



Black: Oil color
Gold: Evidence of its
global price and
value, its rise and
fall, by the rise and
fall of gold.

Palm waste to clean marine life

Vision:

Create a healthy environment for marine life.



Team

Introduction to the team members:

I am studying at National University of Science and Technology. Chemical engineering is my major. Chemical Engineer offering exceptional troubleshooting and safety skills. Methodical and poised with a commitment to driving process improvement. Organized and dependable candidate successful at managing multiple priorities with a positive attitude. Willingness to take on added responsibilities to meet team goals.

The number: 3

Binary name with tribe: Thuraiya Ahmed AL-Shanwi

Major: Chemical Engineering

College/University Name: National University of Science and Technology.

Hobby: Reading and programming,

What role do you play in the team? Collect the raw material and grinding it.



Team

Introduction to the team members:

The student studied at the National University of science and technology, as a Bachelor of Chemical Engineering major. Enjoy searching and exploring. I can work in a team.

The number: 3

Binary name with tribe: Dhiya Humood AL-Sarmi

Major: Chemical Engineering

College/University Name: National University of Science and Technology.

Hobby: photography, editing video, work and search

What role do you play in the team? Responsible for the project experience and the providing of some materials



Team

Introduction to the team members:

I am studying for a Bachelor of Chemical Engineering (BEng) at the National University of Science and Technology (College of Engineering). I am good at working collectively. I am brilliant at project management and have problem-solving skills.

The number: 3

Binary name with tribe: Mazoun Ahmed Al Shuaili

Major: Chemical Engineering

College/University Name: National University of Science and Technology.

Hobby: Practice working in the lab, outdoor sports, photography and chemical engineering design.

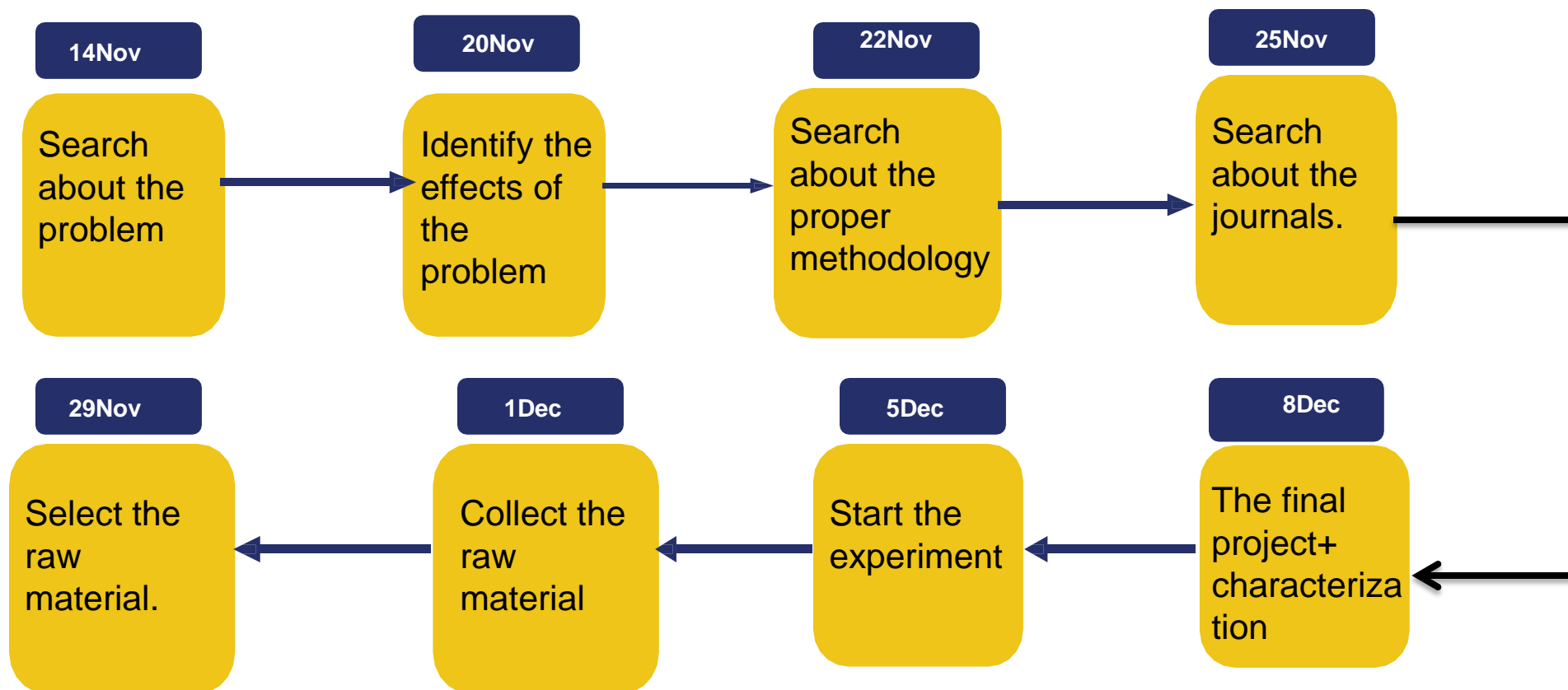
What role do you play in the team? Search and planning,



