

4. Name some challenges that you faced and how you overcame it?

A major challenge we faced was managing everyone's time. As we were a group and everybody had different work schedules and free slots initially it became a major issue to visit communities. While we overcame it by sitting down and spotting the free slots and planning the visits accordingly in groups. Where the people in the group free at a certain time could go while the other group members could visit the same place at another slot. Thus, this is how we managed the community visits.

5. How will such social engagement help you and the society?

Such social engagement could help the new innovative ideas of the youth to flourish. The new social innovation can help those in need hence, it is beneficial to the society. While it is beneficial to me as I would learn and develop a lot of skills in the process like time management, team work and some problem-solving skilling that would also help me in the future.

Hetvi Patel

BSc Biochemistry

1. **What have you learned from Community visit?**

Visiting rural areas in and around the city made me realize that the situations we call problems living in our big concrete houses are not actually problems. Living without adequate water and electricity, huge dumps of garbage in front of the houses, poor sanitation facility etc. are the actual problems. We do not realize it unless we step out of our houses and visit such places. The most important thing I learned was that, development was still a problem for rural parts because the people living there are still ignorant and superstitious. They themselves have become content in their life that they don't understand the actual problems they are facing. I am glad my University gave me an opportunity to visit these places and help them in whatever small amount we can through our knowledge and understanding.

2. **What have you learned in the process of developing social innovation?**

In the process of developing our social innovation, we came across many medicinal uses of herbal plants that people don't know about. For e.g. by just smelling Lavender, out body gets calm and relaxed. It also eases pain and when applied to cuts and bruises functions as an antiseptic. We learned about other weeds that are used as medicine. We even came across many old Ayurveda Techniques that can help improve medical science.

3. **Name some skills that you got to know about and learned as you worked on Khoj.**

We are usually comfortable working with our classmates but working on a project with people who are not in your discipline and have never met before is a challenge. The important thing I learned was team work. Working on a pace everybody is comfortable and have patience were the skills that I learned during Khoj. I identified my role in a group while working for khoj. I always thought that I am comfortable working as a member of a team rather than a Leader but Khoj made me realize that I am more comfortable as a Leader. Other physical skill that learned was extraction of the right portion of medicinal extract of a plant's leaves and flower.

4. **Name the challenges you faced and how you overcame the challenges.**

Being from a Biochemistry and have no technical knowledge about botany was the biggest challenge while working on this project. Our whole social innovation is based on weeds and plants and therefore having basic knowledge about them and their medicinal properties was a must. We overcame this challenge by taking help from some of the Botany students and the Botany Faculties of our University. We performed our experiments under their guided rules.

5. **How will such social engagement help you and the society?**

Cocculus villosus is a weed that is commonly found in our areas. Our social innovation will make people aware about the multiple uses of this weed and help them solve the biggest problem of mosquitoes that is increasing day by day. The ratio of death of diseases like Dengue and Chikungunya is increasing day by day hence, we have tried to make a small contribution towards solving this problem and helping the society.

Dhruvi Patel

BSc Biochemistry

1. What have you learned from community visit?
I have learned that people living in the slums or homes provided by the government still do not have the access to all the resources available in the community to meet the needs of children, youth and families.
People living there face many problems like drainage problems, poor roads and they due to lack of money they cannot buy mosquito repellents. The whole community faced severe problems of disease like dengue, chikungunya and malaria due to mosquitoes.

2. What have you learned in the process of developing social innovation?
I have learnt that whatever the social innovation be, it must address the real social challenge. I have learned about work, ethics, and different social innovation. It should be financially and available to the people who cannot afford it. The product we are making or distributing it should be helpful.

3. Skills learned from Khoj: There are many things I have learned from KHOJ project. Managing time was one of the factor I have learned very well. And I came to know how organic compounds can be used in this kind of making products also.
GROUPWORK: The major learning throughout the KHOJ was working in one group with students from different field. I also learned how to cooperate with the members and to let them know if I was not satisfied something they suggested in good way.

4 Challenges Faced:
The problems faced in our research project was that the ingredient which was needed to make our mosquito repellent was not easily available.

5 How will such engagements help you and society?
The main idea behind KHOJ was to make something innovative. So by keeping in mind that we have made something innovative that is the mosquito repellent gel which the slum area people can use it. The social innovation helped me to utilize the theory knowledge in the practical work

Dhairiya Buch

BSc Biochemistry

1. What have you learned from community visit?

After the community visit I learned that the people those who are living in the community are having many problems especially in the rural areas. There were many such problems identified such as poor roads, blocked drains and also including the problem on which we are working.

