

International Hazard Datasheets on Occupation



Analytical chemist

Who is an analytical chemist?

A worker who conducts analysis, synthesis, and experimentation on substances, for such purposes as product and process development and application, quantitative and qualitative analysis, and improvement of analytical methodologies.

What is dangerous about this job?

- Acute poisoning by a wide variety of poisonous gases, liquids and solids that might be released in chemical reactions and in use of equipment for preparing samples for analysis.
- Burns from flames, hot surfaces or/and liquids, and released hot gases from explosion, during work with flammable materials (solids, liquids and gases) or from uncontrolled exothermal reactions.
- Exposure to a wide variety of chemicals: corrosive, irritating, suffocating, allergenic, radioactive, etc.
- Exposure to carcinogenic, mutagenic and teratogenic substances.
- Exposure to chemicals which may cause different allergic reactions: respiratory tract irritations, asthma, eye irritations or skin rash.
- Musculoskeletal disorders as a result of routine regular posture during work (prolonged standing or uncomfortable sitting).

Hazards related to this job

Specific preventive measures can be seen by clicking on the respective  in the third column of the table.

<p>Accident hazards</p> 	<ul style="list-style-type: none"> • Slips, trips and falls on wet, damaged or uneven straight floors (esp. dangerous when handling chemicals stored in glass vessels) 	
	<ul style="list-style-type: none"> • Clothes, hair, fingers and/or arms being caught in rotating and moving parts of electro-mechanical equipment, in particular centrifuges, mixers, blenders, etc. 	
	<ul style="list-style-type: none"> • "Freeze burns" from skin contact with very cold surfaces or fluids, e.g., liquefied gases 	
	<ul style="list-style-type: none"> • Electric shock or electrocution from defective electric laboratory equipment 	
	<ul style="list-style-type: none"> • Acute poisoning by a wide variety of poisonous gases, liquids and solids that might be released in chemical reactions and in the use of equipment for preparing samples for analysis 	
	<ul style="list-style-type: none"> • Cuts and pricks caused by sharp objects (knives, syringes, etc) broken glass, (explosion/breaking of glass, while inserting glass tubes within the cork) 	

	Burns from flames, hot surfaces or/and liquids, and released hot gases from explosions, during work with flammable materials (solids, liquids and gases) and from uncontrolled exothermic reactions	3
	<ul style="list-style-type: none"> Explosion of equipment that operates in overpressure or vacuum conditions may cause injuries to different parts of the body 	5
	<ul style="list-style-type: none"> Burns caused by corrosive liquids and gases 	
	<ul style="list-style-type: none"> Injuries caused by flying particles that escape during a outbursts from centrifuges and autoclaves 	6
	<ul style="list-style-type: none"> Damage to eyes from exposure to laser beams, corrosive gases, splashes of chemicals and flying particles 	7
Physical hazards	<ul style="list-style-type: none"> Exposure to ionizing radiation during work with radioactive materials and/or defective laboratory equipment using radioactive sources 	8
	<ul style="list-style-type: none"> Exposure to non-ionizing radiation: infrared radiation, visible light, ultraviolet light, laser radiation, microwave and radiofrequency radiation; high and extremely low frequency electromagnetic fields due to work with defective laboratory equipment/instruments and/or incorrect habits of work 	8
	<ul style="list-style-type: none"> Exposure to high amplitude whole-body vibration and noise in subsonic (including infrasound) or ultrasonic ranges from vibrating and rotating mechanical equipment and from ultrasound equipment) 	
Chemical hazards	<ul style="list-style-type: none"> Exposure to a wide variety of chemicals: corrosive, irritating, suffocating, allergic, radioactive, etc. 	9
	<ul style="list-style-type: none"> Exposure to carcinogenic, mutagenic and teratogenic substances 	9
	<ul style="list-style-type: none"> Exposure to substances that can cause damage to the nervous system 	9
	<ul style="list-style-type: none"> Exposure to chemicals that may cause different allergic reactions: respiratory tract irritations, asthma, eyes irritations and skin rash 	9
Biological hazards	<ul style="list-style-type: none"> Possible exposure to biological hazards such as viruses, microbes, fungus, parasites, etc. through pathways such as inhalation, swallowing, skin contact, eye contact, as well as during handling of laboratory samples 	9
	<ul style="list-style-type: none"> Exposure to Legionella, a bacterium which may be transmitted through ventilation systems 	
Ergonomic, psychosocial and organizational factors	<ul style="list-style-type: none"> Musculoskeletal disorders as a result of routine regular posture during a work (prolonged standing or uncomfortable sitting) 	
	<ul style="list-style-type: none"> Overexertions, which may influence various systems of the body, during moving or handling of heavy or large laboratory equipment, or large boxes and packages of chemicals and/or samples intended for analysis 	10

	Eye strain from prolonged work with optic and electron microscopes, computers (VDU), work in rooms with insufficient illumination, etc.	
	<ul style="list-style-type: none"> Cumulative trauma disorders (CTD) as a result of repetitive manual operations, e.g., in pipetting, non-automated counting, manual grinding, etc. 	
	<ul style="list-style-type: none"> Psychological effect of "getting accustomed" to routinely encountered hazards with the resulting loss of alertness 	
	<ul style="list-style-type: none"> Problems associated with unusual working schedules (work at night, on holidays, etc.) required by the continuity of experiments or due to time pressure 	
	<ul style="list-style-type: none"> Development of addiction to psychoactive drugs due to their easy availability 	

