Nuclear Physics Multiple Choice Questions

PSI Physics	Name:	
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- 1. An unknown chemical element is presented by the following formula: ${}_{Z}^{A}X$. What is the name of index Z?
 - A. Atomic mass number
- B. Atomic number
- C. Principle quantum number

- D. Orbital quantum number
- E. Magnetic quantum number
- 2. An unknown chemical element is presented by the following formula: ${}_{Z}^{A}X$. What is the name of index A?
 - A. Atomic mass number
- B. Atomic number
- C. Principle quantum number

- D. Orbital quantum number
- E. Magnetic quantum number
- 3. The atomic number is equivalent to which of the following?
 - A. The number of neutrons in the atom.
- B. The number of protons in the atom.
- C. The number of nucleons in the atom.
- D. The number of α -particles in the atom.

- E. None of the above
- 4. The atomic mass number is equivalent to which of the following?
 - A. The number of neutrons in the atom.
- B. The number of protons in the atom.
- C. The number of nucleons in the atom
- D. The number of α -particles in the atom.

- E. None of the above
- 5. Which of the following particles has the smallest mass?
 - A. Proton
- B. Electron
- C. Neutron
- D. Nucleus
- E. Nucleon
- 6. Which of the following statements about the mass of an atom is true?
 - A. It is evenly divided between the protons and the orbiting electrons.
 - B. It is evenly divided between the nucleons and the orbiting electrons.
 - C. It is concentrated in the electron cloud.
 - D. It is concentrated in the nucleus.
 - E. It is evenly divided between protons, neutrons and orbiting electrons.
- 7. Which of the following is correct for the number of neutrons in the nucleus?
 - A. N = A Z
- B. N = Z A
- C. N = Z + A
- D. N = Z
- E. N = A

- 8. How many electrons are in the ${}^{12}_{6}C$ atom?
 - A. 12
- B. 6
- C. 18
- D. 3
- E. 9

- 9. How many nucleons are in the $^{20}_{10}Ne$ atom?
 - A. 12
- B. 30
- C. 18
- D. 10
- E. 20

- 10. How many neutrons are in the $^{23}_{11}Na$ atom?
 - A. 12
- B. 11
- C. 18
- D. 24
- E. 9

11. How many protons are in the $^{14}_{7}N$ atom?						
	A. 14	B. 6	C. 7	D. 10	E. 9	
 12. What law did Ernest Rutherford use to estimate the size of the nucleus? A. Conservation of nucleon number B. Conservation of angular momentum C. Conservation of linear momentum 						
D. Conservation of energy						
E. Conservation of charge						

- 13. Why are nuclear energy levels more complex than electron energy levels?
 - A. Nuclear energy levels depend only on attractive forces.
 - B. Nuclear energy levels depend on attractive and repulsive forces.
 - C. Nuclear energy levels are an order of one hundred times as great as electron energy levels.
 - D. Electron energy levels depend on the interaction between neutrons and electrons.
 - E. Electron energy levels have greater energy than the nuclear energy levels.
- 14. Which of the following about the nuclear force is true?
 - A. It is an attractive force between electrons and protons in an atom.
 - B. It is an attractive force between electrons and neutrons in an atom.
 - C. It is much weaker than the electromagnetic force.
 - D. It is much weaker than the gravitational force.
 - E. It is a strong, short-range, attractive force between the nucleons.
- 15. What force is responsible for the radioactive decay of the nucleus?
 - A. Gravitational force
 - B. Weak Nuclear force
 - C. Strong Nuclear force
 - D. Electromagnetic force
- 16. Isotopes of an element:
 - A. have the same number of protons and electrons, but a different number of neutrons.
 - B. have the same number of protons and neutrons, but a different number of electrons.
 - C. have different number of protons.
 - D. have different number of electrons.
 - E. have the same number of neutrons and protons.
- 17. Binding energy is:
 - A. the amount of energy required to break a nucleus apart into protons and neutrons.
 - B. the amount of energy required to break a nucleus apart into protons and electrons.
 - C. the amount of energy required to break a nucleus apart into electrons and neutrons.
 - D. the amount of energy released when neutrons change energy levels.
 - E. the amount of energy released when protons change energy levels.

