

# Atmospheric pressure and normal temperatures engineering essay

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Auto Gas is a gas at atmospheric pressure and normal temperatures, but it can be liquefied when moderate pressure is applied or when the temperature is sufficiently reduced. This property makes the fuel an ideal energy source for a wide range of applications, as it can be easily condensed, packaged, stored and utilized. When the pressure is released, the liquid makes up about 250 times its volume as gas, so large amounts of energy can be stored and transported compactly. The use of LPG as an automotive fuel has become legal in India with effect from April 24, 2000, albeit within the prescribed safety terms and conditions. Hitherto, the thousands of LPG vehicles running in various cities have been doing so illegally by using domestic LPG cylinders, a very unsafe practice. Using domestic LPG cylinders in automobiles is still illegal. The fuel is marketed by Indian Oil under the brand name 'Auto Gas'" Indian Oil has setup 350 Auto LPG Dispensing Stations (ALDS) covering 192 cities across India." Auto Gas impacts greenhouse emissions less than any other fossil fuel when measured through the total fuel cycle. Conversion of petrol to Auto Gas helps substantially reduce air pollution caused by vehicular emissions. The saving on account of conversion to Auto Gas in comparison to petrol is about 35-40%. Low filling times and the 35-40% saving is a reason enough for a consumer to convert his vehicle to Auto Gas. DieselDrawing on its vast experience and carefully nurtured skill sets, Indian Oil has made successful forays in diverse areas such as Natural Gas, Petrochemicals, Exploration & Production, Renewable Energy, etc. Over the years, Natural Gas has emerged as the 'fuel of choice' across the world. It is steadily replacing traditional fossil fuels due to its environment friendly characteristics which help in meeting the stipulated

automobile emission norms. Natural Gas has significant cost advantages over fuels such as Naphtha and commercial LPG. Demand for Natural Gas in India is primarily driven by the fertiliser and power sectors, which account for almost two-third of the country's gas consumption. IndianOil has co-promoted Petronet LNG Limited (PLL) for setting up LNG (Liquefied Natural Gas) terminals at Dahej & Kochi. IndianOil has marketing rights for 30% quantity of the LNG procured by PLL from RasGas on long term basis at Dahej besides long term contract at Kochi. Demand for Natural gas in India is growing and cannot be met by the current indigenous production. Hence, IndianOil is in the process of sourcing more quantities of LNG to meet the increasing requirement. DieselWithin the gas business, City Gas Distribution (CGD) is a rapidly growing segment. Green Gas Ltd., IndianOil's joint venture with GAIL (India) Ltd., is already operational in Agra and Lucknow in the state of Uttar Pradesh and is further expanding to cater to the increased demand in various sectors. In an initiative to expand the CGD network, IndianOil has formed a consortium with M/s Adani Gas Ltd. to develop CGD networks on pan India basis. In Gas Transmission business, IndianOil owns and operates Dadri-Panipat Pipeline. IndianOil has formed a consortium with GSPL and other OMC's to build & operate Gas pipelines across the country. In a major step to increase IndianOil's presence in Natural Gas industry, Corporation is currently implementing 5 MTPA LNG import Terminal at Ennore near Chennai which is targeted for completion during 2015-16. IndianOil is in the process of procuring LNG from world market on long term as well as short term basis for meeting the Internal Consumption at our own Refineries and for Ennore LNG Terminal. IndianOil has the capabilities to supply re-gassified

LNG to customers presently located in the Northern and Western regions of India. With the expansion of the pipeline network in Southern region as well as other parts of the country, IndianOil can supply gas to customers located near those pipelines. As a committed supplier, IndianOil is completely responsible for delivery of gas to the customer's premises. The transportation services of the company engaged in transportation of gas are hired to ensure deliveries. This model is used world over wherein multiple gas suppliers operate through one transportation system. The " LNG at Doorstep" initiative involves making LNG available to the customers not connected by gas pipeline. Gas is transported through a cryogenic system, stored in a cryogenic holding tank at the target location and re-gassified on-site through vaporizers for use as fuel. The entire operation being concealed eliminates the possibility of adulteration and pilferage. Introduced in 2007, this initiative has been well received and is attracting more customers located away from the pipelines. IndianOil has in-house capabilities in the manufacturing of Cryogenic equipment at the " State of Art facility at Nasik" for the last three decades.

