



CHEMICAL ENGINEERING
ASSOCIATION



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C H E M I C A L N E W S L E T T E R

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JOB ALERT!!!

PRONOY
(BATCH 2013)

Company: ABC
Required: Chemical Engineer
Profile: Process Engineering

This is usually what we find in a job description for any chemical core company. And as a fourth Year student who is sitting for placements, most of the technical companies coming to our campus comes with a profile called Process Engineering. So what exactly is Process engineering and how does a chemical engineer fit into this role?

As our beloved Wikipedia defines it "Process engineering (also called process systems engineering) focuses on the design, operation, control, and optimization of chemical, physical, and biological processes through the aid of systematic computer-based methods. Process engineering encompasses a vast range of industries, such as chemical, petrochemical, mineral processing, advanced material, food, pharmaceutical, and biotechnological industries." In simpler words the work is mainly concerned with chemical and biochemical processes in which raw materials undergo change, and involves scaling up processes from the laboratory into the processing plant. Responsibilities involve designing equipment, understanding the reactions taking place, installing control systems, and starting, running and upgrading the processes. Environmental protection and health and safety aspects are also significant concerns. Some typical work activities include

- Assessing processes for their relevance, and assessing the adequacy of engineering equipment.
- Designing, installing and commissioning new production units, monitoring modifications and upgrades, and troubleshooting existing processes.
- Applying the principles of mass, momentum and heat transfer to process and equipment design.
- Assuming responsibility for risk assessment, including hazard and operability (HAZOP) studies, for the health and safety of both company staff and the wider community.
- Making observations and taking measurements directly, as well as collecting and interpreting data from the other technical and operating staff involved.
- Working closely with other specialists including scientists responsible for the quality control of raw materials, intermediates and finished products; engineers responsible for plant maintenance; commercial colleagues on product specifications and production schedules and the operating crew.

Work is project-orientated and you may be working on a number of projects, all at various stages, at any given time. So where does a chemical engineer fit in? In each and every role mentioned above. They work closely with Mechanical, Civil, Electrical, Instrumentation and Detailed engineering groups for running the plants efficiently and for the successful completion of projects related to chemical industries. And mostly chemical engineers(or as you now call them process engineers) are the initiators of any project i.e. the first solution to a problem has to be given by them and based on that solution ,the subsequent groups move ahead with their work.

Thus you can say Chemical engineering is synonymous with Process engineering. The face of Chemical and Process Engineering is constantly evolving and career paths are vast and varied.

There is a great scarcity in renewable energy sources and in energy-conservative technologies. It is important also, that these sources and technologies are ecologically friendly too.

Now the world is filled with automobiles of various types from a small two-wheeler to huge trucks, but the soul of those engines are the fuels that we use. From the olden days onwards we use only the fossil fuels, which we are still using now but the major disadvantage of those fuels is the pollution caused by them and their availability. Now our world is under the pressure of pollution. Though there may be many reasons for pollution, the major amount is contributed by automobiles and these fossil fuels are non-renewable resources and we know that these would be available only for 30-40 years. So scientists are searching for renewable resources as fuel for engines, which are pollution free. This article deals about using liquid nitrogen as a fuel for the future world. Nitrogen is very abundant (78%) in our atmosphere. The technique is liquefying the nitrogen gas by the process of "CRYOGENESIS" and using it as a fuel. The major advantage of using this fuel is that it is pollution free (ZERO EMISSION VEHICLLE), since the exhaust of this engine is again a nitrogen gas. So within few years we can see the automobiles that are propelled by liquid nitrogen and we can make a pollution free world.

