Example Questions for Quiz 8

Chapters 12 and 13 – Organic Chemistry and Nuclear Reactions

Here are some questions that are similar to what will be on Quiz 8.
The quiz will have a total of 20 points selected from these possibilities.
You may use your equation and symbol sheets as well as your Periodic Table of Elements.

1. (1 point) Carbon atoms form molecules using _____ bond(s). (answer is a number)

2. (1 point) Oxygen atoms form molecules using _____ bond(s). (answer is a number)

3. (2 point) Sulfur atoms usually form molecules using _____ bond(s), but can form molecules with _____ bonds as in the blood pressure medication hydrochlorothiazide. (answers are numbers)

4. (1 point) Nitrogen atoms usually form molecules using _____ bond(s). (answer is a number)

5. (1 point) Chlorine atoms always form molecules using _____ bond(s). (answer is a number)

6. (2 points) Phosphorus atoms usually form molecules using ____ bond(s), but often might use ____ bond(s). (answers are numbers)

7. (1 point) The molecule ethane C_2H_6 has its carbons connected by a (**single, double, triple**) bond.

8. (1 point) The molecule ethene (aka ethylene) C_2H_4 has its carbons connected by a (**single, double, triple**) bond.

9. (1 point) The molecule ethyne (aka acetylene) C_2H_2 has its carbons connected by a (**single, double, triple**) bond.

10. (2 point) Molecules that have the same chemical formula, but different, structures are called **_____**.

11. (2 points) Benzene has a chemical formula of _____ and is in the shape of a _____.

12. (2 points) Cyclohexane has a chemical formula of _____ and is in the shape of a _____.

13. (2 points) The general formula for the molecules in petroleum is _____ where n=1, 2, 3, …

14. (4 points) The triglyceride molecule we built was made from a glycerol molecule and three_____ acids. With the addition of each of those three, a _____ molecule was released.

15. (4 points) At room temperature, _____ bonds freely rotate, but _____ bonds do not.

16. (4 points) The oxytocin molecule we build used nine _____ acids linked together. With the addition of each of those, a _____ molecule was released.

17. (1 point) A water molecule has a (**bent, straight**) structure.

18. (1 point) A carbon dioxide molecule has a (**bent, straight**) structure.

19. (2 points) _____ _____ are the parts of organic molecules that are usually involved when connecting to other molecules.

20. (4 points) When amino acids are connected together to make polypeptides, proteins, or enzymes, the connections are made by the _____ group on one amino acid with the _____ functional group on the next amino acid.

21. (2 points) Alcohols are simple molecules with an _____ functional group added.

22. (2 points) The flavors of bananas, oranges, pineapples, and apricots are caused by their (**ester, amine, aldehyde, ketone, alcohol**) functional group.

23. (2 points) The chemical that turned the Styrofoam cup to mush in lab was the organic solvent named **__acetone___**.

24. (4 points) Soap is made from _____ and _____ _____

25. (2 points) Molecules that have the same formula but structures that are mirror images can have the (**same, different**) effect in living organisms.

26. (1 point) Biology on earth uses sugars that are (**right-handed, left-handed**).

27. (1 point) Biology on earth primarily uses amino acids that are (**right-handed, left-handed**).

28. (2 points) Name two atoms that our body needs to build DNA that we cannot get from eating carbohydrates and fats are _____ and _____.

29. (4 points) The plastics polyethylene, polypropylene, polystyrene, and many others are built from monomers that have a _____ bond that _____ _____ to connect to the next molecule in the chain.

30. (1 point) Chemical reactions only rearrange atoms, but nuclear reactions can change one kind of atom to another. (**true, false**)

31. (4 points) Atoms with the same number of _____ are said to be the same element even though they might have different numbers of _____.

32. (4 points) A lone neutron will decay into a(n) _____, a(n) _____ and an anti-neutrino with a half-life of 14.7 minutes, but when it is part of a stable nucleus like $^{12}_{6}C_{6}$, it will never decay.

33. (2 points) In the symbol for radioactive carbon-14, $^{14}_{6}C_{8}$, the number in the upper-left is the total number of _____.

34. (2 points) In the symbol for radioactive carbon-14, $^{14}_{6}C_{8}$, the number in the lower-left is the total number of _____.

35. (2 points) In the symbol for radioactive carbon-14, ${}^{14}_{6}C_{8}$, the number in the lower-right is the total number of _____.

