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

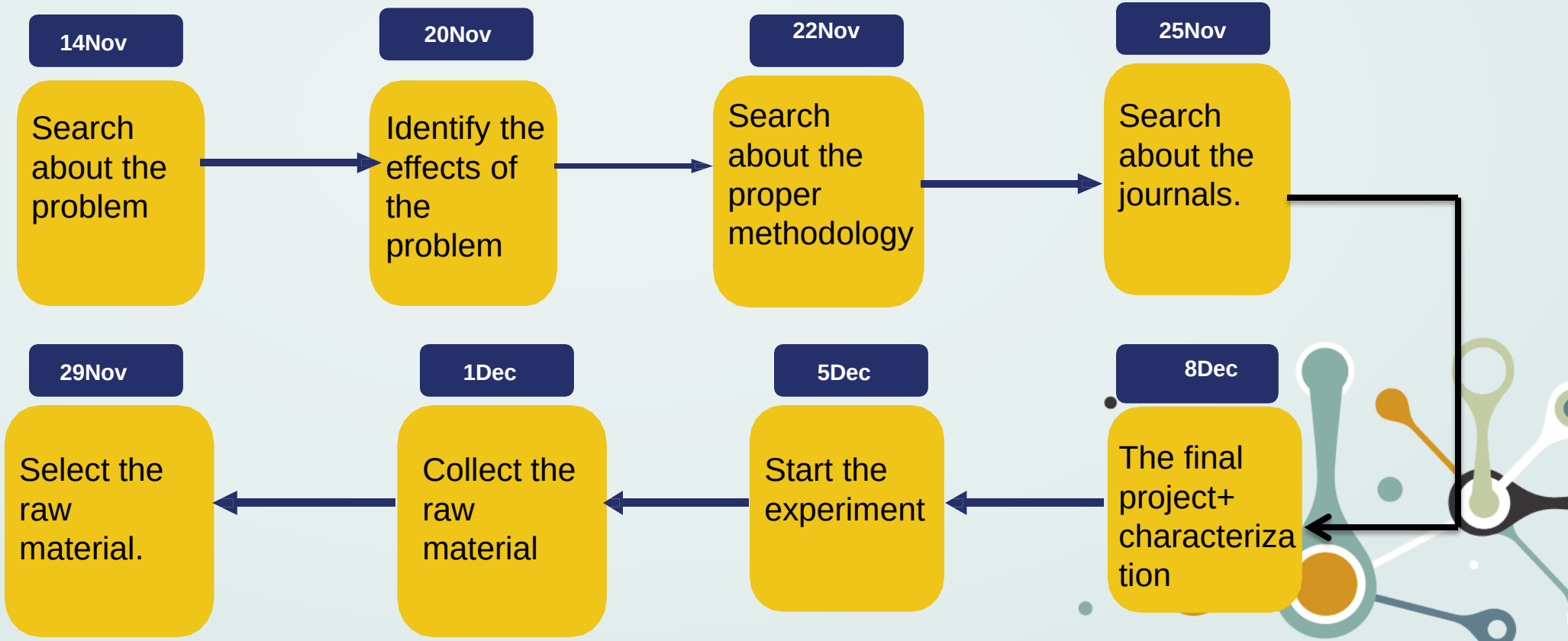
College/University Name: National University of Science and Technology.

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

Increase in environmental problems

Pollution of sea water and oceans.

Old and damaged equipment, human mistake, accidents from the tanker itself.

killing of marine life, tourism-related businesses.

Marine environnement protection, reduce environnemental pollution.

Oil-absorbent from different materials.

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 C2H2 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°C but in this case using 400°C and 900°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)°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, C2H2 and N2 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 (100ml/min) will insert in the furnace for 15minutes.
14. The furnace will heat up to 400°C for 30minutes 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 30minutes again and will conduct under nitrogen gas with the same flow rate (100 ml/min).
17- 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.

