放射線管理士測驗

Radiation Safety Manager

2018年8月26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 |
| *科目* | 不用填寫 |
| *受試者識別代碼* | 您的准考證號碼 1**”000\*\*”**  將您選定之數字的圓圈塗滿。 |
| *科目代碼* | 不用填寫 |
| *地點代碼* | 不用填寫 |
| *作答方式* | 本測驗共有40題問題。請使用1到40作答欄位。  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。 |

1. In gamma rays interact with matter, which effect is occurred mainly at low energy?
2. Photoelectric effect
3. Photonuclear reaction
4. Pair production
5. Tri-Electron production
6. Compton effect
7. Which of the following is the minimum photon energy to produce a pair of electron?
8. 0.511 MeV
9. 1.022 MeV
10. 5.011 MeV
11. 10.22 MeV
12. 20.22 MeV
13. Which of the following is the most related with Bremsstrahlung?
14. α-ray
15. β-ray
16. γ-ray
17. Heavy ion
18. Neutron
19. What is called to be natural decreased radiation value in radiation source?
20. Contamination
21. Equilibrium
22. Decay
23. Absorption
24. Reflection
25. Which of the following is the correct combination of factor that has the line-Spectrum?

|  |
| --- |
| a. α-ray  b. β-ray  c. γ -ay  d. Bremsstrahlung |

1. a, b
2. a, c
3. b, c
4. B, d
5. a, b, c, d
6. What is associated with energy given to a substance per unit length of α-ray?
7. Exposure dose
8. Absorbed dose
9. Equivalent dose
10. Kerma
11. LET
12. Which of the following is the correct combination?

|  |
| --- |
| a. Average-life(τ) is 1.44 times larger than half-life(T).  b. The multiplication of half-life(T) and decay constant(λ) is 0.693.  c. The multiplication of average-life(τ) and decay constant(λ) is 1.44.  d. The equation of radioactivity(A), half-life(T) and elapsed time(t) of radioactivity are A = Aoe-0.693t/T. |

1. a, b
2. b, c
3. a, c, d
4. a, b, d
5. a, b, c, d
6. There are two radioisotopes. : A (λA, NA) and B (λB, NB)

Which of the following is the correct equation for transient radiation equilibrium?

