# 放射線管理士測驗

# Radiation Safety Manager

2015年8月30日 星期日

1. 除題意不清楚或是圖片有問題，禁止詢問與試題有關的問題。
2. 應答時禁止使用任何文件。
3. 請在電腦答案卡上圈選作答

| ***項目*** | **填寫內容：** |
|---|---|
| *姓名* | 您的中文與英文姓名 |
| *試題名稱* | RSM Test |
| *項目* | 不用填寫 |
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| *受試者識別代碼* | 您的准考證號碼 **1”000**”**<br>將您選定之數字的圓圈塗滿。 |
| *科目代碼* | 不用填寫 |
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| *作答方式* | 本測驗共有90題問題。請使用1到90作答欄位。<br>請將測驗卷Q1的答案填入答案卷的解答番號1。Q2 = 解答番號2，Q3 = 解答番號3…Q90 = 解答番號90。 |

Q1. The most important quantity for the assessment of the internal exposure in the human body is:

1） Surface contamination
2） Intake
3） Skin contamination
4） Personal dose $H_p(10)$

Q2. What is the international unit for absorbed dose?

1） rad　2） kerma　3） Gy　4） Sv

Q3. The three factors which are important to protect individuals from radiation are:

1） Time, shielding, and dose rate
2） Dose rate, time, and gender
3） Time, shielding, and distance
4） Distance, time, and dose rate

Q4. Which of the following organizations is NOT a United Nations (UN) agency?

1）UNSCEAR　2）IAEA　3）ICRP　4）WHO

Q5. Which is WRONG about the properties of radiation?

1）The X-ray is a low LET radiation.
2）The gamma ray is high LET radiation.
3）The neutron beam is high LET radiation.
4）The alpha ray is a high linear energy transfer (LET) radiation.

Q6. Which of the following is considered for the Build-up factor in photon shielding?

1） Dose contribution by the electron generation
2） Compton scattering by the electron generation
3） Bremsstrahlung by the electron generation
4） Secondary electron by the electron generation

Q7. Which of the following is correct to shield a high energy beta(β) ray?

1） Shield beta and X-ray
2） Shield beta and gamma ray
3） Shield beta and alpha(α) ray
4） Shield only beta ray

Q8. Which is right combination concerning about the radiation monitor?

1）personal exposure management-TLD
2）internal exposure management-non-bioassay method
3）surface contamination measurement-alarm monitor
4）environment management-whole bode counter

Q9. Which of the following is NOT included in Radiation Protection System?

1） Minimization stochastic effect
2） Optimization of protection
3） Dose limit for individual
4） Justification of actions

Q10. If one made a detailed operation plan, and managed a work effectively from mock exercise and proficiency, which is the applied item in the following radiation protection.

1） Reduction internal exposure
2） Maintain the concentration of radioactive substances
3） Reduction exposure time
4） Protection of outside exposure for containing radioactive substances

Q11. Which of the following is NOT a characteristic of a series of natural radionuclides?

1) The first nuclide's half-life is very long.
2) There is radon gas in the middle or the decay.
3) The last nuclide is Pb.
4) Their atomic numbers are over 92.

Q12. Which is the WRONG combination concerning the measurement of surface combination?

1) direct method-use of survey meter
2) direct method-background measurement
3) indirect measurement-removal efficiency
4) indirect method-detection of fixed contamination

Q13. Bremsstrahlung is a kind of :

1) α particle 2) γ ray 3) Neutron 4) X ray

Q14. Which of following is NOT suitable for a principle of detecting radiation?

1) Chemical activity
2) Biological activity
3) Structural defect induced activity
4) Radio-transparency

Q15. Which of the following is not a gas detector used for measurement of radioactivity in the working environment?

1) ionization surveymeter
2) proportional counter
3) GM surveymeter
4) scinitillation surveymeter

Q16. When the distance from the source of radiation is doubled, the amount of radiation received will be :

1) Doubled 2) Tripled 3) Reduced by 1/2 4) Reduced by 1/4

Q17. Which interaction is the highest level of contribution in measuring of gamma ray?

1) Compton effect
2) Pair electron creation
3) Photoelectric effect
4) Ionization

Q18. Which of the following is a correct equation about radiation intensity(x) and distance from target (d)?

