CHEMICAL ENGINEER

Design chemical plant equipment and devise processes for manufacturing chemicals and products, such as gasoline, synthetic rubber, plastics, detergents, cement, paper, and pulp, by applying principles and technology of chemistry, physics, and engineering.

Tasks

Develop safety procedures to be employed by workers operating equipment or working in close proximity to on-going chemical reactions.

Troubleshoot problems with chemical manufacturing processes.

Evaluate chemical equipment and processes to identify ways to optimize performance or to ensure compliance with safety and environmental regulations.

Conduct research to develop new and improved chemical manufacturing processes.

Determine most effective arrangement of operations such as mixing, crushing, heat transfer, distillation, and drying.

Perform tests and monitor performance of processes throughout stages of production to determine degree of control over variables such as temperature, density, specific gravity, and pressure.

Design and plan layout of equipment.

Prepare estimate of production costs and production progress reports for management.

Design measurement and control systems for chemical plants based on data collected in laboratory experiments and in pilot plant operations.

Develop processes to separate components of liquids or gases or generate electrical currents using controlled chemical processes.

Perform laboratory studies of steps in manufacture of new product and test proposed process in small scale operation such as a pilot plant.

Direct activities of workers who operate or who are engaged in constructing and improving absorption, evaporation, or electromagnetic equipment.

Knowledge

Engineering and Technology — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.

Chemistry — Knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques, and disposal methods.

Mathematics — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.

Physics — Knowledge and prediction of physical principles, laws, their interrelationships, and applications to understanding fluid, material, and atmospheric dynamics, and mechanical, electrical, atomic and sub- atomic structures and processes.

Production and Processing — Knowledge of raw materials, production processes, quality control, costs, and other techniques for maximizing the effective manufacture and distribution of goods.

English Language — Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.

Design — Knowledge of design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models.

Administration and Management — Knowledge of business and management principles involved in strategic planning, resource allocation, human resources modeling, leadership technique, production methods, and coordination of people and resources.

Computers and Electronics — Knowledge of circuit boards, processors, chips, electronic equipment, and computer hardware and software, including applications and programming.

Mechanical — Knowledge of machines and tools, including their designs, uses, repair, and maintenance.

Education and Training — Knowledge of principles and methods for curriculum and training design, teaching and instruction for individuals and groups, and the measurement of training effects.

Public Safety and Security — Knowledge of relevant equipment, policies, procedures, and strategies to promote effective local, state, or national security operations for the protection of people, data, property, and institutions.

Skills

Science — Using scientific rules and methods to solve problems.

Complex Problem Solving — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.

Critical Thinking — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.

Judgment and Decision Making — Considering the relative costs and benefits of potential actions to choose the most appropriate one.

Systems Analysis — Determining how a system should work and how changes in conditions, operations, and the environment will affect outcomes.

Mathematics — Using mathematics to solve problems.

Active Learning — Understanding the implications of new information for both current and future problem-solving and decision-making.

Reading Comprehension — Understanding written sentences and paragraphs in work related documents.

Systems Evaluation — Identifying measures or indicators of system performance and the actions needed to improve or correct performance, relative to the goals of the system.

Operations Analysis — Analyzing needs and product requirements to create a design.

Speaking — Talking to others to convey information effectively.

Active Listening — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.

Writing — Communicating effectively in writing as appropriate for the needs of the audience.

Monitoring — Monitoring/Assessing performance of yourself, other individuals, or organizations to make improvements or take corrective action.

Time Management — Managing one's own time and the time of others.

Troubleshooting — Determining causes of operating errors and deciding what to do about it.

Coordination — Adjusting actions in relation to others' actions.

Operation Monitoring — Watching gauges, dials, or other indicators to make sure a machine is working properly.

Education – Four years Degree course

Abilities

Information Ordering — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).

Mathematical Reasoning — The ability to choose the right mathematical methods or formulas to solve a problem.

Problem Sensitivity — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.

Category Flexibility — The ability to generate or use different sets of rules for combining or grouping things in different ways.

Deductive Reasoning — The ability to apply general rules to specific problems to produce answers that make sense.

Inductive Reasoning — The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).

Oral Comprehension — The ability to listen to and understand information and ideas presented through spoken words and sentences.

Written Comprehension — The ability to read and understand information and ideas presented in writing.

Number Facility — The ability to add, subtract, multiply, or divide quickly and correctly.

Fluency of Ideas — The ability to come up with a number of ideas about a topic (the number of ideas is important, not their quality, correctness, or creativity).

Near Vision — The ability to see details at close range (within a few feet of the observer).

Oral Expression — The ability to communicate information and ideas in speaking so others will understand.

Originality — The ability to come up with unusual or clever ideas about a given topic or situation, or to develop creative ways to solve a problem.

Selective Attention — The ability to concentrate on a task over a period of time without being distracted.