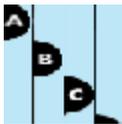
Preventive measures

- 1 Wear safety shoes with non-skid soles; when necessary, floors should be made ragged
- 2 To prevent entanglement in moving machinery, do NOT work with loose hair (cover your head), do NOT wear clothing with loose ends (loose sleeves, loose shirt ends, loose trousers, etc.)
- 3 Wear heat and cold insulating gloves
- 4 Apply chemical safety rules when handling or working with hazardous chemicals; read MSDSs and consult a safety supervisor for specific chemicals
- 5 Install an appropriate guard over and around vacuum glass vessels that way can collapse
- 6 Use chemical resistant gloves, coveralls, face protection and eyes protection glasses
- 7 Wear appropriate eyes protection; consult a safety supervisor or a supplier
- 8 Apply radiation safety rules according to instructions by the factory safety supervisor; if need be consult a safety supervisor
- 9 Follow appropriate safety procedures while working with hazardous chemicals, biological materials and with laboratory animals; in special circumstances consult a safety supervisor
- 10 Use safe lifting and moving techniques while at work with heavy and awkward loads; use mechanical aids to assist in lifting

Specialized information

Synonyms Analytical anorganic chemist; analytical organic chemist; chemist.

Definitions and/or description Conducts analysis, synthesis, and experimentation on substances, for such purposes as product and process development and application, quantitative and qualitative analysis, and improvement of analytical methodologies: Analyzes the chemical nature and make-up of substances using a variety of modern analytical techniques, methods and high technology instrumentation. Analyzes



organic and inorganic compounds to determine chemical and physical properties, utilizing such techniques as chromatography, spectroscopy and spectrophotometry. Conduct sample preparation and quantitative analysis of air, water and soil samples; work with samples containing toxic and hazardous materials. May be responsible for challenge, calibration, maintenance and operation of automatic instrumentation and sample systems. Conducts research into composition, structure, properties, relationships and reactions of matter. An analytical chemist must know the tools that are available to tackle a wide variety of problems. Must have strong skills, practical experience and understanding of various analytical techniques used in the design, development, identification and characterization of new compounds. Must have ability to work independently and effectively under deadlines. May be designated according to chemistry specialty as Analytical Inorganic Chemist; Analytical Organic Chemist.

Related and specific occupations

Chemical technician; organic chemist; inorganic chemist; chemical laboratory worker; chemical engineer; physical chemist; chemical laboratory technician.

Tasks

Adding; adjusting; analyzing; applying; assembling; blending; boiling; calculating; calibrating; changing; classifying; cleaning; closing; concluding; conferring; confirming; connecting; controlling; cooling; contacting (customers); counting; cutting; decreasing; delivering; demonstrating; determining; developing; diluting; disinfecting; dissolving; distributing; ; dosing; dropping; drying; entering of data; estimating; evaporating; examining; extinguishing; fermenting; filling; filtering; grinding; heating; identifying; injecting; installing; making (holes); managing; marking; measuring; milling; mixing; moving; observing; operating; opening; ordering; participating; performing; preparing; printing; processing; refining; removing; reporting; researching; sampling; searching; selecting; separating; sorting; spilling; sterilizing; storing (sample); strengthening; supervising; supplying; taking; treating; updating; warning; washing; weighing; writing.

Primary equipment used

Adjustment and measure temperature equipment; analysis and sampling equipment; balance weight; blending and mixing tools; calculator; computer; electric equipment; glass and plastic vessels; graphic monitor; filters; laboratorial bottles; measure instrument; personal protective equipment; protection and treatment devices; pumps; sieve; scales; stopwatch; vacuum pump.

Workplaces where the occupation is common

Clinics; hospitals; public and private laboratory; industries: chemistry, food, metal finishing, metallurgy, paper, petrochemistry, polymer, rubber, and another; quality assurance laboratory; standard institute; schools; university.

Notes



1. Analytical chemistry is the science of the measurement and identification of the chemical compounds that underlie most aspects of modern life and plays a central part within the chemical industry.

2. Analytical chemists determine the quality of drugs, ensure the accuracy of the testing of the toxicity and stability of pharmaceutical, and determine the composition of everything edible from cat food to best steak, the quality of steel in a suspension bridge or the composition of moon dust. Analytical chemistry is the basis of forensic chemistry, the testing of drugs in sport, the identification of contaminants in food, the measurement of environmental quality and pollution, whether of air, soil or water, and numerous other measurements. Analytical chemists identify the constituents of industrial waste, trace the spillage of pollutants, identify drugs at the scene of a crime, and trace a car from the fragments left at an accident. Their work has lead to home-testing kits for pregnancy and diabetes, curbside testing of blood alcohol levels of drunk drivers, checking the pH of soil, monitoring lead and carbon dioxide levels in exhausts, ensuring the purity of the water we drink and many others.

3. In the light of the above, it is clear that exposure of workers to occupational hazards is highly dependent on the scope of their occupations, and therefore it is possible to provide in more exact

detail concerning their occupational hazards according to their specific occupation.

References



1. ILO Encyclopaedia of Occupational Health and Safety, 3rd Ed., Geneva, 1983.
2. ILO Encyclopaedia of Occupational Health and Safety, 4th Ed., Geneva, 1998.
3. Kirk-Othmer, Encyclopedia of Chemical Technology, 4th Ed., 1992.
4. . U.S. Department of Labor: Dictionary of Occupational Titles – DOT, 2 Vol., 1991.

This datasheet was authored by a group of experts headed by prof. Donagi from the Israel Institute for Occupational Safety and Hygiene

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