1. λA NB = λB NA
2. TA NA = TB NB
3. λA NA = TB NB
4. λA NA = λB NB
5. TA NA = TA NB
6. What is the correct flow of energy unit from low to high?
7. 1 erg < 1 eV < 1 J < 1 cal
8. 1 cal < 1 J < 1 erg < 1 eV
9. 1 eV < 1 cal < 1 J < 1 erg
10. 1 eV < 1 erg < 1 J < 1 cal
11. 1 J < 1 cal < 1 erg < 1 eV
12. Which is the correct range of specific binding energy when it has bigger than 15 mass number?
13. 1 ~ 3 MeV
14. 3 ~ 5 MeV
15. 5 ~ 6 MeV
16. 7 ~ 8 MeV
17. 8 ~ 10 MeV
18. What is correct probability function for t-time? (decay constant is λ, the original radiation activity is A0.)
19. e -1
20. e - λ t
21. λe - λ t
22. A0 e - λ t
23. 1- e - λ t
24. Choose the correct scatter angle which is received the greatest energy to recoil electron by Compton effect?
25. 0°
26. 45°
27. 90°
28. 120°
29. 180°
30. Which of the following is the correct explanation about interaction of radiation and matter?
31. Range : A progress direction which charged particle pass though matter.
32. LET : Electromagnetic wave radiation which is released when a pair of positron and negatron lead to annihilation.
33. W-value : Needed average energy to makes a pair of ion when radiation ionizes gas.
34. Stopping power : Total energy which is received by charged particle when it pass though matter.
35. Mass stopping power : The divided value for stopping power by mass for excluding dependency of density of matter.
36. Which of the following is correct explanation of effective half-life?
37. It is time to take half of the number of atom of radioisotope.
38. It is time to take half of the number of atom at a point in decay process of radioisotope.
39. It is time to take half of radioactivity into human body by metabolic reaction.
40. It is time to take half of radioactivity into human body by physical decay.
41. It is time to take half of radioactivity in the human body by physical decay and biological decay.
42. Choose the correct equation.?
43. 1 b(barn) = 10-24 m2
44. 1 R = 2.58 X 10-4 J/kg
45. 1 eV = 1.602 X 10-19 C
46. 1 amu = 1.66 X 10-27 kg
47. Avogadro number = 6.023 X 10-23 C/mole
48. One atom named ‘X’ has become . What is expected to be generated after some disintegration?
49. 1 alpha decay, 2 gamma decay
50. 1 alpha decay, 2 beta decay
51. 2 alpha decay, 1 gamma decay
52. 2 alpha decay, 2 beta decay
53. 2 gamma decay, 2 beta decay
54. Which of the following is correct radioisotope for smog sensor of fire monitoring?
55. 14C
56. 90Sr
57. 131I
58. 18F
59. 241Am
60. Choose the correct combination.
61. BGO scintillation – β ray
62. NaI(Tl) scintillation – γ ray
63. LiI(Eu) scintillation – γ ray
64. Liquid scintillation counter(LSC) – α ray
65. ZnS(Ag) scintillation – low energy β ray
66. What is the detector which should be refrigerated by using fluid nitrogen for keeping?
67. BGO scintillation
68. Ge(Li) semiconductor detector
69. Li drift semiconductor detector
70. Si surface barrier semiconductor detector
71. HPGe detector
72. Gas-filled radiation detector is changed their character from applied voltage. Which of following is correct for the lowest voltage region?
73. GM region
74. Recombination region
75. Ionization region
76. Limited Proportional region
77. Proportional region
78. Which of the following is a correct guiding principle of radiation detector?
79. Ionizing chamber – Electron avalanche
80. GM counter - Solid ionization
81. Chemical dosimeter – Changing of material
82. Semiconductor detector - Nuclear reaction
83. Proportional counter – Excitation of gas
84. What is used for PET or PET/CT due to no delay of output signal?
85. BGO
86. SI (Li)
87. CsI (Na)
88. NaI (Tl)
89. ZnS (Ag)
90. Which of the following is the right setting up method to extend GM counter’s durability?
91. Threshold value voltage
92. Middle voltage of plateau
93. 25% of the lower voltage from the end of plateau
94. 30% of the upper voltage from the end of plateau
95. 50% of the lower voltage from the end of plateau
96. Which of the following is correct?
97. GM counter is used for measuring α-ray and γ-ray.
98. W-value of semiconductor detector is around 29~36 eV.
99. HPGe semiconductor detector is not needed cooling to use.
100. Usually surface barrier semiconductor detector is used for measuring γ-ray.
101. A degree of γ- ray detection efficiency is proportioned to atomic number.
102. Which is the true about TLD?
103. It is not reusable.
104. It is possible to permanent preserve the report.
105. Amount of thermoluminescence is inverse ratio to absorbed dose in the organization.
106. It cannot measure equivalence dose with combined filter.
107. It is reusable by recovering to primary stage with heating, cooling process.
108. Choose the correct statement about proportional counter and GM counter.

|  |
| --- |
| a. Resolving time of proportional counter is shorter than GM counter.  b. Output pulse of GM counter has not the radiation energy information.  c. If there is the equal sensitive volume, proportional counter is higher about output efficiency of γ-ray.  d. There is a proportional counter of gas flow method. But it is impossible to make the GM counter of gas flow method in principle. |