1) $X_1 d_1 = X_2 d_2$ 2) $X_1 d_2 = X_2 d_1$ 3) $X_2/X_1 = d_1^2/d_2^2$ 4) $X_2/X_1 = d_2^2/d_1^2$

Q19. Which of the following is suitable for a reason for choosing a semiconductor detector for measuring gamma ray?

1) It is for the convenience of use
2) Maintenance and conservation expenses are relatively low
3) Gamma ray measuring efficiency is relatively high
4) Energy resolution is relatively superior

Q20. Radiation levels naturally decrease due to radioactive:

1) Decay
2) Decontamination
3) Equilibrium
4) Absorption

Q21. Which of the following is false?

1） The nuclear force is the force which is responsible for binding two or more nucleons into atomic nucleus
2） The sum of mass of the proton and neutron is greater than the total mass of the nucleons
3） The phenomenon called “Mass defect” is where in nucleons, the protons and neutrons that are being fused together to make up an atomic nucleus, each give up a little mass
4） The amount of mass defect is the binding energy of atomic nucleus

Q22. Which of the following is correct for the radiation that makes auger electrons?

1） Beta ray　2） Gamma ray　3） Specific X-ray　4） Alpha ray

Q23. Which of the following is the minimum photon energy to create a pair of electron?

1） 5.011 MeV　2） 1.022 MeV　3） 0.511 MeV　4） 10.22 MeV

Q24. Radiation is emitted from atomic nucleus or electron orbit. Which of the following is NOT a radiation emitting from atomic nucleus?

1） Alpha particle　2） X-ray　3） Beta particle　4） Gamma ray

Q25. Which of the following is false?

1） Alpha decay can be easily occurred in case of surplus proton exists such as heavy nuclides that has greater than 82 of its atomic number.
2） The typical alpha decay nuclides are $^{239}Pu$, $^{238}U$, $^{226}Ra$, $^{222}Rn$
3） There are β− decay, β+ decay, Electron capture (EC) as three types of beta decay.
4） The typical beta decay nuclides are $^{60}Co$, $^{131}I$, $^{137}Cs$, and $^{192}Ir$

Q26. Which of the following has the greatest specific ionization in the air?

1） 1 MeV alpha ray
2） 1 MeV neutron
3） 2 MeV beta ray
4） 2 MeV gamma ray

Q27. Which is NOT relevant about specialty of radiation accidents?

1）The pollution is long lasting.
2）Waste materials produced in the cleanup operations can be disposed of as general waste.
3）A race amount of radioactive pollutants create problems.
4）Cleanup operations require special equipment and other devices.

Q28. What is the primary reason why GM counter is inappropriate to measure radiation dose?

1） Using gas is difference with air
2） Output pulse is not relevant to radiation type or energy
3） There is low possible that gas and radiation were reacted
4） Dead time is long

Q29. In gamma rays interact with matter, which effect is occurred at low energy?

1） Photoelectric effect
2） Compton effect
3） Electron pair creation
4） Photonuclear reaction

Q30. As the result of measurement in a state opened and closed cover of compensated GM survey meter, doses were 100 μSv/h and 30 μSv/h, respectively. Which radiation fields were you exposed by?

1） Gamma radiation field
2） Beta radiation field
3） Beta and gamma mixed radiation field
4） Gamma and x-ray mixed radiation field

Q31. Choose the wrong statement.
1) LET means linear energy transfer.
2) LET is closely related to relative biological effectiveness (RBE)
3) The greater the LET, the lower the OER.
4) Biological effectiveness increases in proportion to LET.

Q32. Which of the following would be the most effective X-ray shielding material?
1) Wood 2) Paper 3) Plastic 4) Lead

Q33. Which of the following is correct for size of atomic nuclei?
1) Number of electron
2) Number of mass
3) Number of neutron
4) Number of proton

Q34. Which of the following is the most sensitive to radiation?
1) Liver 2) Breast 3) Vessel 4) Bone

Q35. Radiation produces biological effects indirectly by production of free radicals in :
1) Water
2) Glucose
3) Carbohydrate
4) Protein in the body

Q36. Which description is WRONG about radiation skin damages?
1) The severity skin damage caused by radiation exposure depends on the dose and affected surface area.
2) Ulceration of the skin occurs when it is exposed to a dose of about 10 Gy.
3) Radiation exposure of the extremities is likely to disturb blood circulation.
4) The signs and conditions of the exposed individuals differ according to the type of radiation.

