

Examination Content

National Registry of Certified Microbiologists
SM: Biological Safety Microbiology

The National Registry of Certified Microbiologists
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A list of the topics tested on the exam is provided below. Questions are classified first by area and then by specific topic. The examination will have at least one question from each topic.

**DISINFECTION, DECONTAMINATION, STERILIZATION
(10 questions)**

1. Understand the difference between sterilization, decontamination, and disinfection and the applicability and means of monitoring each.
2. Demonstrate knowledge of use, applicability, and potential hazards (explosive, flammable, corrosive, carcinogenic, and irritating) associated with various disinfectants and sterilants.
3. Understand how to use chemicals, steam, dry heat, irradiation, filtration, ultraviolet (UV) sources, gases, or other agents to kill or inactivate microorganisms.

**WORK PRACTICES AND PROCEDURES
(26 questions)**

4. Apply good microbiological techniques, including sterile (aseptic) techniques.
5. Develop, evaluate, and document exposure control procedures for biohazardous agents and materials.
6. Develop procedures and practices to prevent release of infectious aerosols from equipment.
7. Perform biosafety audit of work practices and procedures associated with large-scale operations.
8. Understand and apply monitoring techniques and equipment to determine effectiveness of exposure control measures and to investigate environmental problems.
9. Understand use and disposal of sharps.
10. Select and understand use of personal protective equipment.
11. Select and understand use of respiratory equipment.
12. Develop and implement procedures for managing biohazardous spills and releases.
13. Assure documentation of worker exposure to biohazardous materials and preparation of an incident report.
14. Develop comprehensive emergency response plan for biohazard areas.

**RISK ASSESSMENT AND HAZARD IDENTIFICATION —
INFECTIOUS AGENTS AND RECOMBINANT DNA
(33 questions)**

15. Demonstrate knowledge of personal risk factors associated with microbial exposure.
16. Assess the risk of occupational exposure and infection associated with handling infectious agents.
17. Demonstrate familiarity with routes of exposure, modes of transmission, and other criteria that determine the hazard category of a microorganism.
18. Assess the risk to the community from various work environments where infectious agents or sensitizing materials may be present.
19. Demonstrate understanding of microbial toxins and their potential to cause work-related illness.
20. Demonstrate the ability to recognize the characteristics of bacteria, viruses, fungi, and parasites.
21. Understand the hazard of exposure of service personnel to biological materials.
22. Understand factors that may affect susceptibility, resistance, or consequences of infection.
23. Understand the difference between risk of infection and consequences of infection.
24. Understand the risk associated with biological aerosols in the workplace, such as ventilation, indoor air quality, recirculation, and cooling towers.
25. Understand the risk associated with point source release of biological aerosols in the workplace, such as from homogenizers, cell sorters, centrifuges, fermenters, and lasers.
26. Understand the risks associated with recombinant DNA technology.
27. Demonstrate knowledge of unique biosafety conditions associated with naturally or experimentally infected animals, including nonhuman primates.

**REGULATORY ASPECTS, STANDARDS, AND GUIDELINES
(28 questions)**

28. Interpret and apply the NIH *Guidelines for Research Involving Recombinant DNA Molecules*.
29. Interpret and apply OSHA Bloodborne Pathogens Standard.
30. Interpret and apply guidelines that classify biohazardous agents according to risk.
31. Interpret and apply guidelines for preventing transmission of *Mycobacterium tuberculosis* in the workplace.
32. Interpret and apply regulations for packing, labeling, and shipping of infectious materials, diagnostic specimens, and medical waste.
33. Interpret and apply import and export requirements associated with biological materials.
34. Interpret and apply regulations associated with animal pathogens.
35. Interpret and apply guidelines associated with the large-scale use of microorganisms.
36. Interpret and apply the NSF International Standard/ American National Standard on Class II laminar flow biohazard cabinetry (NSF/ANSI 49).
37. Interpret and apply OSHA law, standards, and directives as they relate to biohazards.
38. Interpret and apply guidelines and regulations relating to infectious and medical waste.
39. Demonstrate familiarity with agencies, such as WHO, CDC, NIH, OSHA, AAALAC, DOT, IATA, ICAO, DOD, EPA, USDA, and FDA, and their role and relationship with biosafety.
40. Interpret and apply the CDC-NIH *Biosafety in Microbiological and Biomedical Laboratories* document and other pertinent CDC publications.
41. Interpret and apply select agent regulations.

**PROGRAM MANAGEMENT AND DEVELOPMENT
(23 questions)**

42. Understand the role and function of an institutional biosafety committee.
43. Prepare and maintain a biosafety manual.
44. Review project proposals and advise on biosafety issues.
45. Advise on occupational health programs for persons working with biological materials.
46. Provide and interpret biosafety resource and reference information.

47. Organize and implement institutional biosafety compliance programs and audit their effectiveness.
48. Institute, evaluate, and document biosafety training.
49. Identify biological agents and materials in your institution.
50. Develop and implement an infectious and medical waste management program.
51. Provide technical information and advice on products impacting biological safety.
52. Develop and recommend biosafety policies.

**EQUIPMENT OPERATION AND CERTIFICATION
(18 questions)**

53. Understand the use and validation of a steam autoclave.
54. Understand the use and certification of biological safety cabinets (BSCs).
55. Demonstrate knowledge of Class I, II, and III BSC design features, applications, and functions.
56. Understand the calibration and use of air-measuring instruments to verify the safe operation of biological safety equipment.
57. Understand the design, function, and efficiency of HEPA filters.
58. Understand the limitations in the use of equipment, such as fume hoods and clean benches, for work with biohazardous materials.
59. Understand the use and validation of sterilizers using ethylene oxide (ETO) and vaporized hydrogen peroxide.
60. Understand the equipment and chemicals used for space decontamination.
61. Understand the use and applicability of animal containment equipment.

**FACILITY DESIGN
(12 questions)**

62. Understand the functions and indications for use of primary and secondary barriers.
63. Understand the difference and appropriateness of facility design to balance the need for hazard containment, personal product, and environmental protection.
64. Review architectural and engineering plans and advise on biosafety issues.
65. Verify that facilities as built meet minimum biosafety design criteria.