## **Petrol/Gasoline**

Automotive gasoline and gasoline-oxygenate blends are used in internal combustion spark-ignition engines. These spark ignition engine fuels are primarily used for passenger cars. They are also used in off-highway utility vans, farm machinery and in other spark ignition engines employed in a variety of service applications. [http://www. iocl.](http://www.iocl.com/NewImages/Thumbnails/XtraCare-at-night.jpg)

[com/NewImages/Thumbnails/XtraCare-at-night. jpg](http://www.iocl.com/NewImages/Thumbnails/XtraCare-at-night.jpg) Gasoline is a complex mixture of relatively volatile hydrocarbons that vary widely in chemical &

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physical properties and are derived from fractional distillation of crude petroleum with a further treatment mainly in terms of improvement of its octane rating. The hundreds of individual hydrocarbons in gasoline range from C<sub>4</sub> to C<sub>11</sub>. An oxygenate is an oxygen-containing, ashless organic compound (such as an alcohol or ether) which can be used as a fuel or fuel supplement. Motor gasoline is sold at retail outlets where it is directly delivered into the automobile tank. The Indian Standard governing the properties of motor gasoline & gasoline-oxygenate blends is IS 2796 : 2000 (3rd Rev). In view of the auto fuel policy issued by Govt of India, more & more stringent specifications (equivalent to Euro II, Euro III, Euro IV) are being made applicable for the gasoline being marketed in India. This has led to reduction of environmentally polluting factors in gasoline. Indian Oil Aviation Service is a leading aviation fuel solution provider in India and the most-preferred supplier of jet fuel to major international and domestic airlines. Between one sunrise and the next, Indian Oil Aviation Service refuels over 1500 flights – from the bustling metros to the remote airports linking the vast Indian landscape, from the icy heights of Leh (the highest airport in the world at 10,682 ft) to the distant islands of Andaman & Nicobar. Jet fuel is a colorless, combustible, straight-run petroleum distillate liquid. Its principal uses are as jet engine fuel. The most common jet fuel worldwide is a kerosene-based fuel classified as JET A-1. The governing specifications in India are IS 1571: 2001 (7th Rev) Indian Oil is India's first ISO-9002 certified oil company conforming to stringent global quality requirements of aviation fuel storage & handling. Indian Oil Aviation also caters to the fuel requirements of the Indian Defense Services, besides

refueling VVIP flights at all the airports and remote heli-pads/heli-bases across the Indian subcontinent. Indian Oil Aviation group regularly organizes International Aviation conferences that act as a vital information facilitator with participation from leading international and all domestic airlines, allied industries, statutory aviation authorities and government agencies from over 35 countries. IndianOil is the only oil company in India to market the widest possible range of fuels used by the aviation industry in India- JP-5, Avgas 100LL, Methanol Water Mixture, Jet A-1 and aviation lubricants, etc. Aviation Turbine Fuel (ATF) is dispensed from specially designed refuellers, which are driven up to parked airplanes and helicopters. Major airports have hydrant refuelling systems that pump the fuel right up to the filling outlets on the tarmac through underground pipelines for faster refuelling. Essentially, ATF is pumped into an aircraft by two methods: Overwing and Underwing. Overwing fuelling is used on smaller planes, helicopters, and piston-engine aircraft and is similar to automobile fuelling - one or more fuel ports are opened and fuel is pumped in with a conventional pump. Underwing fuelling, also called single-point is used on larger aircraft. To ensure that you receive the best service, every one of our 101 AFSs follows specific quality audits based on a Quality Control Index System benchmarked to global standards. In addition, 15 Quality Certification Laboratories provide complete specification tests round-the-clock. Ensuring that these standards are always upheld, there is a back up of a highly skilled, qualified and dedicated team of officers and refueling crew. IndianOil has a strategic partnership with Air BP, the world leader in aviation business. IndianOil regularly organizes seminars, symposiums and workshops to constantly interact with its partners, which