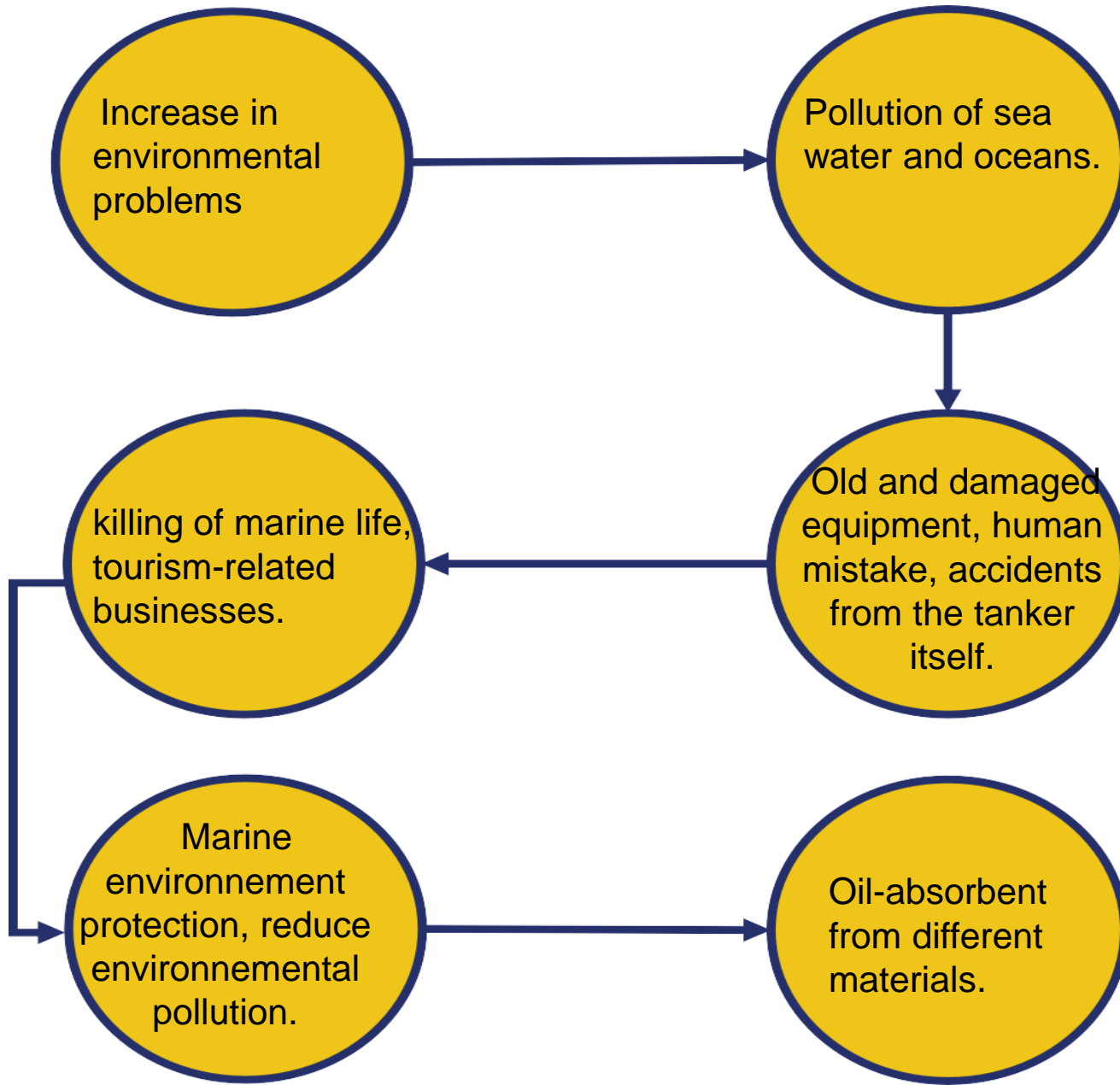


Project Phases Summary

Briefly explain the stages of project implementation (as bullet points)



Choose a challenge



Brief explanation of the challenge.



(Oil spill, 2022)

Project Idea

○ Explanation of the project idea

Using waste of palm stem to make a product to absorb oil during a spill. The fabrication of carbonaceous aerogel as bio-oil-sorbents from local feedstock reduces the pollution of seawater and oceans, thus protecting marine life from pollution. Therefore, the method adopted by this study is the bottom-up approach. In this method, carbon atoms begin to gather together on the surface of the powder. Then, these atoms convert to clusters, and by affecting different parameters such as temperature and time, nanoparticles will produce.

○ Determine project requirements

Beaker, magnetic stirrer, furnace, stopwatch, grinder, palm tree stem, distilled water, nitrogen , acetylene gas, seawater , oil, Scanning Electron Microscopy(SEM), Transmission Electron Microscopy(TEM), analytic balance.