Q37. Many smoke detectors contain:
1) Americium-241
2) Carbon-14
3) Strontium-90
4) Iodine-131

Q38. Which of the following is NOT true for the bioassay method?
1) Measure using the excretion of human body
2) Can measure α radiation for internal exposure
3) It is easy to take a specimen but complicated to handling
4) Measuring is simple and assessment is accurate

Q39. In radiation protection, the product of absorbed dose and the correction factor(rad x QF) is used to determine :
1) C/Kg 2) Sv 3) Ci 4) J/Kg

Q40. Which of the following is correct about radiation accident?
1) A damage from a prejudice and a rumor hardly occur
2) It is easy to distinguish between psychological symptoms and radiation exposure symptoms
3) Radiation is invisible and insensible
4) The scale of radiation accident will be different by the type of radiation material, the amount of radiation, the climate condition of the accident time, a place of the accident, and the accident time

Q41.What is a dose limit for a pregnant woman who is a radiation worker.

1) Underbelly 1mSv, Annual Limit of Intake 1/10
2) Underbelly 1mSv, Annual Limit of Intake 1/20
3) Underbelly 2mSv, Annual Limit of Intake 1/10
4) Underbelly 2mSv, Annual Limit of Intake 1/20

Q42. Which is NOT right about the effect of radiation on the human body?

1） late effects
2） nonspecific symptoms
3） simplicity of clinical outcome
4） unawareness of exposure to radiation

Q43. Which of the following is the case which is subjected to the dose limit?

1) Affected dose of an attending physician during giving a radiation treatment in the hospital
2) Affected dose of bodily tissue without diseased area when one is exposed to radiation for treating cancer
3) Affected dose of an air crew
4) Affected dose of inhabitant who live on the ground with higher natural background radiation level

Q44. Which of the following increase exposure dose during taking an X-ray?

1） Using a compensating filter
2） Using a high sensitivity screen
3） Shield the gonad
4） Using a short focus-skin distance

Q45. Which of the following is NOT true for protect the exposure from radiation dose rate in space ?

1） Attain proficiency by Mock-up Training
2） Isolate radiation substances or maintain the concentration
3） Attain proficiency by Cold-up Training
4） Increase number of the workers in order to prevent the concentrated exposure for one worker

Q46. When a photon interacted with an atom, the total energy of the photon was absorbed by an electron of the atom. It will be:

1） Pair production
2） Photoelectric effect
3） Compton effect
4） Annihilation.

Q47. Which is the WRONG description of the signs and conditions resulting from acute whole-body radiation exposure?

1） 7 to 10 Gy: nearly all are dead
2） 3 Gy: threshold value for death
3） 1 Gy: nausea and vomiting in about 10% of the exposed population.
4） 0.5 Gy: reduced hematopoietic functions due to exposure of the red bone marrow

Q48. Which of the following is a correct specification of an output pulse at ionization in a gas filling detector?

1) It is in inverse proportion to incident radiation.
2) It is equal to energy of incident radiation.
3) It shows uniformity in voltage area
4) It is without regard to a type of charged gas.

Q49. Select the information that accident victims will NOT seek immediately after the radiation accident.

1）safety of their family and their close associates
2）future life planning
3）somatic effects of radiations and radioactive material
4）status of the radiation accident

Q50. There are Film badge, Thermo luminescence dosimeter(TLD), and so on in the individual monitoring of radiation workers. These types of individual dosimeters use a filter, then chooses not a right role of the filter.

1) Tissue-equivalent correction
2) Background correction
3) Distinction of radiation type
4) Correction for energy dependence of radiation

Q51. Which of the following is the right exposure dose to make the radiation damage of the human body equal to LD100 ?

1）100 cGy　　2）200 cGy　　3）400 cGy　　4）700 cGy

Q52. Choose the correct arrangement of items in descending order of organ/tissue absorbed doses in the $^{18}$F-FDG-PET examination (in the case of urination every two hours).

1）Brain > Heart > Kidney > Lung > Red marrow
2）Brain > Kidney > Heart > Red marrow > Lung
3）Kidney > Heart > Brain > Lung > Red marrow
4）Kidney > Brain > Heart > Red marrow > Lung

Q53. Which of the following is false for the principle of emergency measure at the radiation accident?

1）Principle of safety maintenance
2）Principle of reporting
3）Principle of prevention of expansion
4）Principle of underestimation

Q54. Choose an incorrect answer about a radiation protection.

