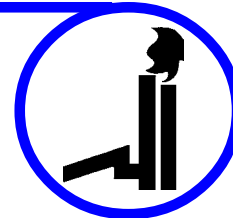


# Pharmaceutical Industry Workers



## Occupational Brief Title Codes:

- D.O.T.: 559.
- G.O.E.: 06.02.11
- S.O.C.: 51-9
- O\*NET™: 51-9
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## Occupational Subtitles:

- Capsule Filling Machine Operators
- Coaters
- Compressors
- Fermenter Operators
- Granulator Machine Operators
- Inspectors
- Laborers
- Pharmaceutical Production Workers
- Production Supervisors
- Vial and Ampoule Examiners
- Vial and Ampoule Fillers

## Work Classification Based Related

### D.O.T. Occupations:

- Chemical Processing Laborers
- Lacquer Makers
- Pharmaceutical Laboratory Technicians
- Soap Makers

## Interests Based Related

### G.O.E. Occupations:

- Color Makers
- Burner Operators
- Drier Operators
- Make-Up Operators

## Skills Based Related

### O\*NET Occupations:

- Combination Machine Tool Operators and Tenders, Metal and Plastic
- Conveyor Operators and Tenders
- Petroleum Refinery and Control Panel Operators
- Punching Machine Setters and Setup Operators, Metal and Plastic

**Pharmaceutical industry workers** (phar-ma'ceu-ti-cal `in-dus-try `work-ers) work in manufacturing plants that produce medicines and other pharmaceutical products. They tend equipment that measures, weighs, mixes, and grinds ingredients and forms pills and capsules. They process serums, vaccines, powdered or granulated products, ointments, salves, and lotions.

The pharmaceutical industry in the United States leads the world in putting new and effective medicines on the market. New drugs have reduced the death rates from pneumonia, polio, influenza, tuberculosis, syphilis, and other diseases. Antibiotics and antimalarials have saved millions. In the United States, life expectancy has increased from forty-four to seventy-nine years, largely because of drugs and vaccines.

The production of a new medicine is a costly and lengthy process requiring years of research, testing, and final approval by the Food and Drug Administration. Of all the chemical compounds that undergo research and testing, only one in five thousand passes the screening process and reaches the public as a new drug.

## Work Performed

Once a drug has been researched, developed, and approved as a therapeutic agent, pharmaceutical manufacturers produce it in large quantities. The new drug may be in the form of tablets, capsules, suspensions, or injectables. Other substances such as coloring and flavoring agents, inert fillers, stabilizers, preservatives, and other additives may go into a dosage that patients can take.

Working on production lines, **pharmaceutical production workers** weigh and measure the ingredients for tablets and capsules. They tend machines that mix, compress, and coat tablets. They monitor equipment and tanks to prepare mixtures for creams, ointments, liquids, powders, gums, and other substances. Workers run filter presses, water stills, and other machines to prepare ingredients for further processing. Production of the dosage forms also involves quality control, labeling, inspecting, storing, and shipping. Constant checking is a part of every stage of production. Workers must inspect, weigh, and test the products for conformity to specifications.

**Fermenter operators** tend fermenting tanks and equipment. This process produces antibiotics. Operators start the mixing tanks, add ingredients such as salt, yeast, and sugar, and transfer the mix to a fermenting tank. They monitor temperatures in the tanks; add liquid antibiotic, water, and foam preventive; and measure the amount of solution before transferring it to another tank for further processing. Advances in biotechnology are permitting fermentation procedures to produce many other drugs also.

**Granulator machine operators** tend mixing and milling machines equipped with fine blades that mix and crush ingredients to powder to prepare them for pressing into tablets. These operators weigh and measure amounts by the formula and the size of the batch. They start the mixing machine to blend the ingredients and add starch paste or water and alcohol to the batch.

These workers also install cutting blades and screens and tend revolving mills to force the mixture through a sieve to make a product of exact fineness. These workers may screen a granulated mixture to determine the size range of the

granules. They may tend equipment to remove mineral salts from water.

They spread the mixture on trays and put the trays in an oven or steam dryer at a preset temperature. They then remove the trays and test the product for dryness. They sometimes use a moisture meter to decide whether the batch needs more mixing or drying. They check batches for size, weight, and texture.

**Compressors** setup and operate machines to compress granulated or powdered ingredients into medicinal tablets. They install dies and adjust spring tension and ram pressure of air- or hydraulic-powered presses, according to specifications. They scoop ingredients into a hopper or position a canister of powder on top of a hopper using an overhead lift. They press control buttons to activate, adjust, and stop the machine. They examine, weigh, and test samples for defects, such as surface chips and pits, soft centers, and excessive brittleness using micrometers, scales, and hardness testers. They check the dimensions of a sample using calipers, micrometers, and other gauges. They route a sample to the lab for analysis, according to procedure.