apart from being a two-way channel of communication, helps us to stay abreast with advances in technology. SERVO brand, from IndianOil, is the brand leader among lubricants and greases in India and has been conferred the "Consumer Superbrand" status by the Superbrands Council of India. Recognised for its brand leadership by the World Brand Congress and as a Master Brand by CMO, Asia, SERVO has now carved a significant niche in over 20 countries across the globe. With over 1000 commercial grades and over 1,500 formulations encompassing literally every conceivable application, SERVO serves as a one-stop shop for complete lubrication solutions in the automotive, industrial and marine segments. Recognised for cutting-edge technology and high-quality products, SERVO is backed by IndianOil's world-class R&D and an extensive blending and distribution network. The recent top-end offerings in the segment are all-new engine oils on a differentiated synthetic platform—SERVO Futura Synth, a 100% synthetic premium lubricant for diesel & petrol cars and SERVO 4T Synth, engine oil with advanced synthetic chemistry for 4-stroke two-wheelers—represent a big leap in bringing technologically advanced motor oils of global standards to the Indian market. Both the products offer outstanding engine protection and performance that far surpasses the benefits offered by conventional mineral-oil based lubricants. (Please refer to the product sub-segment on this website for product specifications and recommendations of the newly-launched products). In the retailing segment, besides Indian Oil petrol stations, SERVO range of lubricants is available through a network of a unique SERVO Stockist Management System (SSMS) across the country. The products are available in every corner of the country through various

retailing initiatives like SERVOXPRESS stations, bazaar outlets and thousands of auto spare parts shops across the country along with a unique concept of Gramin SERVO Stockists to reach the rural hinterland. SERVOXPRESS vehicle servicing centres are one-stop shops for quick, easy and convenient auto care, offering a refreshing experience to motorists. Opened in convenient locations like malls, petrol pumps or as stand-alone units, SERVOXPRESS stations have facilities for engine oil change, tyre & battery check-ups, air-conditioner service, vacuum cleaning, perfuming, upholstery cleaning, polishing, lamination installation, etc., besides replacement of minor parts for two and four-wheeler vehicles. Lubrication is the art of reducing friction between rubbing or rolling surfaces. In the recent past two terminologies have gained currency - Tribology, the science of Rubbing; Rheology, the study of stream or flow. The earliest knowledge of lubrication is evident from grease lubricated chariot wheels excavated from the ruins. The rapid development of this science can be said to have started from the 18th century, with significant technological progress in commercial usage in the 20th century. Most lubricants are liquids. Water is a natural lubricant but has extremely limited application due to its very low viscosity and very low boiling point, besides its contribution to rusting and corrosion.

## **Marine Fuels & Lubricants**

Indian Oil caters to all types of bunker fuels and lubricants required by various types of vessels operating throughout the world in the shipping industry. Bunker supplies are made at all major ports of India; Mumbai, Kandla, Vasco, Chennai, Tuticorin, Kakinada, Visakhapatnam, Kochi, New Mangalore, Kolkata, Paradip, JNPT, Port Blair and Haldia. Apart from meeting