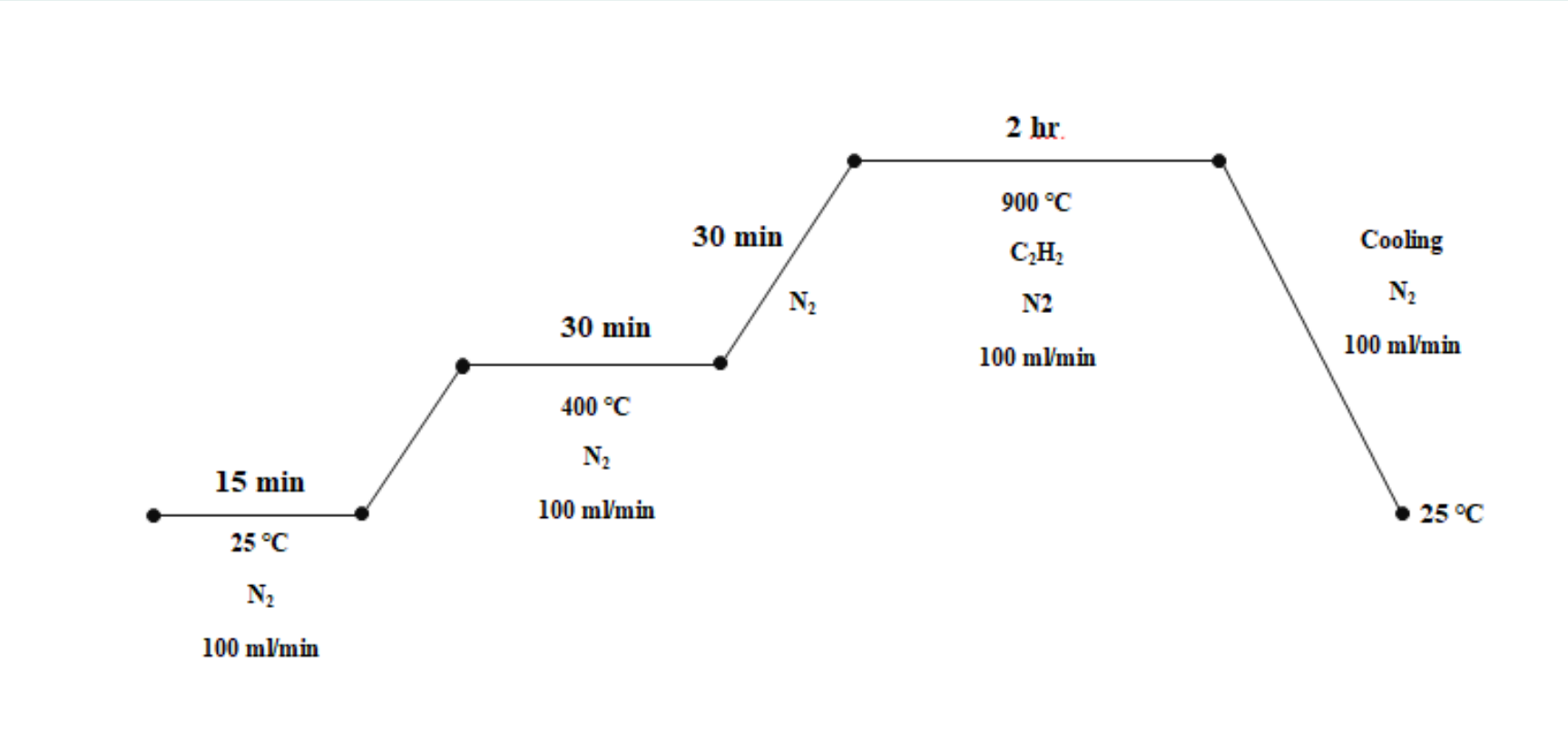
Optimization (Test):

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 20minutes. Three different temperatures will be tested to study the effect of the temperature on the removal of oil from sea water (25, 30, 35)°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.