18.	. If m_H is the atomic mass of Hydrogen, m_n is the mass of a neutron, and M is the atomic mass of the atom, which of the following is the mass defect formula?						
	-			C. $\Delta m = Z \cdot m_H - N \cdot m_D - M$			
		$\Delta m = Z^{*}m_{H} + N^{*}m_{n} - M$ B. $\Delta m = Z^{*}m_{H} + N^{*}m_{n} + M$ C. $\Delta m = Z^{*}m_{H} - N^{*}m_{n}$ E. $\Delta m = M - Z^{*}m_{H} - N^{*}m_{n}$					
19.	When nucleons form a stable nucleus, binding energy is:						
	A. created from nothing.		B. destroyed into not	troyed into nothing.			
	C. transformed into visible light. D. abso		D. absorbed as high of	orbed as high energy photons or particles.			
	E. released as high energy pho	otons or pa	articles.				
20.	When a nucleus is divided into its constituents, energy is:						
	A. created from nothing.		B. destroyed into not	thing.			
	C. transformed into visible ligh	ht.	D. absorbed by the n	ucleus which then breaks it apart.			
	E. released by the nucleus as i	it breaks a	part.				
21.	An isotope with a high Binding Energy per nucleon:						
	A. will decay in a short period	of time.	B. is very unstable.				
	C. is very stable . D. has		D. has very few elect	very few electrons.			
	E. has more protons than neu	trons.					
22.	Why do heavier nuclei have a greater ratio of neutrons to protons than lighter nuclei?						
	A. to add more nucleons so that the binding energy is greater.						
	B. to provide a greater weak nuclear force.						
	C. to provide more attractive electromagnetic force.						
	D. to provide more attractive	D. to provide more attractive strong nuclear force to balance the repulsive electromagnetic force.					
	E. to provide more repulsive s	strong nuc	lear force to balance	the attractive electromagnetic force.			
23.	Which of the following is the alpha	a particle?					
	A. $_{+1}^{0}e$ B. $_{-1}^{0}e$	C. ${}^{1}_{0}n$	D. $^1_1 H$	E. ⁴ ₂ He			
24.	. Which of the following is the eta^- particle?						
	A. $_{+1}^{0}e$ B. $_{-1}^{0}e$	C. ${}_0^1n$	D. 1_1H	E. ⁴ ₂ He			
25.	Which of the following is the β^+ particle?						
	A. $_{+1}^{0}e$ B. $_{-1}^{0}e$	C. 1_0n	D. ${}^1_1 H$	E. ⁴ ₂ He			
26.	Which of the following about the gamma ray is true?						
	A. It carries a positive charge.		B. It carries a	B. It carries a negative charge.			
	C. It can be deflected by a mag	_		D. It can be deflected by an electric field.			
	E. It has zero rest mass and a	neutral ch	arge.				

27. Which type of radiation is stopped by a sheet of paper?

B. beta particle

E. Ultraviolet radiation

C. Gamma ray

A. alpha particle

D. X-ray

28.	28. What is the missing element from the following equation $^{226}_{88}Ra \rightarrow ? + ^4_2He?$					
	A. $^{230}_{86}Rn$	B. $^{220}_{86}Rn$	C. $^{228}_{86}Rn$	D. $^{222}_{86}Rn$	E. $^{224}_{86}Rn$	
29.	What is the missing	g element from t	the following equ	uation $^{14}_{6}C \rightarrow$? +	${1}^{0}e$?	
	A. $^{13}_{7}N$	B. ${}^{12}_{6}C$	C. $^{17}_{8}0$	D. $^{16}_{8}O$	E. $^{14}_{7}N$	
30.	A 100 g sample of a will remain after 15		ment has a half-	life of 5 days. H	ow many grams o	of radioactive material
	A. 100 g	B. 50 g	C. 25 g	D. 12.5 g	E. 0 g	
31.			chermic			
32.	The following react	tion: ${}_{0}^{1}n + {}^{235}_{92}U \rightarrow$	$\Rightarrow^{141}_{56}Ba + ^{92}_{36}Kr + ^{32}_{36}Kr + ^{$	$3_0^1 n$ is called:		
	A. Fusion	B. Fission	C. alpha decay	D. bet	a decay	E. gamma decay
33. The following reaction: ${}_{1}^{2}H + {}_{1}^{3}H \rightarrow {}_{2}^{4}He + {}_{0}^{1}n$ is called:						
	A. Fusion	B. Fission	C. alpha decay	D. bet	ta decay	E. gamma decay

Answer Guide

- 1. B
- 2. A
- 3. B
- 4. C
- 5. B
- 6. D
- 7. A
- 8. B
- 9. E
- 10. A
- 11. C
- 12. D
- 13. B
- 14. E
- 15. B
- 16. A
- 17. A
- 18. A
- 19. E
- 20. D
- 21. C
- 22. D
- 23. E
- _ _ _
- 24. B
- 25. A
- 26. E
- 27. C
- 28. D
- 29. E
- 30. C
- 31. B
- 32. B
- 33. A