**Coaters** control machines that apply coatings to pharmaceutical tablets. These coatings may flavor, color, preserve, add medication, or control disintegration time. They dump uncoated tablets into rotary pans of machines and start the machines. They then pour pre-measured amounts of liquid coatings, such as medicated syrup, dye, and gelatin, onto tablets to form base or successive coats according to formula or production order. To prevent tablets from sticking together and to produce a uniform coating, coaters sprinkle dusting powder onto tablets and stir them.

Coaters examine the tablets for defects such as chips and discoloration, and scrape the coating with a file to ascertain dryness. They also measure sample tablets using calipers or micrometers, and weigh them on a balance scale to determine adherence to weight and coating-thickness specifications. They then dump coated tablets and a pre-measured amount of liquid wax into a canvas-lined pan and start the pan revolving to give the tablets a final glossy coating.

**Capsule filling machine operators** run machines to fill gelatin capsules with medicine. These capsules may hold a number of different compounds such as antihistamines, vitamins, or pain relievers. Operators scoop empty capsules into a loading hopper and put the medicine into the filling hopper. In a number of steps the machine fills and seals the capsules and ejects them into a container. These workers inspect the capsules for breakage and faulty filling. They may weigh some capsules and compare the weight with figures on the specification sheet. They may run a branding machine to print the company name on the capsules.

**Vial and ampoule fillers** tend machines that fill vials and ampoules with liquid drug products. Ampoules are sealed glass tubes that hold a solution for hypodermic injections. Vials are small glass or plastic containers with rubber stoppers. Vials and syringes are replacing ampoules

as the primary containers for liquid drug products in the United States. Workers start the machine and dump empty vials and ampoules into the hopper, or they place them on the rotating table of a machine that sets them up for filling. They adjust the gas flame in the unit that seals the vials and ampoules. Once sealed, these workers count and pack the vials and ampoules in cartons for shipment.

**Vial and ampoule examiners** check vials and ampoules filled with liquid drugs. They look for flaws in the glass and for incorrect amounts of the drug. They may use a magnifying glass to inspect the containers for contamination, cracks, leaks, or other damage. They discard damaged containers. They may count and keep records of the number of inspected containers and put them in cartons. They may also seal the end of the ampoules with a Bunsen burner and tweezers.

**Inspectors** test pharmaceutical ingredients and products to detect deviations from manufacturing standards. They select samples of in-process pharmaceutical ingredients, capsules, tablets, and related products for testing, according to prescribed procedures. They weigh and measure samples, test hardness, and place samples in a disintegration bath and observe and time the rate at which they dissolve. They check ingredients against specifications to verify conformity of product name, count, and labeling. They also carry samples of incoming products to the analytical laboratory for quality assurance testing.

**Laborers** carry out tasks to help in the processing and packing of drug and toiletry products. They bring supplies to production on hand trucks or other gear. To help machine tenders, they feed plants, roots, and herbs into silage cutters, fanning mills, and washing machines. Laborers open drums and scoop or dump the contents into kettles, tanks, or hoppers. These helpers take filled cartons off packing machine conveyors and move boxes, crates, and drums from or to the receiving and shipping departments.

**Production supervisors** direct workers. They study production schedules and figure the time required to complete the jobs. They explain company policies to workers and enforce safety rules.

Supervisors examine the specifications and blueprints of job orders. They assign jobs to workers and set up or adjust work procedures. To meet production schedules, they use their knowledge of what and how much the workers and machines can do. Sometimes they suggest changes in procedures and equipment to make the department or the work crew more efficient.

Supervisors may train new workers. They recommend promotions, transfers, and discharges. They may confer with other bosses or with worker representatives about grievances.

All workers in the pharmaceutical industry follow detailed, written procedures and keep written records of work performed. These procedures and records are required by law to ensure the utmost care in the production of pharmaceutical products.

### **Working Conditions**

Pharmaceutical industry operators work in clean, air-conditioned, well-lighted production departments, which may be noisy at times but are generally quiet.

Most workers wear special clothing to reduce the possibility of contamination of the pharmaceutical products. Some workers, such as those employed in filling vials or syringes, wear complete body and face coverings to help maintain sterile conditions during filling operations.

As a rule, machine operators stand much of the time, but otherwise require little physical effort. Laborers and material handlers walk, stand, bend, and lift materials and supplies. They load or unload boxes, crates, drums, and other containers full of supplies. They use hand trucks or forklifts to move and lift heavy or bulky supplies. When workers perform hazardous tasks they use safety equipment.

### **Hours and Earnings**

Most pharmaceutical industry workers work a 40 hour week. Hours may vary with the job or the department. Most workers are on a day shift. Some companies may run production shifts around the clock seven days a week. Overtime is common during peak production periods.

Earnings cover a broad range, which vary with the size of the employing firm, the work shift, years with the company, and the geographic location of the plant. According to the Bureau of Labor Statistics, in 2004, production workers earned an overall average of \$21.35 an hour or \$919.87 a week. Laborers generally earned less than skilled workers such as machine operators; and production supervisors averaged earnings closer to \$25-30 an hour with yearly earnings reaching \$60,000 or more.