Liquid Nitrogen is the cheapest, widely produced and most common cryogenic liquid. It is mass produced in air liquefaction plants. The liquefaction process is very simple. Normal, atmospheric air is passed through a dust precipitator and pre-cooled using conventional refrigeration techniques. It is then compressed inside large turbo pumps to about 100 atmospheres. Once the air has reached 100 atmospheres and has been cooled to room temperature it is allowed to expand rapidly through a nozzle into an insulated chamber. By running several cycles the temperature of the chamber reaches low enough temperatures and the air entering it starts to liquefy. Liquid nitrogen is removed from the chamber by fractional distillation and is stored inside well-insulated Dewar flasks.

CRYOGENICS!!

NEERAJA S
BATCH 2015

How does the Nitrogen Powered car work? Heat from the atmosphere vaporizes liquid nitrogen under pressure and produces compressed nitrogen gas. This compressed gas runs a pneumatic (compressed gas drive) motor with nitrogen gas as the exhaust. The principle of running the LN2000Car is like that of steam engine, except there is no combustion involved. Instead liquid nitrogen at -320oF (-196oC) is pressurized and then vaporized in a heat exchanger by ambient temperature of the surroundings air. This heat exchanger is like the radiator of a car but instead of using air to cool water, it uses air to heat and boil liquid nitrogen. The resulting high pressure nitrogen gas is fed to an engine that operates like a reciprocating steam engine, converting pressure to mechanical power. The only exhaust is nitrogen, which is major constituent of our atmosphere.

SO due to the nitrogen abundance and its property of inertness and zero emissions we would see the world filled with cars that would be propelled by everlasting nitrogen. The scope of cryogenics has expanded widely from basic military and space applications to various civil applications. Already Infrared sensors are being increasingly used for fire detection alarm systems, energy conservation thermo graphic analysis, astronomical observations, and medical thermo graphic analysis for early Cancer detection. The future developments are expected to lead towards disposable miniature 80 K cryogenics. Ever since the introduction of cryogenic nitrogen, it has found applicability in practically all fields because of its higher efficiency as compared to cryogenics based on other refrigerating cycles. Cryogenics offer immense scope for the researchers and scientists for challenging ideas for new developments. Thus we conclude that cryogenic nitrogen is playing a very important role in researches .

THE BOOMING SEMICONDUCTOR INDUSTRY

KATHAMBARI
(BATCH OF 2014)

As Chemical Engineers, we may tend to think this article is about the manufacture of semiconductor chips. But there is more to it and it is something that needs serious attention. Semiconductors seem to be anywhere and everywhere throughout our everyday lives, yet it is surprising how little most people know about the potentially devastating effects their manufacturing can have on the environment and human health. Today's semiconductors are usually composed of silicon. First, silicon crystals are melted and purified to 99.9999% purity. The molten silicon is drawn into long, heavy, cylindrical ingots, which are then cut into thin slices called wafers. The further processing includes deposition, removal processes, patterning and modification of electrical properties.

What is a clean room?

A clean room is designed with fanatical attention to detail aimed towards keeping the room immaculate and dust-free. Most surfaces inside these clean rooms are composed of stainless steel and these surfaces are sloped to avoid settling of dust. The air is filtered and lighting is bright and slightly yellowish. Workers in these rooms must be covered from head to toe in "bunny suits". They must first pass through a series of air lock doors, stand under a number of "air showers" that actually blow dust off clothing, and walk across a sticky floor matting that removes grime from the bottom of shoes. These techniques may perpetuate the illusion that this is a safe and sterile process. But it should be noted that the bunny suits protect the silicon wafers from the people, not the people from the chemicals!! The various chemicals involved in semiconductor manufacture include acetone, arsenic, arsine, benzene, cadmium, HCl, lead, methyl chloroform, toluene, trichloroethane and a few of them are even carcinogenic.

Now the Effects.....

