**الــمـــــرحـــــــلـــــــة : الثالثه**

**الـــفــصـل الــــدراسي : 2020-2021**

**الــــــــــــــمـــــــــــادة : السلامه البايولوجيه**

**Biosafty Levels**

 Biosafety Level (BSL) The biosafety level, or level of protection from the pathogen, is a range from Romance Level 1 (BSL-1) to Level 4 (BSL-4). Select the Center for Disease Control and Prevention (CDC) in the United States. In the European Union, the same levels of biosafety were established in a directive law. Wednesday, Canada, Canada, Canada, Containment. Sometimes designations sometimes have P1 to P4 (for pathogen or for level), as in the laboratory term of P3 level.



Key Features of a Level 4 Laboratory Biosafety

At the lowest level of biosafety, precautions may consist of regularly wash and minimum protection equipment. At higher biosafety levels, precautions may include airflow systems, multiple containers, sealed containers, and positive pressure personnel, and protocols for all procedures, condensed training for individuals, and high levels of security control The Canadian Ministry of Health reported that until 1999, more than 5,000 cases were recorded and 190 deaths.

Levels

Are the first level of the first level of biosafety (BSL-1) suitable for working with specific factors and does not cause disease among healthy humans. These factors must only be the minimum possible risk of laboratory and environment. At this level, precautions are limited for other levels. The laboratory staff must wash their hands when entering the laboratory and exit from it. The search can be made using these factors on standard open laboratories without special fit equipment. However, eating and drinking is generally prohibited in laboratory regions. Pollution of potential materials must be contaminated before disposal, either by adding a chemical substance such as bleaching or esoprenol or by packaging to still contain elsewhere. Personal protection equipment is only required for conditions in which individuals may be exposed to dangerous substances. The first-level Biosafety Laboratories must be locked to reduce access to the laboratory. However, BSL-1 laboratories are not necessary for the overall building. This level of biosafety is appropriate to work with several types of microorganisms including non-causative rules of eccherichia coli and staphylococcus cluster, thin roset bacill Due to the ease of relativity to safety and maintenance in a laboratory from the first biosafety level BSL-1, these species are usually used as an educational spaces for secondary schools and colleges.

second level edit

 At this level, all precautions used in Biosafety Level 1 are followed, and some additional precautions are also taken. BSL-2 is different from BSL-1 in the following:

 Laboratory personnel are specially trained in dealing with pathogens and are directed by scientists with advanced training.

 Access to the laboratory is limited while work is in progress.

 Take extreme precautions with contaminated sharps.

 Some measures where aerosols or infectious spots may develop are taken in a safety room for microbiology testing for biosafety or other physical containment equipment.

 Biosafety Level 2 2 is appropriate for work that includes agents with moderate potential risks to employees and the environment.This includes various microbes that cause mild or difficult disease in humans by aerosols in a laboratory environment.Examples include hepatitis A, B and C viruses, human immunodeficiency virus (HIV), pathogenic strains of coli and staphylococcus, salmonella, Plasmodium falciparum, and Toxoplasma gondii.

The third level

Biosafety Level III 3 is suitable for working with microbes that can cause serious and fatal diseases by inhalation.This type of work can be done in clinical, diagnostic, educational, research, or production facilities. At this level the precautions taken in the BSL-1 and BSL-2 biosafety level laboratories are taken, in addition to additional measures including:

 Medical supervision is provided to all laboratory personnel and appropriate vaccinations (if any) are given to reduce the risk of accidental or unnoticed infection.

 All procedures related to infectious substances must be carried out within a safety room for microorganisms testing.

 Laboratory personnel should wear rigid protective clothing from the front (such as a gown that ties at the back). They are clothes that are not to be worn outside the laboratory and must be disposed of or disinfected after each use.

 A laboratory biosafety manual should be drafted detailing how the laboratory will operate consistent with all safety requirements.