Speech Clarity — The ability to speak clearly so others can understand you.

Visualization — The ability to imagine how something will look after it is moved around or when its parts are moved or rearranged.

Flexibility of Closure — The ability to identify or detect a known pattern (a figure, object, word, or sound) that is hidden in other distracting material.

Written Expression — The ability to communicate information and ideas in writing so others will understand.

Far Vision — The ability to see details at a distance.

Perceptual Speed — The ability to quickly and accurately compare similarities and differences among sets of letters, numbers, objects, pictures, or patterns. The things to

be compared may be presented at the same time or one after the other. This ability also includes comparing a presented object with a remembered object.

Speech Recognition — The ability to identify and understand the speech of another person.

Work Activities

Making Decisions and Solving Problems — Analyzing information and evaluating results to choose the best solution and solve problems.

Analyzing Data or Information — Identifying the underlying principles, reasons, or facts of information by breaking down information or data into separate parts.

Getting Information — Observing, receiving, and otherwise obtaining information from all relevant sources.

Communicating with Supervisors, Peers, or Subordinates — Providing information to supervisors, co-workers, and subordinates by telephone, in written form, e-mail, or in person.

Interacting With Computers — Using computers and computer systems (including hardware and software) to program, write software, set up functions, enter data, or process information.

Updating and Using Relevant Knowledge — Keeping up-to-date technically and applying new knowledge to your job.

Organizing, Planning, and Prioritizing Work — Developing specific goals and plans to prioritize, organize, and accomplish your work.

Processing Information — Compiling, coding, categorizing, calculating, tabulating, auditing, or verifying information or data.

Thinking Creatively — Developing, designing, or creating new applications, ideas, relationships, systems, or products, including artistic contributions.

Identifying Objects, Actions, and Events — Identifying information by categorizing, estimating, recognizing differences or similarities, and detecting changes in circumstances or events.

Interpreting the Meaning of Information for Others — Translating or explaining what information means and how it can be used.

Provide Consultation and Advice to Others — Providing guidance and expert advice to management or other groups on technical, systems-, or process-related topics.

Establishing and Maintaining Interpersonal Relationships — Developing constructive and cooperative working relationships with others, and maintaining them over time.

Evaluating Information to Determine Compliance with Standards — Using relevant information and individual judgment to determine whether events or processes comply with laws, regulations, or standards.

Monitor Processes, Materials, or Surroundings — Monitoring and reviewing information from materials, events, or the environment, to detect or assess problems.

Developing and Building Teams — Encouraging and building mutual trust, respect, and cooperation among team members.

Documenting/Recording Information — Entering, transcribing, recording, storing, or maintaining information in written or electronic/magnetic form.

Developing Objectives and Strategies — Establishing long-range objectives and specifying the strategies and actions to achieve them.

Estimating the Quantifiable Characteristics of Products, Events, or Information — Estimating sizes, distances, and quantities; or determining time, costs, resources, or materials needed to perform a work activity.

Scheduling Work and Activities — Scheduling events, programs, and activities, as well as the work of others.

Guiding, Directing, and Motivating Subordinates — Providing guidance and direction to subordinates, including setting performance standards and monitoring performance.

Inspecting Equipment, Structures, or Material — Inspecting equipment, structures, or materials to identify the cause of errors or other problems or defects.

Communicating with Persons Outside Organization — Communicating with people outside the organization, representing the organization to customers, the public, government, and other external sources. This information can be exchanged in person, in writing, or by telephone or e-mail.

Coaching and Developing Others — Identifying the developmental needs of others and coaching, mentoring, or otherwise helping others to improve their knowledge or skills.

Coordinating the Work and Activities of Others — Getting members of a group to work together to accomplish tasks.

Monitoring and Controlling Resources — Monitoring and controlling resources and overseeing the spending of money.

Judging the Qualities of Things, Services, or People — Assessing the value, importance, or quality of things or people.

Training and Teaching Others — Identifying the educational needs of others, developing formal educational or training programs or classes, and teaching or instructing others.

Drafting, Laying Out, and Specifying Technical Devices, Parts, and Equipment — Providing documentation, detailed instructions, drawings, or specifications to tell others about how devices, parts, equipment, or structures are to be fabricated, constructed, assembled, modified, maintained, or used.

Selling or Influencing Others — Convincing others to buy merchandise/goods or to otherwise change their minds or actions.

Detailed Work Activities

Prepare operational reports.

Evaluate characteristics of equipment or systems.

Develop technical methods or processes.

Determine causes of operational problems or failures.

Design industrial processing systems.

Research engineering aspects of biological or chemical processes.

Determine operational methods.

Monitor the productivity or efficiency of industrial operations.

Estimate operational costs.

Direct industrial production activities.

Conduct validation tests of equipment or processes.

Design control systems for mechanical or other equipment.

Research industrial processes or operations.