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Accelerated Chemistry

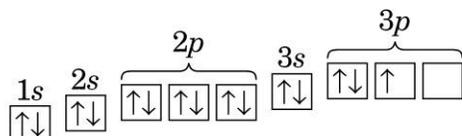
## CHAPTER 4 PRE-TEST

# Arrangement of Electrons in Atoms

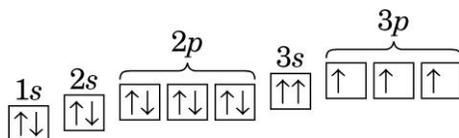
In the space provided, write the letter of the term that best completes each sentence or best answers each question.

\_\_\_\_\_ 1. Which of the following orbital notations for phosphorus is correct?

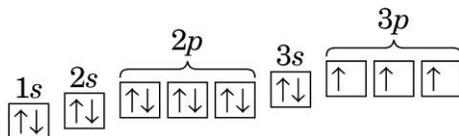
a.



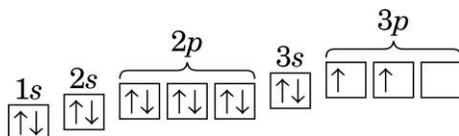
b.



c.



d.

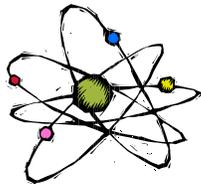


\_\_\_\_\_ 2. The diagram  $\boxed{\uparrow\downarrow}$  represents two electrons with

- opposite spin states.
- the same spin state.
- different energies.
- the same energy.

\_\_\_\_\_ 3. Which of the following quantum numbers describes a p-orbital in the third energy level?

- $n = 3, l = 0, m = 0$
- $n = 3, l = 1, m = 0$
- $n = 3, l = -1, m = 0$
- $n = 4, l = 1, m = 0$



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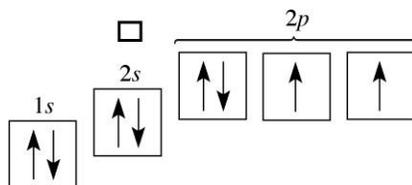
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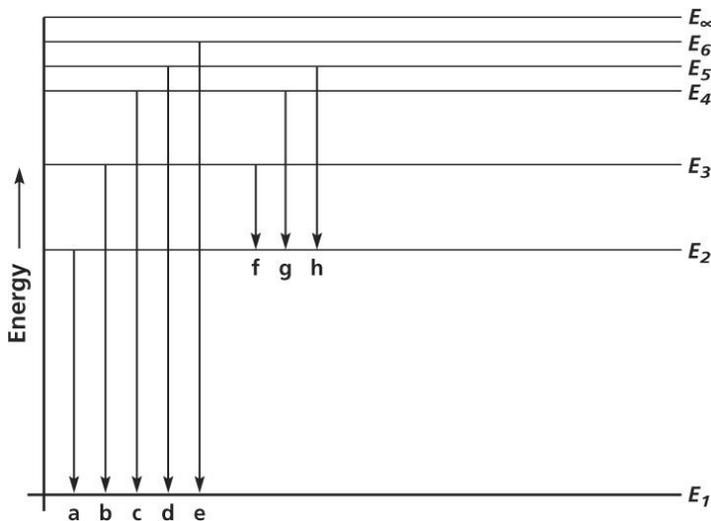
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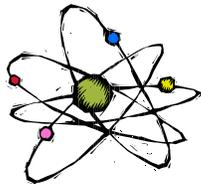
\_\_\_\_\_ 4. The electron configuration below violates



- the Pauli exclusion principle.
  - the Aufbau principle.
  - Hund's rule.
  - Both (a) and (c).
- \_\_\_\_\_ 5. A photon is emitted from a gaseous atom when an electron moves to its ground state from a(n)
- inner shell.
  - excited state.
  - $n = 0$  state.
  - less energetic state.
- \_\_\_\_\_ 6. How many wavelengths of light are represented in the diagram below?