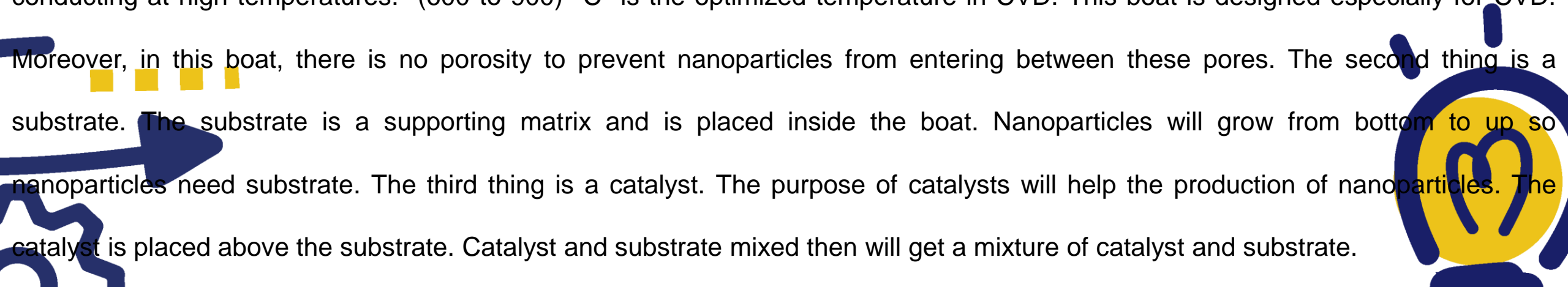


Project Idea

Explanation of the technical aspect of the project



Using a nanotechnology and the method that will follow is chemical vapor deposition (CVD) to produce nanoparticles. In CVD the nanoparticles are produced at high temperatures under conducting C_2H_2 gas by using a solid substrate which is the waste of stem palm trees. This experiment involves the decomposition of carbon gas. The application of it that apply in this experiment produces a high purity of powder. It's done in the hot-wall reactor (furnace) with carrier gases at temperatures in most cases ranging from 200 to $1200^{\circ}C$ but in this case using $400^{\circ}C$ and $900^{\circ}C$. CVD happens in a very closed furnace. In this experiment, the furnace is a horizontal tube. Producing a Nanoparticle by using CVD, require a very important three things which are: boat, substrate, and catalyst. The first thing is a boat. The boat is a container. This boat has to withstand high temperatures and at boat due to CVD conducting at high temperatures. (600 to 900) $^{\circ}C$ is the optimized temperature in CVD. This boat is designed especially for CVD. Moreover, in this boat, there is no porosity to prevent nanoparticles from entering between these pores. The second thing is a substrate. The substrate is a supporting matrix and is placed inside the boat. Nanoparticles will grow from bottom to up so nanoparticles need substrate. The third thing is a catalyst. The purpose of catalysts will help the production of nanoparticles. The catalyst is placed above the substrate. Catalyst and substrate mixed then will get a mixture of catalyst and substrate.