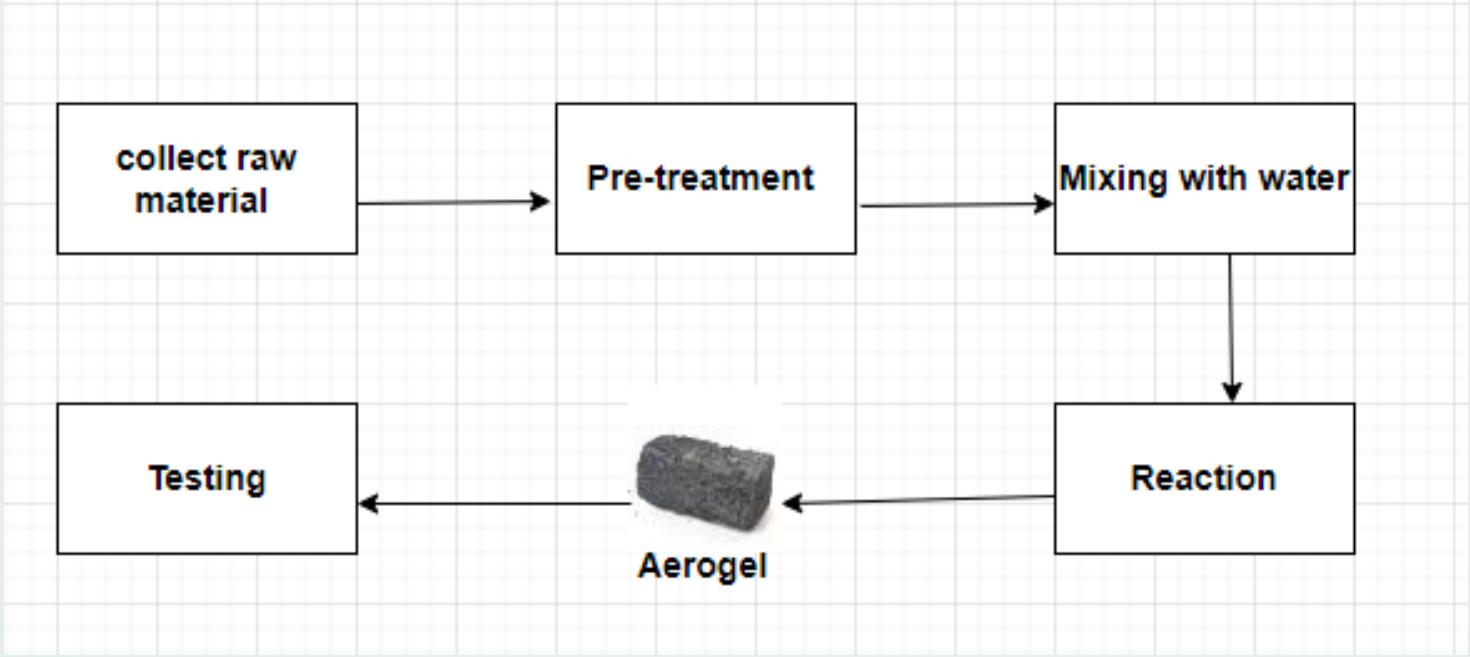


Reaction conditions

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.

- Protecting the environment: Solutions to oil spills can help protect the environment by preventing or cleaning up spills that can have harmful effects on plants, animals, and ecosystems.
- Protecting human health: By preventing or cleaning up oil spills, solutions can help protect human health by reducing the risk of exposure to harmful substances and contaminants.
- Supporting economic industries: Many economic industries, such as tourism and fishing, can be negatively impacted by oil spills. Solutions to oil spills can help support these industries by reducing the risk of spills and the associated economic consequences.
- Promoting sustainability: By reducing our reliance on fossil fuels and supporting renewable energy sources, solutions to oil spills can help promote sustainability and protect the environment for future generations.

Impact and change

The change you made:

- Protect marine organisms from pollution and increasing the quantity and quality of food produced by the sea contributes to human nutrition and
- Reducing the extinction of some birds. They are mainly affected by the oil spill.
- Reduce the negative impact on seawater desalination projects because oil spill is the one of the most difficult problem that facing desalination projects.
- Reducing the risk of harm to the environment by suggesting a solution to an oil spill, we may be able to help reduce the risk of harm to the environment, including plants, animals, and ecosystems.

Impact and change

Behavioural change of community members

- Increased awareness and understanding of the problem: Finding a solution to an environmental problem may increase awareness and understanding of the problem among community members, which may lead to more informed decision-making and actions in the future.
- Increased engagement in environmental issues: Finding a solution to an environmental problem may also lead to increased engagement in environmental issues by community members, such as through volunteering or supporting organizations that work on these issues.
- Changes in individual behavior: Finding a solution to an environmental problem may also lead to changes in individual behavior, such as reducing the use of products or practices that contribute to the problem or adopting more sustainable behaviors.
- Changes in community policies and practices: Finding a solution to an environmental problem may also lead to changes in community policies and practices, such as the adoption of new regulations or the implementation of new programs to address the problem.

Impact and change

Bea'h's positive impact.

- Improved reputation: Implementing a solution to an oil spill could improve a company's reputation, as it demonstrates the company's commitment to addressing environmental issues and reducing the risk of spills. This can be particularly important in industries where public perception is an important factor in success, such as the oil and gas industry.
- Increased efficiency: A solution to an oil spill may also lead to increased efficiency in a company's operations, such as by reducing the risk of spills or by streamlining processes to prevent spills. This can result in cost savings for the company and increased competitiveness in the market.
- Legal and regulatory compliance: Implementing a solution to an oil spill can also help a company comply with laws and regulations related to environmental protection, which can reduce the risk of legal or regulatory penalties.
- Customer and stakeholder support: A solution to an oil spill may also help a company win the support of customers and other stakeholders, such as shareholders, who may be more likely to support a company that is seen as taking steps to address environmental issues.

Overall, implementing a solution to an oil spill can have a range of positive impacts for a company, including improved reputation, increased efficiency, legal and regulatory compliance, and customer and stakeholder support.

Impact and change

The impact of the solution on the activities and work of Beah Company

- Financial impacts: A solution to an oil spill may have financial impacts on a company, such as costs associated with implementing the solution or lost profits due to reduced demand for products or services that contribute to the problem.
- Changes in business practices: A solution to an oil spill may also lead to changes in business practices, such as the adoption of new technologies or the implementation of new programs to prevent or mitigate spills.
- Reputation impacts: A solution to an oil spill may also have impacts on a company's reputation, either positively if the company is seen as a leader in addressing the problem, or negatively if the company is perceived as not doing enough to prevent or mitigate spills.
- Legal and regulatory impacts: A solution to an oil spill may also involve changes to laws and regulations that impact the activities and work of companies, such as new requirements for reporting spills or the implementation of penalties for non-compliance.

Impact and change

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

Documenting cases - statistics - experiences - positive results

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.