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100% bunker requirement of the Indian Navy, it also supplies bunker fuels to all major shipping and dredging companies of India. Spot requirement of different vessels calling at Indian ports are met through nominations received from local shipping agents and international bunker traders/brokers. While Indian Oil supplies Furnace Oil (FO) and High Flash High Speed Diesel (HFHSD) meeting stringent BIS specifications, it also offers the entire range of SERVO brand marine grade lubricants. Supplies are made through pipelines, barges and tank-trucks. Bunker supplies are undertaken through pipeline at specified jetties at Haldia, Vasco, Port Blair, Mangalore, Visakhapatnam, Kakinada, JNPT (Mumbai) and Chennai. Tank trucks are used for bunker supplies at Tuticorin, Paradip, Port Blair, Mangalore and Haldia. Barges are used for bunker supplies at jetties and inner anchorages at Haldia, Mumbai, Kandla, Visakhapatnam, Kochi and Chennai. Indian Oil has also started supplying Bonded 380 cst FO bunker fuel from Chennai from May 2009 as per ISO 8217: 2005 specifications. The price of this product is internationally competitive and revised on a weekly basis based on MOPS (Mean of Platts-Singapore). KeroseneKerosenes are distillate fractions of crude oil in the boiling range of 150-250°C. They are treated mainly for reducing aromatic content to increase their smoke point (height of a smokeless flame) and hydrofining to reduce sulphur content and to improve odour, colour & burning qualities (char value). Kerosene is used as a domestic fuel for heating / lighting and also for manufacture of insecticides/herbicides/fungicides to control pest, weeds and fungi. Since kerosene is less volatile than gasoline, increase in its evaporation rate in domestic burners is achieved by increasing surface area of the oil to be

burned and by increasing its temperature. The two types of burners which achieve this fall into two categories namely vaporisers & atomizers. The Indian Standard governing the properties of kerosene is IS 1459: 1974 (2nd Rev).

## **Bulk/Industrial Fuels**

In the large volume consumer segment, IndianOil's provides complete Fuel Management Solutions to customers who require fuels in bulk and have dedicated facilities for storage and handling. These customers benefit from IndianOil's efficient sourcing and supplies matched to their usage patterns and inventory. The optimization on and optimization of supplies is especially relevant in the light of high-energy input costs in the recent past, which is expected to continue in the future too. IndianOil's tankages are strategically located across the country and are custom-designed to maintain low-cost supplies that can be rapidly transported through a sophisticated supply-chain management system. Whether it is an immediate need, a long-term supply contract or even setting up dedicated storage and handling facilities at your premises, IndianOil's network is at your service. IndianOil's marketing operations network of storage, distribution and supply hubs is backed by on-time logistics and round-the-clock after-sales service. Many institutional customers like the railways, steel plants, thermal power plants, textile mills, power plants, state transport undertakings, large corporates and fleet & logistics companies tie-up for long-term contracts backed by IndianOil's comprehensive fuel & lubricants consultancy-a formidable expertise that IndianOil has built over nearly five decades of working with a cross-section of customers from a wide-range of industrial sectors. IndianOil's bulk liquid fuel

supply covers the complete gamut of fuels-Auto fuels, Light Diesel Oil, Low Sulphur Heavy Stock, Special Products and much more.

## **Bitumen**

Bitumen is a common binder used in road construction. It is principally obtained as a residual product in petroleum refineries after higher fractions like gas, petrol, kerosene and diesel, etc., are removed. Indian Standard Institution defines Bitumen as a black or dark brown non-crystalline solid or viscous material having adhesive properties derived from petroleum crude either by natural or by refinery processes. IndianOil produces bitumen from its refineries at Panipat, Mathura, Koyali, Haldia and Chennai and markets it in bulk as well as packed in steel drums. IndianOil also markets modified Bitumen CRMB and Emulsion. CRMB is produced at Panipat, Mathura, Koyali, Haldia and CPCL refineries. IndianOil markets Bitumen Emulsion by the brand name Indemul and it is produced from emulsion plants located in Haldia and Panipat refineries. CRMB and Emulsion are available both in bulk as well as in packed drums