The main problem is that the industry does not have a single overarching and definitive process for manufacturing, and it is difficult to pinpoint one particular compound as causing a certain health problem because some plants use as many as 300 chemicals. Also, many of the manufacturing processes take place in closed systems, so exposure to harmful substances is often difficult to detect unless monitored on a daily basis. Contamination has also been an issue in areas surrounding fabrication plants. Drinking water was found to be contaminated with trichloroethane and Freon. These toxins were later suspected to be the cause of birth defects of many children in the area. The companies' underground storage tanks were found to have leaked tens of thousands of gallons of the toxic solvents into the ground. Another area of concern is the eventual fate of discarded electronic systems such as computers, pagers, mobile phones, and televisions that contain semiconductor devices. They pose an environmental risk not only through their sheer bulk in city dumps and landfills but also because their semiconducting devices often contain significant amounts of heavy metals, including lead and other potentially hazardous substances.

So...

Having understood the impact that semiconductors can cause, let us all minimize the usage of electronic devices and also learn to dispose them off properly.

CHRONICLES OF A NESTLE INTERNEE

PRADEEK
(BATCH 2013)

"Nestle", doesn't the word just bring to our minds the thought of wonderful creamy chocolate?? Given that try imagining what it would be like to work with them in making the magic happen!! Having difficulties?? So why don't we rather hear about it from one of our very own who actually did it!! Here goes....

Nestle, the worlds' largest food manufacturing company, offers summer internship to a few students from leading technical and business schools. Nestle summer internship programme offers not only world class training wherein you get the opportunity to interact with some of the best engineers of the country but also gives you the freedom to implement your ideas onsite. Having been one of the prestigious ones to make it to the lucky lot, here is what the internee has to say, (tips alert for people aiming to bag it in the future!)

"I was deputed at Nestle Goa; this facility of Nestle is a culinary unit (Maggi Noodles & Sauce). I was part of the Project Team which was responsible to setup the entire plant from scratch for a new product which will be launched in the market by October 2012. I was part of the Process Engineering division of the project team. At Process Engineering, we basically had hands on experience in designing equipments like Fluidized Bed Dryer (read about it in Treybal Third Edition Page Number 698), Air Handling Unit (Modified form of Air conditioners which controls humidity apart from temperature), Pressure Reducing Stations (Reduces pressure of steam according to requirement), Granulators (Converts powder to granules), Cyclones (Gas- Solid separating equipment), Radiators (Read Kern for more details about designing of radiators). Apart from sizing & designing of the mentioned equipment, process engineering team played a major role in designing utility of the plant. Utility means pipelines for supply of steam, water (both hot & cold), air, edible oil. We basically had to calculate the size (in Nominal Bore or inch) of the pipes according to the material that will be flowing through it (not a very tough task). I also gained knowledge about many types of pumps & control valves.

