



# Scientific Occupations

## Geologist

Some geologists study the crystal structure of minerals. They use techniques such as X-ray Crystal Diffraction (XRD) and X-ray Photoelectron Spectroscopy (XPS). The use of X-rays needs to be monitored so users wear a radiation dosage badge. Techniques such as XPS need ultrahigh vacuum conditions and so require liquid nitrogen. The liquid nitrogen is poured into traps on the ultrahigh vacuum pumps. Liquid nitrogen is very hazardous as it is  $-196^{\circ}\text{C}$  and causes severe 'cold burns'. If handling large amounts of liquid nitrogen a full face visor should be worn as well as gauntlets. The geologist may work in a laboratory in a university and wears the usual lab wear such as a lab coat and safety spectacles when required. A geologist usually has a degree in geology or earth science and A levels in science subjects such as chemistry and physics or maybe geography.

## Combustion Physicist

A combustion physicist may work on the use of alternative fuels e.g. biodiesel from oilseed rape. They work in a laboratory in a university or in a large company with research facilities. It involves the use of shock tubes, long steel tubes connected together with a diaphragm separating gases at different pressures. The work provides a clearer understanding of the processes involved in the initiation of combustion in different types of fuels. Care must be taken to protect the ears and eyes when the shock tube is ignited. In addition the usual lab wear such as a lab coat may be worn. Combustion physicists have degrees in physics or engineering and A levels in physics and maths.

## Quality Control Chemist

A Quality Control (QC) chemist usually works on a manufacturing plant. If the plant manufactures harmful chemicals such as sulfuric acid then the chemist will need to protect himself against these hazards. Sulfuric acid is used in car batteries and in the manufacture of fertilisers. It is corrosive and harmful. The chemist will need to go onto the plant to take samples and so will need to wear a hardhat and safety footwear. In addition a chemical splash suit, goggles or face visor and neoprene (chemically resistant) gloves should be used when handling concentrated sulfuric acid. Some Quality Control chemists have GCSEs in science or chemistry and are then trained for the job by their employers. Or they may have an A level in Chemistry or perhaps even a degree in chemistry depending on the type of job they are doing.

## Pharmaceutical Microbiologist

A pharmaceutical microbiologist works on the development of painkilling medicines. Hygiene is essential when working with medicines, this means using hair coverings as well as disposable gloves to minimise contamination. They work in a laboratory and wear usual lab clothing such as a lab coat and safety spectacles as needed. A pharmaceutical microbiologist may work in a laboratory in a university. They may work in the research laboratories of a large pharmaceutical company. Usually they will have a degree in microbiology and A levels in chemistry and biology.

## Pathologist

The pathologist may be a forensic scientist who performs autopsies to ascertain cause of death. Care must be taken to avoid breathing in possible harmful micro-organisms and to avoid direct skin contact. Contact with bodily fluids is kept to a minimum. Pathologists work in laboratories and may work in autopsy rooms. Lab coats are worn. Usually they will have a degree in biomedical science and A levels in chemistry and biology.

## Space Technologist

A space technologist may work in a clean room. This means that every effort is made to keep dust and fibres to a minimum. Shoe covers, lab coats and hair coverings are worn because it is essential to avoid dust and fibres that might affect the composites. The satellite components are made from carbon composites. This involves impregnating carbon fibre material with a special resin. A space technologist may work in a laboratory in a university that specialises in space science. Usually they will have a degree in physics or engineering and A levels in physics and chemistry.



# Hazard Information Cards

<b>Hazard</b>	<b>Hazard</b>	<b>Hazard</b>
<b>X-Ray</b>	<b>Shock Tubes</b>	<b>Liquid Nitrogen</b>
<b>Description</b>	<b>Description</b>	<b>Description</b>
Working with X-rays means that levels of radiation exposure need to be carefully monitored.	Shock tubes consist of a length of strong steel tube divided into two compartments. These are separated by a diaphragm of thin material. The gas at the shorter end is pressurised and the diaphragm is burst allowing the shock wave to form. This can seriously damage hearing.	Liquid Nitrogen is VERY cold, actually $-196^{\circ}\text{C}$ , and hence it causes severe burns. It is difficult to contain. It boils very aggressively when warmed and splashes liquid droplets in many directions. Gauntlets should be well-insulated and loose fitting so they can be removed quickly if liq. $\text{N}_2$ splashes down the inside.
<b>PPE Needed</b>	<b>PPE Needed</b>	<b>PPE Needed</b>
Lab Coat Radiation Dosage Badge	Lab coat Ear defenders Goggles	Full-face visor Gauntlets Lab coat

<b>Hazard</b>	<b>Hazard</b>
<b>Sulfuric Acid</b>	<b>Microbiology Lab</b>
<b>Description</b>	<b>Description</b>
Concentrated sulfuric acid is corrosive and causes burns and irritation to the skin and eyes. Heavy duty, chemically-resistant gloves must be worn. These are often made of neoprene.	Microbiology Labs often mean cleanroom conditions. Dust, fibres and hairs must be kept to an absolute MINIMUM. Therefore hair coverings and face masks are necessary.
<b>PPE Needed</b>	<b>PPE Needed</b>
Chemical splash suit Neoprene gloves Goggles or face visor	Lab coat Disposable gloves Safety spectacles