36. (1 point) An alpha (α) decay is when a nucleus emits a _____ nucleus. (use a symbol for it like ${}^{x}_{y}A_{z}$)

37. (1 point) A beta $^{-}$ (β^{-}) decay is when a nucleus emits a(n) _____.

38. (1 point) A positron is the anti-particle of a(n) _____.

39. (1 point) If an electron and a positron meet, they completely annihilate producing _____ gamma ray photons.

40. (1 point) A beta $^{+}$ (β^{+}) decay is when a nucleus emits a(n) _____.

41. (1 point) A gamma (γ) decay is when a nucleus emits a(n) _____.

42. (3 points) Our skin is able to protect us from _____ and _____ rays, but not from _____ rays.

43. (2 points) When a large, unstable nucleus breaks apart, the processes is called nuclear _____ and energy is (**required, released**).

44. (2 points) When two small nuclei join together, the process is called nuclear _____ and energy is (**required, released**).

45. (1 point) The unstable uranium nucleus used in atomic bombs is (${}^{238}_{92}\mathbf{U}_{146}$, ${}^{235}_{92}\mathbf{U}_{143}$)

46. (1 point) In general, the most stable nuclei are those with equal numbers of protons and neutrons. (**true, false**)

47. (2 point) Heavy nuclei need to have more _____ than _____ to be stable.

48. (2 points) What fraction of unstable nuclei remain after 1 half life?

49. (2 points) What fraction of unstable nuclei remain after 2 half-lives?

50. (2 points) What fraction of unstable nuclei remain after 3 half-lives?

51. (2 points) After a nuclear explosion or accident radioactive strontium is produced. If ingested, it will accumulate in the _____ of an animal.

52. (2 points) After a nuclear explosion or accident radioactive iodine is produced. If ingested, it will accumulate in the _____ of an animal.

53. (2 points) After a nuclear explosion or accident radioactive cesium is produced. If ingested, it will accumulate in the _____ of an animal.

54. (2 points) A better name for an “atom” bomb would nuclear _____ bomb.

55. (2 points) A better name for a “hydrogen” bomb would be nuclear _____ bomb.

55. (2 points) An atom bomb is triggered by a(n) _____ explosion.

57. (2 points) A hydrogen bomb is triggered by a(n) _____ explosion.

58. (1 points) All current nuclear electric generation plants depend on controlled nuclear (**fusion, fission**).

59. (2 point) Every second our bodies experience roughly (**0.01, 1, 100, 10^4, 10^6, 10^8**) nuclear decays.

60. (2 point) Cosmic rays vary widely hour by hour, but during quiet times our bodies experience roughly (**0.01, 1, 100, 10^4, 10^6, 10^8**) cosmic rays hits every hour.

61. (2 points) When $^{238}_{92}U_{146}$ decays to $^{206}_{82}Pb_{124}$ via a series of alpha and beta decays, _____ is produced, a heavy inert gas that can collect in basements.

62. (1 point) Magnetic resonance imaging (MRI) uses nuclear magnetic resonance to determine biological activity. If you have an MRI scan done on you, should you be worried about nuclear radiation? (**yes, no**)

63. (1 point) In medicine, radioactive elements are often used to _____ certain illnesses.

64. (1 point) In biological research, radioactive elements are used to trace biochemical _____.

65. (5 points) On March 11, 2011, a magnitude 9.0 earthquake occurred 40 km east of the northeast corner of Japan. The subsequent tsunami was up to 40 m high and swept 10 km inland killing over 16,000 people. When the earthquake struck, a power plant at Fukushima with four nuclear reactors started shutting down and switched to emergency power generators. Unfortunately, the emergency power generators were near the shore and were destroyed by the tsunami. The cooling _____ in the reactors then started evaporating away and its _____ fuel rods overheated. This caused cooling water to react with the zirconium in the fuel rods producing _____ gas which collected in the containment buildings, mixed with _____ and exploded. The fuel rods melted through the bottom of the steel and concrete containment vessels. The site will be unusable for many times the _____ -year half-life of its radioactive contents.

66. (1 point) Nuclear (**fission, fusion**) bombs are about 100 times more powerful than (**fission, fusion**) bombs.

67. (2 points) Atomic bombs are possible because $^{235}_{92}U_{143}$ will immediately break apart when struck by a _____ and will then produce more than one _____ as it breaks apart. This causes a very rapid chain reaction.