1. a, b
2. a, c
3. b, c
4. b, d
5. c, d
6. Which of the following is proper counter for 3H with water?
7. BF3 counter
8. ZnS(Ag) detector
9. Liquid scintillation counter(LSC)
10. GM counter
11. Ge (Li) semiconductor detector
12. Which of the following is a correct condition of radioisotope clinically?
13. Chemical toxicity
14. Useful and short half-life
15. Must not be take easily
16. Must be difficult to chemical separation
17. Release radiation about characteristic right to use
18. Why is not proper reason about GM counter for measurement amount of radiation?
19. Dead time is long.
20. Detective efficiency is low due to low sensitivity.
21. Main amplifier needs to amplification process because of little output voltage.
22. Output voltage has not information about kind of radiation and energy.
23. There is difficulty to make counter window for multipurpose because many kind of radiation measurement.
24. Which of the following is the correct feature of GM counter?
25. It is impossible to manufacture various type.
26. It is impossible to measure the dose generally because it has no energy resolution.
27. It should be used in the environment of low radiation if internal annihilation is applied.
28. It is mainly used at low intensity of the radiation field, because the dead time is relatively short.
29. Annihilation gas is introduced to prevent the generation of secondary electrons by ultraviolet rays emitted from the excited atoms.
30. What is the main cause of dead time in GM counter?
31. Annihilation gas
32. Applied voltage
33. Pulse height discriminator
34. Internal pressure of detector
35. Space quantity of electric charge of positron
36. What is the main reason why the size of output pulse is important in proportional counter?
37. To reduce the dead time
38. To increase the sensitivity of detector
39. To check a kind of radiation
40. To check a kind of detector
41. To consider the direction dependency of detector
42. What is the most important peak in the analysis of radioisotope at gamma ray?
43. Photo peak
44. Single escape peak
45. Double escape peak
46. Backscatter
47. Compton edge
48. What is the correct explanation for Single Channel Analyzer(SCA)?
49. It is used the coincidence circuit.
50. It is possible to count the pulse through upper selector only.
51. It has longer dead time than multi channel analyzer.
52. It is mainly used to monitoring radiation existence of special energy.
53. It is mainly used to monitoring radiation existence of various energy.
54. What is the correct character for scintillation matter in scintillation detector?
55. It is not easy to detect light
56. Transition of excited electronic will happen as needed
57. Light output is inversely proportional to incident radiation
58. Charged particle of kinetic energy has to have heat efficiency.
59. The reflection rate of the substance should be similar to glass.
60. What is the applying dose when calibrating radiation counter?
61. Absorbed dose
62. Exposure dose
63. Effective dose
64. Equivalent dose
65. Committed dose
66. What is the correct combination of explanation blow?

|  |
| --- |
| a. Kerma is only applied to indirect ionizing radiation.  b. Bragg-Gray’s principal is used for measurement of exposure dose.  c. Absorbed dose has no relation what radiation or matter is.  d. Absorbed dose of γ-ray is maximum compared to any depth of incidence matter. |

1. a, b
2. a, c
3. a, d
4. b, c
5. c, d
6. Which of the following is true for dose limitation of radiation workers?
7. Dose limit is defined the maximum value of a radiation dose for the external exposure.
8. Dose limit is defined the maximum value of a radiation dose for the internal exposure.
9. Effective dose limit of the radiation worker is 50 mSv per 3 years, but cannot exceed 20 mSv per year.
10. Effective dose limit of the radiation worker is 100 mSv per 5 years, but cannot exceed 20 mSv per year.
11. Effective dose limit of the radiation worker is 100 mSv per 5 years, but cannot exceed 50 mSv per year.
12. What is the most dangerous atom when it come inside human body?
13. 3H
14. 51Cr
15. 90Sr
16. 226Ra
17. 99mTc
18. What is the correct procedure of radiation?
19. Radioactivity management – People management – Environment management
20. Environment management - People management - Radioactivity management
21. Radioactivity management - Environment management - People management
22. People management - Environment management - Radioactivity management
23. People management - Radioactivity management - Environment management