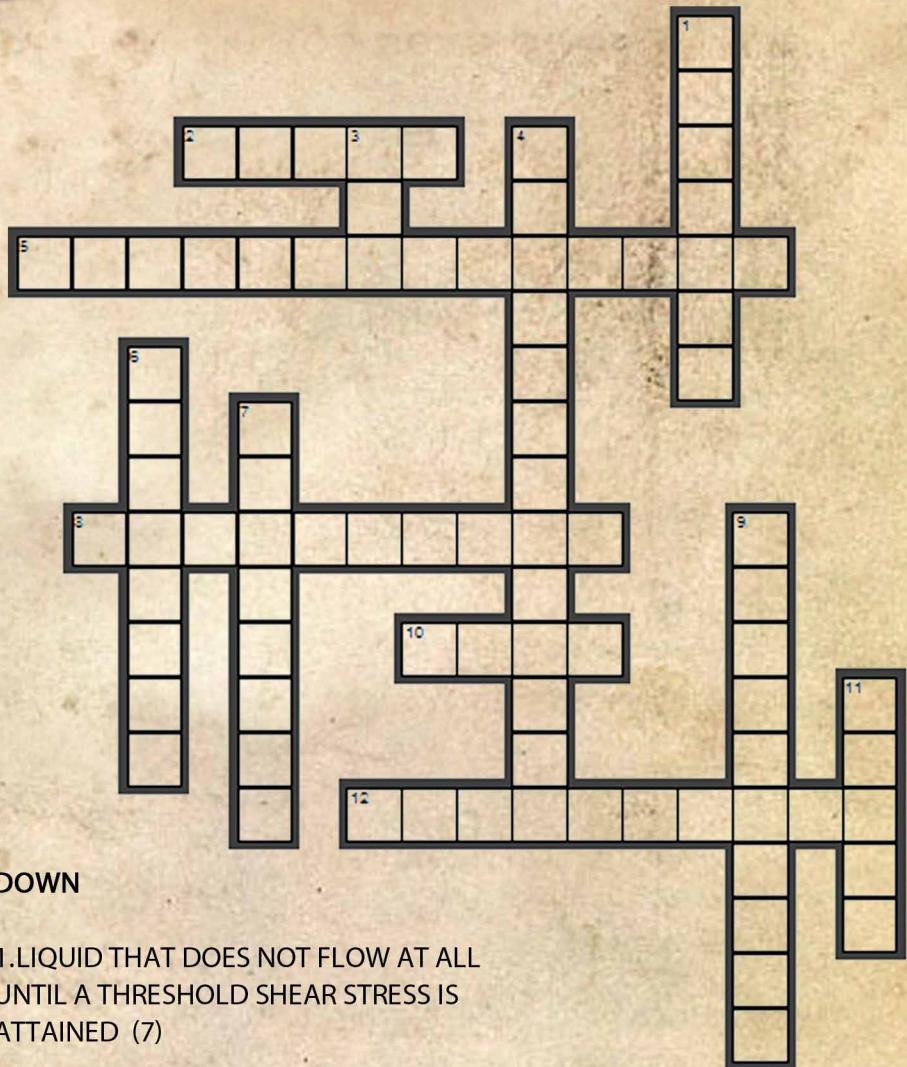
The most appreciated work done by me was the suggestion to use the condensate from radiators to heat the vegetable puree (which was stored in a vessel), thus ensuring zero waste policy of Nestle.

Nestle not only offers best remuneration among the Indian industries but also gives you the best work culture (also best food!). Working at Nestle (Specially Goa) is fun. Though they may sometimes expect you working long but it ensures you enjoy doing it (with free chocolates).

If you get the opportunity to be a part of Team Nestle next summer, make sure you carry with you a soft copy of Mc Cabe Smith & Treybal. #experience

CROSSWORD

JAYASHRI
(BATCH 2015)



DOWN

1. LIQUID THAT DOES NOT FLOW AT ALL
UNTIL A THRESHOLD SHEAR STRESS IS
ATTAINED (7)

3. CHLOROBENZENE IS CONDENSED WITH
CHLOROL TO GIVE THIS PESTICIDE (3)

4. SOHIO PROCESS IS THE MOST
ECONOMICAL TO PRODUCE THIS
COMPOUND (13)

6. SLOW SPEED MACHINES FOR COARSE
REDUCTION OF LARGE QUANTITIES OF
SOLIDS (8)

7. THE METAL USED TO CATALYSE THE
CONTACT PROCESS (8)

9. THE FIRST ANTIBIOTIC DISCOVERED
(10)

11. TWO PHASE MIXTURE OF MOTHER
LIQUOR AND CRYSTALS OF ALL SIZES (5)

ACROSS

2. PLOT BETWEEN REYNOLD'S
NUMBER AND FRICTION FACTOR (5)

5. PROCESS FOR SEPARATION OF
MULTI COMPONENT MIXTURES OF
GASES OR LIQUIDS (14)

8. STEAM FLOW IN A SMOOTH WELL
DESIGNED CONVERGING NOZZLE
(10)

10. IN POTENTIAL FLOW, WALL DRAG
IS (4)

12. REMOVAL OF SULPHUR AND ITS
COMPOUNDS FROM PETROLEUM IS
CALLED (10)

ANSWERS