2. What have you learned in the process of developing a social innovation?

I learned that weeds which are of no value and are wild plants which prevents the other plants to grow properly can be used as mosquito repellents to keep away the mosquitoes and thereby preventing them from biting humans. Therefore apart from disadvantages Weeds also have advantages such as weeds growing on desert lands, waste lands and sloppy fields lower wind and water erosion and also help for protection of the environment.

3. Name some skills that you got to know about and learned as you worked on khoj.

The skills that I got to know during my work on khoj teamwork, time management and however how to identify the problem and then thinking about the solution for that problem.

4. Name some challenges that you faced and how you overcame the challenges?

The biggest challenge that we faced was the problem we had chosen earlier did not work therefore we were tensed and talked to our faculties about the problem, but we soon chose the other problem and started working on it and luckily it gave very good results, our social innovation was “Weeds used as mosquito repellents”. Therefore we worked hard and overcame the challenge.

5. How will such social engagement help you and the society?

Such kind of social engagement will be helpful to me as I will feel good that my ideas to the people living there and also to the society as diseases caused by mosquitoes will be reduced and the society will be disease free.

Bhargav Borse

BCA

1. **What have you learned from community visit?**

Vising different places with different environment type was a chance to understand the livelihood of the other people and their condition. Also realized the importance of the facilities we have for ourselves. Taught us how the real world survives in very harsh conditions.

2. **What have you learned in the process of developing social innovation?**

Working with different students as a single team taught me how to collect various ideas and club it to make the best out of it.

3. **Gave a chance to understand the society and their problems.**

Working towards something innovative created a deep inner interest to learn new things and develop well for the needy people.

4. **Name some skills that you got to know about and learned as you worked for khoj.**

Team work was the first thing I learned. Secondly, Patience to do something innovative. Also to share the ideas and come out with the expected result.

5. **Name some challenges you faced and how you overcame the challenges.**

Challenges were: Sometimes to understand the idea of teammate was challenging, to decide which innovation is good for the society, Cost factor and is efficiency was also confusing sometimes.

6. **How will such social engagement help you and the society?**

Social engagement can help a person to have a continuous touch with the society and its problems.

Similarly during the needy times the society can get help form the people surrounding them.

Priyanka Parte

BSc Chemistry

1. **Things learned from community visit:**

The first task for KHOJ was community visit. That is choosing an area, identifying the problems in that area and selecting any one problem to solve amongst them the people those who are living in the community are having many problems especially in the rural areas. There were many such problems identified such as poor roads, blocked drains and also including the problem on which we are working. Where I made an attempt to converse although i kept on stuttering with the help of my group members I was able to get the information I needed, Also community visit was an eye opener to the conditions that the people still live-in in modern India.

2. **Things learned from developing social innovation:**

Thinking about all the possible solutions to a problem.The drive to find the most effective and innovative solution. To find the perfect solution we had to do a lot of reading on the topic and now I think I know more about mosquitoes and how to repel them. I learned that weeds which are of no value and are wild plants which prevents the other plants to grow properly can be used as mosquito repellents to keep away the mosquitoes and thereby preventing them from biting humans.

3. **Skills learned through KHOJ** :
    a. The thing I liked most about KHOJ was that it was full of learning opportunities and I got to know and even learn various skills.
    b. Time management: Everything had a definite time limit so it was really necessary to organize work in such a way that it was manageable in the given time.
    c. Team work: In KHOJ as we were divided into a group of 8 individuals, having different personalities, believes and views.
    d. Responsibility :I'd say all the group members had their own responsibilities, the work they were assigned in a way all giving something for the group , The individual took responsibility of his/her actions regardless of the outcome. This is what KHOJ thought me.
4. 4. ***Challenge faced:***

The biggest challenge that we faced was the problem we had chosen earlier did not work therefore we were tensed and talked to our faculties about the problem, but we soon chose the other problem and started working on it and luckily it gave very good results, our social innovation was "Weeds used as mosquito repellents". Therefore we worked hard and overcame the challenge.

5. **'How will such social engagements help you and society?"**

The main idea behind KHOJ was to create a social innovation that will help society as well as develop something new and innovative, our social innovation aims at protecting nature as well

as helping people. Social engagement such as this can help us make a better tomorrow for future generation by using clean eco-friendly sources. The innovations like KHOJ can help us progress in that way. Our social innovation will repel mosquitoes using purely natural that will not harm environment and will be effective to society if this came into effect there will be less cases of a common insecticide used by famous brands such as all out and good knight. It will help me by giving me satisfaction at finally having contributed something to society.

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