## **Petrochemicals**

<http://www.iocl.com/NewImages/Thumbnails/PP-Petrochem1.jpg> India is amongst the fastest growing petrochemicals markets in the world. Taking this into consideration and to enhance its downstream integration, IndianOil is focusing on increasing its presence in the domestic petrochemicals sector besides the overseas markets through systematic expansion of customer base and innovative supply logistics. Petrochemicals have been identified as a prime driver of future growth by IndianOil. The Corporation is envisaging

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an investment of Rs 30, 000 crore in the petrochemicals business in the next few years. These projects will utilise product streams from the existing refineries of IndianOil, thereby achieving better exploitation of the hydrocarbon value chain. Beginning with a low-investment, high-value projects such as Methyl Tertiary Butyl Ether (MTBE) and Butene-1 at Gujarat Refinery, Vadodara, IndianOil has set up a world-scale Linear Alkyl Benzene (LAB) plant at Gujarat Refinery and an integrated Paraxylene/Purified Terephthalic Acid (PX/PTA) plant at Panipat. A Naphtha Cracker complex with downstream polymer units is also in operation at Panipat. [http://www. iocl. com/NewImages/Thumbnails/petrochemicals\\_dis. jpg](http://www.iocl.com/NewImages/Thumbnails/petrochemicals_dis.jpg)These initiatives are designed to catapult IndianOil among the top three petrochemicals players in Southeast Asia in the long term. In order to penetrate the petrochemicals market effectively, a separate Strategic Business Unit (SBU) has been created in IndianOil for marketing of petrochemicals. This SBU has five exclusive sub-groups, classified product wise (LAB, PTA, Polymers) and function wise (Logistics & Exports), in addition to regional/field set-ups to offer reliable customer service. This SBU has already established IndianOil's LAB business both in India and abroad. Today, IndianOil is a major supplier to the key players in the detergent industry, both national and international. Similarly, in PTA business, all major domestic customers are catered to by IndianOil. A robust logistics model has been the key to IndianOil's success story and facilities have been put in place for seamless product dispatches to customers by rail, road and sea.

## Special Products

Other than the regular petroleum products like light distillates, middle distillates, heavier products like Furnace Oil, Bitumen, etc., IndianOil refineries also manufacture petroleum products for specific applications. These specific applications could be feed stock for chemical industry, raw material for specific industries and solid fuels. The petroleum products, produced for specific applications are called, 'Petrochemicals and Specialties (P&S) Products'. Every petroleum refinery is not designed to produce P&S products but IndianOil's refineries have been planned to make a large portfolio of P&S products. The indicative list of products from IndianOil's various refineries is as follows: RefineryP&S ProductsBarauniCarbon Black Feedstock (CBFS), Raw Petroleum Coke (RPC), SulphurDigboiParaffin WaxGuwahatiRaw Petroleum Coke (RPC)HaldiaCBFS, Jute Batching Oil (JBO), Micro Crystalline Wax (MCW), Mineral Turpentine Oil (MTO), SulphurKoyaliLABFS, Mineral Turpentine Oil (MTO), Sulphur, TolueneMathuraPropylene, SulphurPanipatBenzene, Mineral Turpentine Oil (MTO), Petcoke, Sulp[1]hur

## PART A

### Geographical region

#### Geography and Climate of Sri Lanka

Overall, Sri Lanka has a varied terrain but it mainly consists of flat lands but south-central portion of the country's interior features mountain and step sided river canyons. The flatter regions are the areas where most of Sri Lanka's agriculture takes place, aside from coconut farms along the coast.

Sri Lanka's climate is tropical and the southwestern part of the island is the <https://assignbuster.com/atmospheric-pressure-and-normal-temperatures-engineering-essay/>

wettest. Most of the rain in the southwest falls from April to June and October to November. The northeastern part of Sri Lanka is drier and most of its rain falls from December to February. Sri Lanka's average yearly temperature is around 86°F to 91°F (28°C to 31°C). An important geographic note about Sri Lanka is its position in the Indian Ocean, which made it vulnerable to one of the world's largest natural disasters. On December, 26, 2004, it was struck by large tsunami that hit 12 Asian countries. Around 38, 000 people in Sri Lanka were killed during this event and much of Sri Lanka's coast was destroyed.