 In addition, a facility that houses a BSL-3 Biosafety Level III laboratory must have certain features to ensure proper containment. The laboratory entrance should be separated from areas of the building with unrestricted traffic flow. In addition, the laboratory should have two sets of self-closing doors (to reduce the risk of aerosol leakage).The construction of the laboratory should be such that it is easy to clean. Carpets are not allowed, and any points of convergence on floors, walls, and ceilings must be sealed to allow easy cleaning and disinfection.In addition, windows should be closed and a ventilation system installed that forces air to flow from "clean" areas of the laboratory to areas where infectious agents are handled.Air must also be purified from the laboratory before it is recycled.

 A 2015 study by USA Today journalists identified more than 200 lab sites that have been certified as Biosafety Level 3 3. Workshop proceedings on "Developing Norms for the Provision of Biological Laboratories in Low-Resource Contexts" provide a list of BSL3 laboratories in these countries.

 Biosafety Level 3 is commonly used in research and diagnostic work involving many microbes that can be transmitted by aerosols and/or cause severe disease. These include Francisella tularensis, Mycobacterium tuberculosis, Chlamydia psittaci, Venezuelan equine encephalitis virus, Eastern equine encephalitis virus, SARS-CoV-1, and SARS-CoV-1. Middle Eastern MERS-COV, Coxiella burnetii virus, Rickettsia rickettsii virus, several Brucella species, chikungunya, yellow fever virus, West Nile virus, Yersinia pestis and Corna virus, The causative agent of COVID-19 (SARS-CoV-2).

fourth level

Biosafety Level 4 4 (BSL-4) is the highest level of biosafety precautions, suitable for dealing with agents that can easily be transmitted through aerosols in the laboratory and cause serious or fatal diseases in humans for which no vaccines or treatments are available.BSL-4 laboratories are generally established to be either microorganism safety room or protective suit labs.In laboratories that use safety cabinets for microorganisms, all work must be done inside a level 3 biological safety cabinet.Items leaving the cabinet must be disinfected by passing through an autoclave or disinfectant tank. The biosafety compartment itself should not have seamless edges to allow for easy cleaning. In addition, the safety compartment and all materials within it must be free from sharp edges to reduce the risk of damage to the gloves.In a hazmat-certified laboratory, all work must be done in a biosafety level II chamber by personnel wearing a positive pressure suit. Upon exiting a BSL-4 certified laboratory, personnel must pass through a chemical decontamination shower, followed by a positive pressure wetsuit removal room, followed by a personal shower. Entry to a BSL-4 Biosafety Level 4 laboratory is restricted to trained and authorized personnel, and all persons entering and leaving the laboratory must be registered. As with BSL-3 Biosafety Level 3 laboratories, BSL-4 Biosafety Level 4 laboratories must be separated from areas receiving unrestricted traffic. In addition, airflow is tightly controlled to ensure that air always flows from "clean" areas of the laboratory to areas where infectious agents are working. The entrance to a BSL-4 Biosafety Level 4 laboratory should also use airlocks to reduce the possibility of aerosols leaving the laboratory. All laboratory waste, including air, water, and filtered litter, must also be decontaminated before it can leave the facility.

 Biosafety Level 4 laboratories are used to diagnose and search for easily transmitted pathogens that can cause fatal disease. These include a number of viruses known to cause viral hemorrhagic fevers such as Marburg virus, Ebola virus, Lassa virus, and Crimean-Congo hemorrhagic fever. Other BSL-4 biosafety level 4 pathogens include Hendra virus, Nipah virus, and some flaviviruses. In addition, pathogens that are not precisely known and that may be closely related to dangerous pathogens are often treated at this level until sufficient data is obtained either to confirm continued action at this level, or to allow them to be dealt with at a lower level. 15th] This level is also used to treat Variola virus, the causative agent of smallpox, although this work is only performed at the Centers for Disease Control and Prevention in Atlanta, United States, and the State Research Center for Virology and Biotechnology in Koltsovo, Russia.

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