

**Radiation Safety Training Test
(Radiation Users)**

1. Ionizing radiation can be in the following forms:
 - a. Alpha and Beta particles, infrared and microwaves.
 - b. Ultraviolet A and B waves.
 - c. Alpha, beta and neutron particles and gamma rays.
 - d. All of the above.

2. What is the meaning of Annual Limit of Intake (ALI)?
 - a. ALI is the yearly amount of radionuclide that can be ingested without injurious chemical effects.
 - b. ALI is the annual limit of radionuclide that will give an internal dose equivalent of 5000 mrem.
 - c. ALI is the maximum amount of dispersible radioactive material allowed in an uncontrolled area.
 - d. None of the above.

3. What are the calculated surface contamination units used at Idaho State University (ISU)?
 - a. Disintegrations per minute (DPM).
 - b. Counts per minute (CPM).
 - c. Curies
 - d. All of the above.

4. Decay half life is defined as the following?
 - a. The amount of time it takes any radioactive material to totally putrefy.
 - b. The amount of time it takes for a given number of radioactive atoms to be reduced by one half through the process of radioactive decay.
 - c. The amount of time it takes for a given number of radioactive atoms to totally disintegrate.
 - d. None of the above.

5. What are sources of naturally occurring radiation exposure?
 - a. Dental x-rays, tanning beds and microwave ovens.
 - b. Dental x-rays, nuclear medicine treatments and food irradiation.
 - c. Cosmic rays, terrestrial radiation, sources in the human body and radon.
 - d. None of the above.

6. What is a possible effect of a large acute exposure in the range of 300-450 rads?
 - a. Cancer.
 - b. Mutations in the individuals' offspring.
 - c. There are no somatic effects.
 - d. Nausea, vomiting, and death.

7. What is the whole body NRC annual dose limit and the ISU ALARA goal ?
 - a. 5 rem/year and 100 mrem/year.
 - b. 50,000 rem/year and 5 rem/year.
 - c. limits are set by your lab supervisor.
 - d. 360 mrem/years

8. Methods to reduce external radiation dose include:
 - a. Minimizing time, maximizing distance and using available shielding.
 - b. Maximizing time, minimizing distance and putting the source of radiation between you and a shield.
 - c. Calculating dose rate using diffusion theory prior to entering any radiation field.
 - d. All of the above.

9. If you double your distance from a point source of radiation, the radiation dose rate falls to _____ the original value.
 - a. two times
 - b. one tenth
 - c. one fourth
 - d. one eighth

10. Methods to reduce internal radiation exposure are:
 - a. Cover all wounds or cuts.
 - b. Do not eat or drink in areas controlled for radiological purposes.
 - c. Do not smoke or chew in areas controlled for radiological purposes.
 - d. All of the above.

11. What radiation users are required to perform bioassay analysis?
 - a. Anyone who uses radionuclides at ISU.
 - b. Anyone exposed to a radiation field of 100 mrem or more.
 - c. Anyone who uses dispersible radioactive material in quantities of 1 ALIs/month or greater.
 - d. No one at ISU is required to perform bioassay analysis.

12. When can temporary dosimetry be issued at ISU?
 - a. On a case by case basis. Temporary dosimetry will not be used to circumvent training requirements.
 - b. At your supervisors discretion.
 - c. With the approval of the RSO.
 - d. None of the above.