Project Idea



Explanation of the technical aspect of the project

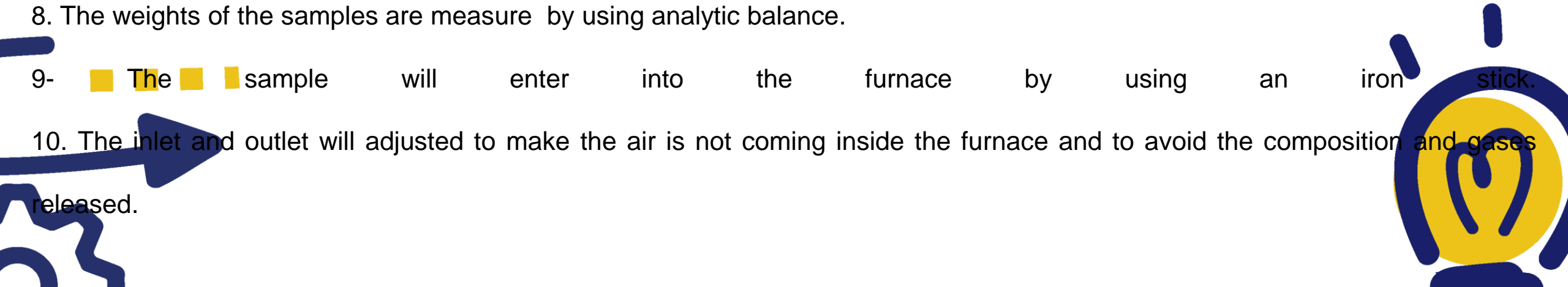
The process will start now. The process requires two types of gases which are hydrocarbon gas and inert gas. In this experiment, C_2H_2 and N_2 were used. These gases have a continuous input flow and continuous output flow. At high temperatures, this hydrocarbon gas will crack. So, above the boat especially above the catalyst will there a free atoms of carbon. A catalyst allows the free atoms of carbon to dissolve at the surface. So, carbon will diffuse inside the catalyst. So, during the process will have a continuous flow of hydrocarbon gas and continuous cracking of carbon atoms. The distance or bond between carbon atoms will be very close to each other. So, carbon atom to carbon atom will form a carbon material. With time and continuing in this way, nanoparticles will be produced which are carbon nanoparticles. In the boat that is placed close to the inlet of the furnace the number of nanoparticles will be high because more concentration of carbon atoms will be taken by this boat. There are some conditions to control the growth of nanoparticles such as control of the flow rate of hydrocarbon gas, temperature, time, and type of catalyst. All these conditions need to be optimized for the better growth of nanoparticles. Using this method can be produced different types of nanoparticles. But in this experiment aerogel will produce.