1）Cannot restrict an act attendant upon a radiation exposure inappropriately
2）Prevent a definite effect, lower a probable effect to approvable level in a radiation exposure
3）A justification of radiation protection means to maintain exposure reasonably achieve as low as possible in consider of economic and social factor in plan and act
4）Nobody can exceed the limitation of a radiation dose about the exposure management

Q55. Which of the following is NOT correct about a consultation of radiation exposure for the responsible person on the radiation safety?

1）Listen to a consultation of a person carefully
2）Construct the relationship of mutual trust
3）Access with a position of expropriation to other person
4）Go through with original idea with a ignoring other unnecessary opinion

Q56. In case of radiation exposure, 50% of the exposed population with a half lethal dose is killed. What is the main cause of death?

1）skin disorders
2）small intestine disorders
3）blood forming organ disorders
4）heart disorders

Q57. Which is correct about the public dose limits?

1）The dose limit is 1 mGy/year.
2）The dose limit is 1 mGv/year.
3）The dose limit corresponds to the minimum radiation level above which exposures have been found to increase hereditary risks.
4）The dose limit corresponds to the minimum radiation level above which exposures have been found to increase cancer risks.

Q58. Which statement is the correct answer about the consultation for a radiation exposure?

1） Consultation of a radiation exposure is a persuasion
2） It is important to understand what the other want to know
3） Radiation exposure consultation is a correspondence of a discontent from the victim
4） It is insane to feel uneasy about radiation exposure

Q59. Which one is the most appropriate detector for energy calibration of γ-ray generated from a sample that contains multiple nuclides?

1）Si detector
2）Ge detector
3）BGO detector
4）CsI(TI) detector

Q60. Which of the following is NOT true about a principle of radiation protection?

1） Justification of performance
2） Optimization of a protection
3） Highest priority of safety
4） Prohibition of dose limitation

Q61. Which is NOT right about mental health problems caused by a radiation disaster?

1）heart disease, cerebral infraction
2）demotivation
3）decline in concentration and memory
4）insomnia, loss of appetites

Q62. What is the correct feature about semiconductor detector?

1） W-value of Ge is about 30 eV
2） Si surface barrier semiconductor detector is suited for measuring gamma ray
3） Compare to other detector, resolution time is very short
4） Poor energy resolution

Q63. Which of following measuring instrument is suitable for measuring the alpha ray?

1） Si surface barrier semiconductor detector
2） Thermo luminescence dosimeter
3） GM counter
4） NaI(Tl) scintillation crystal

Q64. Which is suitable match for detector and principle of detector?

1） Semiconductor detector and excitation
2） Proportional counter and radiation damage
3） GM counter and fluorescence
4） Pocket dosimeter and gas ionization

Q65. Which of the dose that does NOT include radiation weighting factor in dose evaluation process?

1） Equivalent dose
2） Committed dose
3） Effective dose
4） Absorbed dose

Q66. In case of internal exposure, which is practicable for evaluating exposure dose during long hours?

1） Committed dose
2） Equivalent dose
3） Absorbed dose
4） Effective dose

Q67. Which of the following explanations is WRONG?

1） deterministic effect: radiation effect causing damage whose severity does not depend on dose.
2） stochastic effect: radiation effect whose probability of occurrence is a function of the dose without the existence of a threshold dose.
3） threshold dose: a radiation dose which is equivalent to that affecting 1 to 5% of the exposed population, thereby creating statistical significance.
4） multiplicative risk projection model: a method that yields a larger radiation-induced cancer incidence rate, the higher the spontaneous rate of occurrence.

Q68. Which is incorrect explanation about factor that occurs radiation damage?

1） Biological effect of radiation can be affected by temperature
2） Generally, relative biological effectiveness (RBE) of high energy positron is much bigger than that of alpha ray
3） By-stander effect means in case endow a specific cell with dose among a group of cell, it also exert influence on the neighboring cells which are not exposed
4） Compare to adult, child is more sensitive to radiation because cell division of a child is more prosperous than an adult

Q69. Threshold effect means effects show above certain level of dose. Which of following is NOT related to the threshold effect?

1） Muddiness of crystalline lens
2） Hematogenous function damage
3） Erythema
4） Gene mutation
5）

Q70. Which radiation has a fear of erythema on radiation worker?

1） Alpha particle
2） Beta particle
3） Gamma particle
4） Neutron