

Quiz #16

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Mark the letter of the *BEST* answer onto your scantron sheet.

MAKE NO MARKS AT ALL ON ANY OF THESE PAGES.

1. Which of the following is the *primary* reason why physicists and other scientists were troubled by Rutherford's model of the atom?
 - A. Rutherford's model did not explain how the atom's electrons are arranged in space outside of the nucleus.
 - B. Rutherford's model did not address the question of why the negatively charged electrons do not spiral down into the nucleus.
 - C. Rutherford's model did not explain the charge (positive vs. negative) between the protons in the nucleus and the electrons outside of the nucleus.
 - D. Rutherford's model did not begin to account for the differences in chemical behavior between the various elements.
2. Which of the following is described by "...is a form of energy that exhibits wavelike behavior as it travels through space?"
 - A. photon
 - B. gamma rays
 - C. electromagnetic radiation
 - D. electrons
 - E. None of the above is described by the quote.
3. Which of the following is NOT a correct *unit* for frequency?
 - A. Hertz
 - B. sec^{-1}
 - C. 1/s
 - D. ν
 - E. All of the above are *units* we use for frequency.
4. What is the relationship between λ and frequency of a wave?
 - A. Direct
 - B. Inverse
 - C. Neither direct nor inverse
 - D. They are equal.
5. Which of the following is not part of the visible electromagnetic spectrum?
 - A. Red light
 - B. Infrared light
 - C. Violet light
 - D. Ultraviolet light
 - E. More than one of the above is not part of the visible electromagnetic spectrum.

6. What is the frequency of green light which has a wavelength of 4.90×10^{-7} m?
- A. $6.28 \times 10^{14} \text{ s}^{-1}$
 - B. $6.12 \times 10^{14} \text{ s}^{-1}$
 - C. $6.00 \times 10^{14} \text{ s}^{-1}$
 - D. $6. \times 10^{14} \text{ s}^{-1}$
 - E. $3.00 \times 10^8 \text{ m/s}$
7. An x-ray has a wavelength of 1.15×10^{-10} m. What is its frequency?
- A. $6.21 \times 10^{18} \text{ s}^{-1}$
 - B. $2.61 \times 10^{18} \text{ s}^{-1}$
 - C. $6 \times 10^{18} \text{ s}^{-1}$
 - D. $3.00 \times 10^8 \text{ m/s}$
 - E. None of the above are correct.
8. What is the speed of an electromagnetic wave that has a frequency of 7.8×10^6 Hz?
- A. $6.20 \times 10^{18} \text{ s}^{-1}$
 - B. $2.91 \times 10^{18} \text{ m/s}$
 - C. $6.37 \times 10^{18} \text{ m/s}$
 - D. $3.00 \times 10^8 \text{ m/s}$
 - E. None of the above is correct.
9. *Track*, the new radio station in Indianapolis, broadcasts with a frequency of 107.9 MHz. What is the wavelength of the broadcast? (1 MHz = 10^6 Hz.)
- A. 4.8 m
 - B. 3.17 m
 - C. 7.88 m
 - D. 2.78 m
 - E. 1.2 m
10. Which of the following scientists searched for an explanation for why light is emitted from heated objects?
- A. Albert Einstein
 - B. Johann Balmer
 - C. Max Planck
 - D. Werner Heisenburg
 - E. Niels Bohr
11. Which of the following is described by "...is the minimum amount of energy that can be gained or lost by an electron?"
- A. electromagnetic radiation
 - B. quantum
 - C. wave
 - D. photoelectric effect
 - E. orbit
12. Which of the following is the correct SI unit for energy?
- A. Hz
 - B. Newton
 - C. Joule
 - D. m/s
 - E. J • sec

13. Only one of the following frequencies of light can eject an electron from a metal surface. Which frequency is this?
- A. 4.27×10^{14} Hz
 - B. 6.31×10^{14} Hz
 - C. 9.77×10^{14} Hz
 - D. 1.00×10^{15} Hz
 - E. 1.34×10^{15} Hz
14. The photoelectric effect clearly shows _____ nature of light.
- A. the particle
 - B. the wave
 - C. the wave and particle
 - D. neither the wave nor particle
15. Which of the following is described by "...particle of electromagnetic radiation with no mass that carries a quantum of energy?"
- A. Electron
 - B. Proton
 - C. Neutron
 - D. Photon
 - E. Light wave
16. Which of the following scientists was given credit for making the connection between the dual nature of light (wave – particle duality) and the dual nature of an electron?
- A. Albert Einstein
 - B. Louis deBroglie
 - C. Frederik George
 - D. Werner Heisenburg
 - E. Niels Bohr
17. What is the energy of this ultraviolet light having a frequency of 1.05×10^{16} Hz?
- A. 6.96×10^{-18} J
 - B. 2.56×10^{-18} J
 - C. 1.22×10^{-18} J
 - D. 4.19×10^{-15} J
 - E. 5.88×10^{-14} J
18. How many visible spectral lines does the element *hydrogen* have?
- A. 1
 - B. 4
 - C. 27
 - D. 39
 - E. More than 50
19. What is the difference between white light as it is described in at atomic emission spectra as compared to the atomic emission spectra of any specific element?
- A. White light is a continuous spectra.
 - B. Any element's atomic spectra always has exactly 4 lines of color.
 - C. Neither of the above is true.
 - D. A and B above are true.

20. Which of the following pairs is INCORRECT?
- A. Longest wavelength – radio waves
 - B. Highest frequency – gamma waves
 - C. Greatest energy – gamma waves
 - D. Greatest energy – infrared waves
 - E. All of the above are CORRECT.
21. Which of the following scientists is given credit proposing the quantum model of the hydrogen atom and his model correctly predicted the frequencies of the lines in hydrogen's atomic emission spectrum?
- A. Albert Einstein
 - B. Johann Balmer
 - C. Max Planck
 - D. Werner Heisenburg
 - E. Niels Bohr
22. The lowest allowable energy state of an atom is called its:
- A. Excited state
 - B. Photon state
 - C. Ground state
 - D. Magnetic state
 - E. United state
23. Bohr's atomic model
- A. Explained the spectral lines of hydrogen remarkably well.
 - B. Failed to explain the spectrum of any element other than hydrogen.
 - C. Did not fully account for the chemical behavior of atoms.
 - D. All of the above.
 - E. None of the above.
24. Which of the following scientists was able to create an equation which predicts that all moving particles have wave characteristics?
- A. Albert Einstein
 - B. Johann Balmer
 - C. Max Planck
 - D. Werner Heisenburg
 - E. Louis de Broglie
25. Which of the following describes "... the inverse relationship between knowing an electron's velocity and it's position in place?"
- A. Schrodinger's equation
 - B. De Broglie's equation
 - C. Heisenberg's Uncertainty Principle
 - D. Einstein's equation
 - E. None of the above