Project Idea



○ Procedure:

- 1- Palm tree stem will select as feedstock as they are strong, available, cheap, and wash them with water.
- 2- The wood will cut into small pieces and then grind it till powder.
- 3- The powder will mixed with water using a magnetic stirrer.
- 4- The final product will be dried using sun or furnace.
- 5- A small sample will filter by using filtration paper which will put in the funnel.
- 6- The funnel will put in the conical flask. After a period of time, the sample will dry totally.
- 7- The weight of an empty boat will measure by using analytic balance.
8. The weights of the samples are measure by using analytic balance.
- 9- The sample will enter into the furnace by using an iron stick.
10. The inlet and outlet will adjusted to make the air is not coming inside the furnace and to avoid the composition and gases released.



Project Idea



○ Procedure:

11. The furnace will adjust in specific parameters (temperatures, time).
12. The process will conduct in a furnace under nitrogen gas.
13. At room temperature (25°C) nitrogen gas in flow rate (100 ml/min) will insert in the furnace for 15 minutes.
14. The furnace will heat up to 400 °C for 30 minutes again and will conduct under nitrogen gas with the same flow rate of nitrogen.
15. The temperature will keep at the same temperature and flow rate for 30 min to break the carbon bonds.
16. The furnace will heat up to 900°C for 30 minutes again and will conduct under nitrogen gas with the same flow rate (100 ml/min).
- 17-19. The temperature will keep at 900°C as it is for 2hr to make sure the process will complete.
18. The furnace will conduct under C₂H₂ for 2hr.
19. The furnace will switch off.



Project Idea



Procedure:

20. Finally, the cooling process will start for 2hr conduct under nitrogen at room temperature (25°C) and flow rate to produce the final product. Leave the furnace to cool completely so carbons atoms decomposed to each other to form the aerogel.
21. The final sample will weight by using analytic balance.

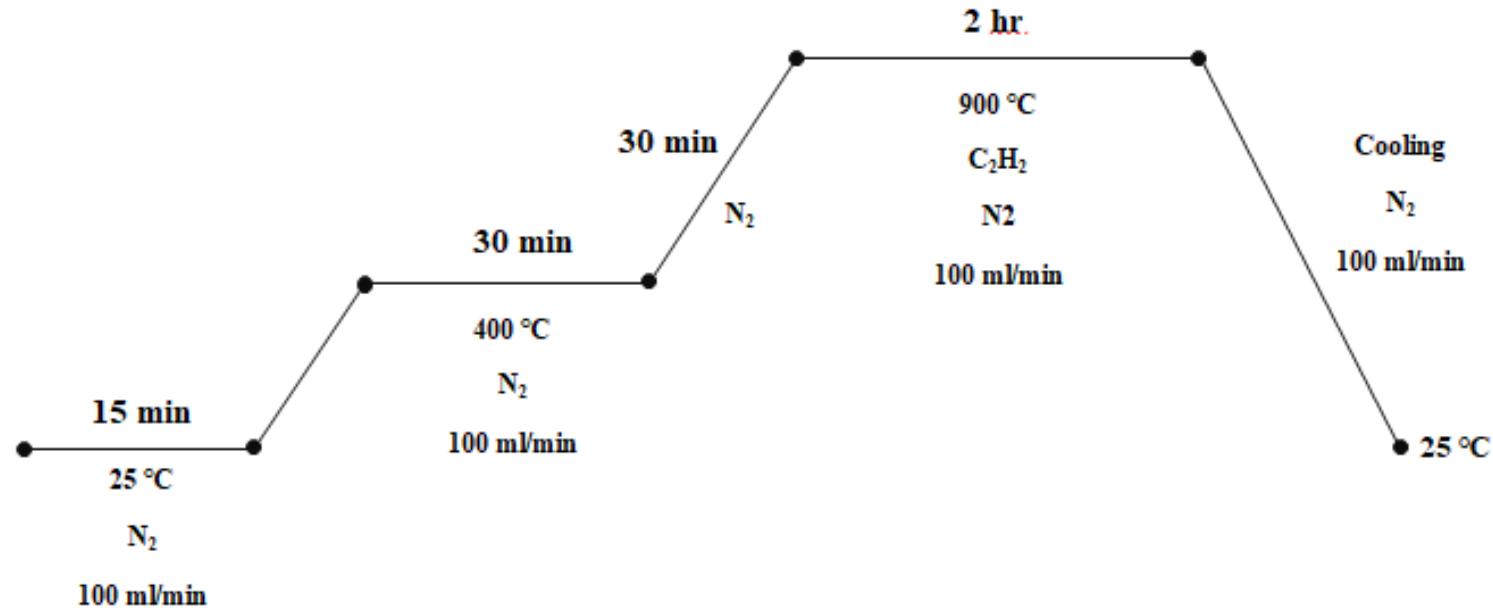
Optimization (Test):