13. What is the definition of a Radiation Area (RAD Area) and what are the entry requirements?
- Any area with a dose rate of 100 mrem/hr.
You must have Technical Safety Office permission to enter a Rad Area and you must be wearing appropriate personnel contamination clothing.
 - Any area with radiation present.
There are no entry requirements.
 - Any area with uncontrolled dispersible radioactive isotope.
The area must be surveyed for contamination.
 - Any area with a dose rate of 5 mrem/hr and less than 100 mrem/hr.
You must be authorized to enter a Radiation Area and must be wearing your personal dosimeter.
14. What are your actions for a spill of radioactive material which does not involve personal injury?
- If you caused an accidental spill, start to clean up if it is in your capability.
 - If you found an unknown spill and felt uncomfortable about it, contact Technical Safety Office for assistance.
 - Behave in a timely manner to minimize your exposure.
 - All of the above.
15. A contamination meter reads 200 counts per minute (cpm) when performing a contamination survey for P-32. The efficiency on the detector states the efficiency for P-32 is 50%. How many disintegrations per minute (dpm) is the instrument measuring.
- 400 dpm
 - 200 dpm
 - 10,000 dpm
 - 100 dpm
16. A contamination meter reads 30 cpm. The lab you are in uses tritium (H-3) exclusively. What is the contamination level of the lab in dpm.
- 30 dpm
 - 300 dpm
 - 50 dpm
 - Most contamination meters are not able to measure tritium. You can not determine tritium contamination levels with the information given.
17. A personal dosimeter is issued to you, where are you allowed to use this dosimeter.
- When using radioactive material that is licensed to ISU only.
 - The dosimeter may be used at the INL during a tour of selected radiation areas.
 - You may wear it on numerous cross country flights to measure your dose due to

- cosmic radiation.
- d. You may wear it as part of your internship duties with the Department of Energy (on location at the INL)
18. What is the definition of Removable Contamination Limit (RCL)?
- The maximum amount of contamination that can be taken out of the laboratory.
 - The maximum amount of removable contamination (allowed for each individual radionuclide) that can be measured on any surface (in dpm/100cm²)
 - The limit below which you clean up your lab prior to any required survey.
 - None of the above.
19. Who is allowed to order and receive radioactive material from stores?
- Any university staff with a Radiation Safety program.
 - The Nuclear Regulatory Commission must be contacted for all radioactive material.
 - Radioactive material is ordered through the department secretary.
 - Your lab supervisor (professor) fills a purchase order which must be signed by the Radiation Safety Officer. For radionuclide pick up from stores, a Technical Safety Office person must receive the package.
20. When can you generate mixed hazardous waste?
- Never.
 - With approval of the Radiation Safety Committee.
 - There are no restrictions on the generation of mixed hazardous waste.
 - Mixed hazardous waste is the responsibility of the chemical safety committee.
21. You are performing a contamination survey and find that the meter you are using is beyond the calibration date. What are your actions?
- There are no actions required.
 - Finish the survey and call the Technical Safety Office immediately to verify the survey results and to calibrate the survey meter.
 - Do not perform any contamination survey, since the results will be in error.
 - Use an exposure survey meter as an acceptable alternative.
22. It becomes necessary to transport some radioactive material off campus. How will you accomplish this?
- Double package the item and place a radioactive material sticker on the item prior to transport.
 - Radioactive material can not be transferred from the laboratory. Once your lab takes possession it must stay in the laboratory until the material decays away?
 - Contact the Technical Safety Office.
 - None of the above.
23. How often are Responsible Users/Radiation Users required to have training on the safe

- use of radioactive materials?
- a. Training in the use of radionuclides is at the discretion of the lab supervisor.
 - b. The user must have training prior to using radionuclides/exposure to radiation and yearly thereafter.
 - c. Training is on a biannual basis.
 - d. There are no training requirements for the use of radioactive material.
24. Who is responsible for the inventory of a laboratories radioactive material?
- a. The Responsible User.
 - b. The Technical Safety Office.
 - c. The Department Chairperson.
 - d. The Radiation Safety Officer.
25. What is the purpose of personal dosimetry?
- a. Personal dosimetry provides legal record of the individuals exposure history.
 - b. Personal dosimetry protects the individual from exposure to radiation.
 - c. Personal dosimetry measures the amount of internal contamination that an individual receives from working with radioactive material.
 - d. None of the above.
26. The initial activity of a Cs-137 ($T_{1/2} = 30$ years) source is 8 mCi. Which will be the activity after 90 years?
- a. 2.67 mCi
 - b. 1 Ci
 - c. 1 mCi
 - d. 1 MCi
 - e. none
27. During the maintenance in a lab a worker was exposed to a dose rate of $10\mu\text{Sv/h}$. The worker completed the job in 2 hours. The total dose was:
- a. 2 rem
 - b. 20 mSv
 - c. $10\mu\text{Sv}$
 - d. 2 mrem
 - e. none