## **2. Forms of transportation and communication available in that regions**

In 1987 the road network extended 74, 954 kilometers, of which 25, 504 were maintained by the Ministry of Highways and the remainder by local governments (see fig. 10). During 1984 the government embarked on a five-year road maintenance program at an estimated cost of Rs5 billion, to be financed by loans from the World Bank (see Glossary) and the Asian Development Bank, together with a grant from Japan. The total number of registered motor vehicles in 1986 was about 478, 000. Road haulage is handled by private companies; some businesses also have their own trucking operations. After 1978 container transport became an important mode of freight haulage for exports produced in the investment promotion zones. Intercity haulage is carried out by trucks. Bullock carts remained important in rural and suburban areas in the 1980s. The Ceylon Transport Board had the sole responsibility for providing public passenger road transport from 1957 to 1978. Fares were heavily subsidized, but overcrowding was severe.

In 1978 private buses were again allowed to operate, and the Sri Lanka Transport Board and nine regional transport boards replaced the Ceylon Transport Board. The Sri Lanka Transport Board had responsibility for overall transport policy, budgeting, and production planning, whereas the regional boards were responsible for the operation of regular regional and interregional bus services. In 1986 the revenue-cost ratio of the regional boards was 89 percent. Private road transport expanded rapidly in the late 1970s and early 1980s, but as in the state sector, there was some contraction in the mid-1980s as a result of the declining security in the northern and eastern parts of the country. In 1986 the private sector accounted for about half of the passenger-kilometers. Many buses in both the state and private sectors were in poor condition. The island's first railroad line, from Colombo to Kandy, was opened in 1867, and in the 1980s Sri Lanka Railways had 1,944 kilometers of railroad track. In early 1988, service in Northern and Eastern provinces had been irregular for several years. The network's passenger-kilometers amounted to 1.9 billion in 1986, about 38 percent less than its total in 1982. Freight services, on the other hand, remained fairly steady in the mid-1980s. The railroads have been operated at a loss since independence. Three ports can accommodate deep water vessels: Colombo, Trincomalee, and Galle. Colombo was by far the most important. In 1985 it handled nearly 3 million tons of cargo compared with about 600,000 jointly handled by the other two ports. In 1986 the Ceylon Petroleum Corporation began a project to build a single-point buoy mooring 9.6 kilometers offshore from Colombo port. When completed, this project will greatly reduce the costs of discharging crude oil to the refinery

near Colombo. In 1971 Sri Lanka launched its own merchant fleet. The state-owned Sri Lanka Shipping Corporation purchased its first vessel, a 14, 000-ton freighter, in March 1971. By 1981 the corporation owned eight ships, including a 20, 000 deadweight ton tanker. In 1987 the firm began to replace its aging fleet. Colombo is a stopping place on international air routes between Europe and the Asia-Pacific region. The first stage of a redevelopment plan for the Bandaranaike International Airport at Katunayake was completed in October 1986 with the opening of a new runway, built at a cost of Rs517 million. Some foreign airlines reduced or suspended services in the mid-1980s because of declining traffic due to the security situation. Air Lanka, the nation's flag carrier, was established in 1980, and in early 1988 it connected Sri Lanka with Europe, the Middle East, and South and Southeast Asia. It was 60 percent government owned. In 1987 a presidential commission set up to inquire into the airline's financial affairs accused former members of the airline's board of subordinating the company's development to their private gain. Taking into account the realizable value of its assets and other costs associated with a forced sale, estimated cumulative losses up to the end of the fiscal year 1986 were Rs7. 7 billion, or about Rs1. 3 billion for each year of operation. In early 1988, a foreign airline was reportedly being sought to manage Air Lanka and turn it into a viable enterprise.