To find the optimal process conditions for the time and temperature to obtain the maximum oil removal. The water and oil will place in the beaker, then the volume of the oil in the oil will measure, and the product will place in the beaker to start the process of separating the oil from the water. Then the separations will monitor at different times 5 minutes, 10 minutes, 15 minutes and up to 20 minutes. Three different temperatures will be tested to study the effect of the temperature on the removal of oil from sea water ($25, 30, 35^{\circ}\text{C}$). At each temperature, the amount of oil absorbed in the separation process will measure. This process is monitor to determine the best time and temperature at which the product absorbs the oil in a large amount to determine the best temperature and time for removing the oil.

Project Idea

Visualization of the project prototype

Procedure diagram.

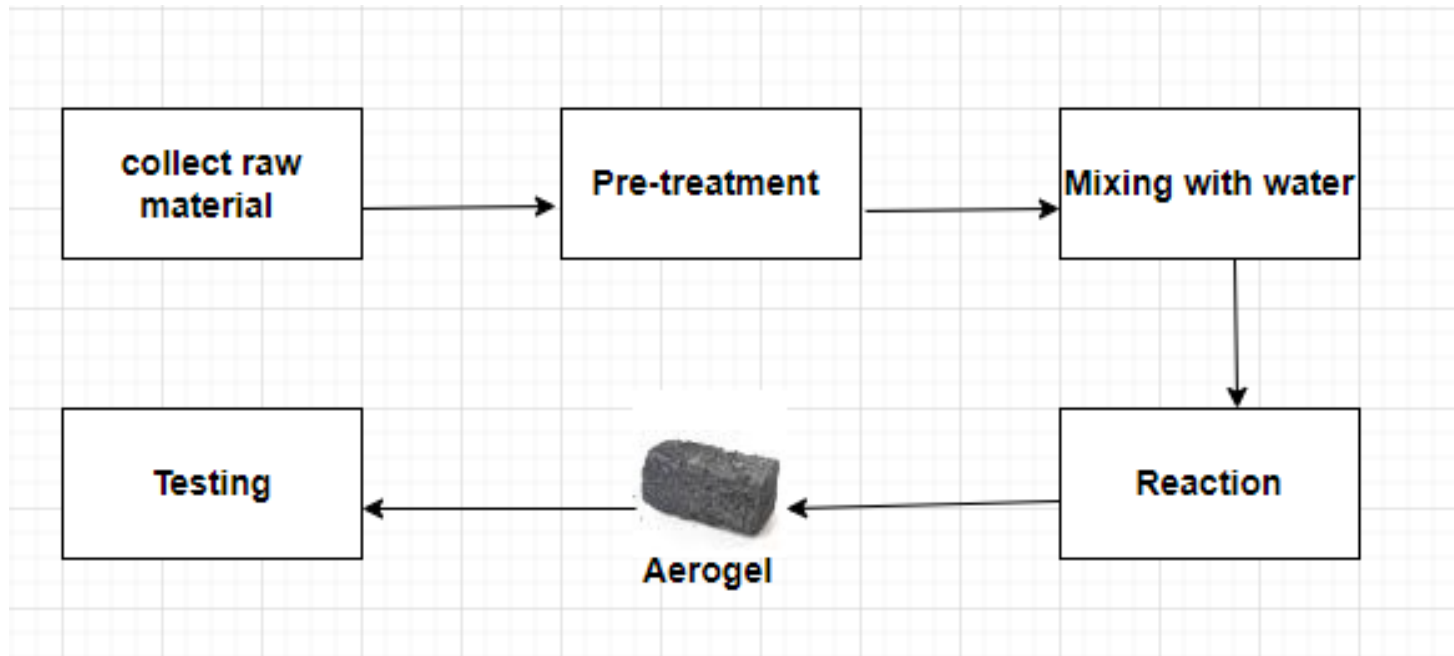


Reaction conditions

Project Idea

- Visualization of the project prototype

The predesign below is to understand the general steps for producing aerogel.



Pre-design of aerogel

Impact and change



- **The impact of the solution you produced on society.**

- The good health, which positively affects an increase in the lifespan of the individual and helps increase his productivity.
- Increasing awareness among individuals of the danger of pollution and the importance of preserving the marine environment.

Also contribute to finding solutions that reduce the problem.

- **The change you made:**

- Protect marine organisms from pollution.
- Increasing the quantity and quality of food produced by the sea contributes to human nutrition.
- Reducing the extinction of some birds. They are mainly affected by the oil spill.

Impact and change



- **Behavioural change of community members:**

- Everyone became responsible and concerned with environmental issues.
- Preserving the environment is one of the priorities of the individual because of his increased understanding and understanding of the causes and consequences of pollution.