These workers usually get time and a half or double time for work over forty hours a week. Those on evening or night shifts may get an extra 10 percent. Benefits usually include paid holidays and vacation time, sick leave, medical and dental insurance, group life insurance, and pension plans. These companies may also offer savings plans, stock options, and reimbursement for tuition costs for employees who take work-related studies or courses.

### **Education and Training**

The job market in this industry is very competitive. Although those without a high school diploma may find labor and production jobs, a diploma will help workers get better jobs and promotions. High school course work should include mathematics, English, chemistry, biology, and physics.

Most pharmaceutical firms offer nonprofessional workers on-the-job training. Certain positions, such as mixing operations, require technical or vocational training. Some companies have their own study programs. Others may send selected workers to school where they improve their knowledge, qualifications, and skills. Supervisory and management positions usually require at least some postsecondary education, often in business related subjects, in addition to extensive work experience.

### **Professional Societies**

The pharmaceutical industry is regulated by the Food and Drug Administration, which requires strict and detailed studies in the development of medications before they are made available to the public.

Professional societies within the pharmaceutical industry offer organized unity for the research and development, production, packaging, and sale of pharmaceuticals. They offer business connections, and promote education and advancement in every aspect of the pharmaceutical industry. These associations also represent and lobby on behalf of the pharmaceutical industry in legal, legislative and public affairs, hold conferences and seminars, and maintain and develop industry codes and guidelines.

One professional association is the Drug, Chemical and Associated Technologies Association (DCAT) which represents approximately 375 companies. Their membership includes manufacturers, packaging agents, and brokers in the drug, chemical, and cosmetics industries. Another professional society is the Pharmaceutical Research and Manufacturers of America (PhRMA). They are a non-profit trade association of more than 100 research-based pharmaceutical companies who manufacture dosage-form pharmaceuticals under their own brand name. These companies account for 90 percent of the sales in the United States.

### **Personal Qualifications**

Workers in the pharmaceutical industry must be alert and detail oriented. They must be able and willing to work to exact specifications. Production workers should have dependable work habits and the temperament to work at repetitive tasks.

Occupations can be adapted for workers with disabilities. Persons should contact their school or employment counselors, their state office of vocational rehabilitation, or their state department of labor to explore fully their individual needs and requirements as well as the requirements of the occupation.

### **Where Employed**

According to a report from the Bureau of Labor Statistics the pharmaceutical industry employed over 228,000 people in 2004. Of that, approximately 108,000 were production workers, and less than 6,000 were production supervisors. There are over 850 pharmaceutical manufacturing firms operating in the United States. The four largest industries are Pfizer, Johnson and Johnson, Bristol-Myers Squibb, and Merck and Company. Pharmaceutical manufacturers operate nationwide. However, employment opportunities are most lucrative in Indiana, New Jersey, Pennsylvania, New York, California, Illinois and North Carolina where many companies are based.

### **Employment Outlook**

Overall the employment outlook for workers in the pharmaceutical industry is considered very good and is

expected to continue to increase through the year 2012. As machinery becomes more automated, however, there may be a drop in the number of packaging and filling machine operators. Opportunities will be best for workers who can both setup and operate a variety of machines, especially computer numerical-control machines.

As the population continues to include many more older people, the pharmaceutical industry will expand in order to meet the increased medical needs of this group of people. The creation of new drugs and medicines for the treatment of diseases such as cancer, HIV/AIDS, Alzheimer's, and heart disease will create additional need for more workers. Many pharmaceutical companies are expanding into health related products, cosmetics, veterinary medicines, and botanicals. There has also been an increasing emphasis on biotechnology products.

### Entry Methods

Job seekers can inquire at local employment offices, or they can write to organizations that represent the industry. They can check newspapers, magazines, and trade journals for leads. Some looking for work may write to chamber of commerce offices in different cities to get facts on pharmaceutical companies in those locations.

### Advancement

Almost all workers in this industry can advance to some extent. The key to promotion is good work and attendance habits, and education. With further education production workers may become lab assistants. Research assistants may advance to more complex scientific assignments. Production workers with leadership skills often become supervisors. With formal postsecondary education and management training, supervisors with outstanding ability may move up to middle management positions.

### For Further Research

**Drug, Chemical & Associated Technologies Association**, One Washington Boulevard, Suite 7, Robbinsville, NJ 08691. Web site: [www.dcat.org](http://www.dcat.org)

**Pharmaceutical Research and Manufacturers of America**, 1100 Fifteenth Street, N.W., Washington, DC 20005. Web site: [www.phrma.org](http://www.phrma.org)

### Acknowledgments

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### Noteworthy Quote

*“Working in the pharmaceutical industry is highly rewarding and challenging. We are responsible for supplying people with everyday necessities ranging from cosmetics to medications used to help fight illness or pain, to vaccinations you receive as an infant to prevent illness, or vitamins to maintain good health. For me, it is exciting to know that I have not only been a part of all the advances that pharmaceuticals have brought to our society, but also all that it will bring in the future.”*

**—Don Alchen, Production Manager, Amphastar Pharmaceuticals, Rancho Cucamonga, California**

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