- **Bea'h's positive impact.**

- Find an appropriate solution to the problem.
- When make a lot of our product will help to reduce the amount of burning of palm waste. In addition, our product is 100% natural, as after the oil spill in the seas is absorbed. It can dispose of without any increase in residues and dirt. So it can be disposed it in the soil and acts as a nutrient soil because it is carbon. Our product is a natural source without any interference from chemicals.

Impact and change



- **The impact of the solution on the activities and work of Beah Company:**
 - The company will be able to receive large quantities of agricultural waste, especially waste of palm trees.
 - This solution helps Beah positively reduce the pollutants produced by the individual or the community by converting these pollutants into a manufactured product that has a positive impact on the environment, the individual, and the community. In addition, it positively affects the lives of humans, animals, and plants.

Impact and change

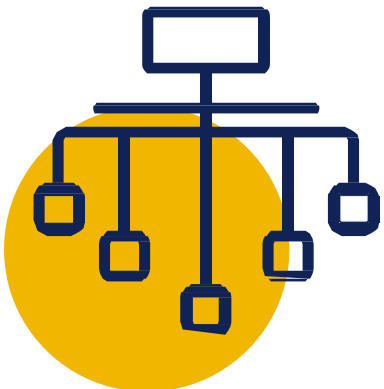


(By viewing photos, videos, application, etc.)

Documenting cases - statistics - experiences - positive results

Show
method





Project work plan

Task Name	Q1 2022		Q2 2023		Q3 2023	
	Nov 14	Dec 14	Jan 14	Feb 14	Mar 14	Apr 14
Planning						
Research						
Design						
Implementation						
Follow up						



Search Methods

Methods of collecting information



Google scholar/
Journals



Ask questions



Tutors/ Supervisor



Visit the Million
Palm Project

The financial side

Item	Qty	Prices (OMR)
Nitrogen gas (N2)	10 litre Steel Cylinder (200 bar)	21
Acetylene gas (C2H2)	10 litre Steel Cylinder	43
Oil (1 liter) (M95)	1 bottle	0.239 RO/L
(Air Products Company)		Total= 64.239 OMR

- ❖ Cylinder on exchange basis or deposit basis. VAT 5% is additional.
- ❖ The project is economically feasible because it has a low cost and high efficiency.