- 1
  - 6
  - 7
  - 8
- \_\_\_\_\_ 7. What is the frequency of light whose wavelength is 633 nm?
- $4.74 \times 10^{-4}$  Hz
  - $4.74 \times 10^{-2}$  Hz
  - $4.74 \times 10^{14}$  Hz
  - $4.74 \times 10^{16}$  Hz



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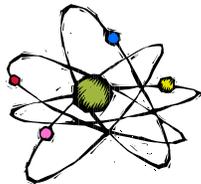
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- \_\_\_\_\_ 8. What is the frequency of a photon whose energy is  $3.4 \times 10^{-19}$  J?  
( $h = 6.626 \times 10^{-34}$  J·s)
- $8.8 \times 10^{26}$  Hz
  - $5.1 \times 10^{14}$  Hz
  - $1.9 \times 10^{-15}$  Hz
  - $2.3 \times 10^{-52}$  Hz
- \_\_\_\_\_ 9. When electromagnetic radiation strikes the surface of a metal, electrons are ejected from the metal's surface. This is a description of the
- photoelectric effect.
  - quantum theory.
  - Aufbau principle.
  - effects of diffraction.
- \_\_\_\_\_ 10. The lowest energy state of an atom is its
- highest-occupied energy level.
  - principle quantum number.
  - electron configuration.
  - ground state.
- \_\_\_\_\_ 11. Which of these does the angular momentum quantum number indicate?
- the shape of an orbital
  - the main energy level of an electron
  - the orientation of an orbital around the nucleus
  - the spin state of an electron in an orbital
- \_\_\_\_\_ 12. Which are the sublevels in an energy level of  $n = 3$ ?
- $s$ ,  $p$ , and  $f$
  - $s$ ,  $d$ , and  $f$
  - $s$ ,  $p$ , and  $d$
  - $p$ ,  $d$ , and  $f$
- \_\_\_\_\_ 13. What is the highest occupied energy level in an atom of strontium in its ground state?
- $n = 3$
  - $n = 4$
  - $n = 5$
  - $n = 6$



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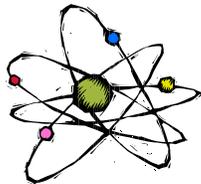
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- \_\_\_\_\_ 14. What is the correct electron configuration for a ground-state atom with 7 electrons?
- $1s^2 2s^2 2p^3$
  - $1s^2 2s^2 2p^2 3s^1$
  - $1s^2 2s^3 2p^2$
  - $1s^2 2s^5$
- \_\_\_\_\_ 15. What is the correct noble-gas notation for the electron configuration of an atom of chlorine?
- $[\text{Ar}]3s^2 3p^5$
  - $[\text{Ne}]3s^2 3p^4$
  - $[\text{Ar}]3s^2 3p^4$
  - $[\text{Ne}]3s^2 3p^5$
- \_\_\_\_\_ 16. What is the atomic number of the element with the noble-gas notation  $[\text{Kr}]5s^1$ ?
- 35
  - 36
  - 37
  - 38
- \_\_\_\_\_ 17. In which orbital(s) are all the inner-shell electrons located in an atom of magnesium that is in the ground state?
- 1s
  - 1s, 2s
  - 1s, 2s, 2p
  - 1s, 2s, 2p, 3s
- \_\_\_\_\_ 18. The electron configuration below represents a ground-state atom of which element?  $1s^2 2s^2 2p^6 3s^2 3p^4$
- sulfur
  - oxygen
  - silicon
  - selenium
- \_\_\_\_\_ 19. Which of the following types of electromagnetic radiation has the lowest frequency?
- X rays
  - infrared light
  - ultraviolet light
  - microwaves



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- \_\_\_\_\_ 20. The distance between corresponding points on adjacent waves is the wave's
- energy.
  - wavelength.
  - frequency.
  - speed.
- \_\_\_\_\_ 21. According to Einstein, which of the following can behave like a wave and also like a stream of particles?
- a noble gas
  - the atomic nucleus
  - electromagnetic radiation
  - a hydrogen atom in the ground state
- \_\_\_\_\_ 22. When an atom in an excited state emits a photon of radiation, the energy of the photon is equal to the
- energy of the atom's excited state.
  - energy of the atom's final state.
  - total energy of the atom's excited state and its final state.
  - difference in energy between the atom's excited state and its final state.
- \_\_\_\_\_ 23. The total number of orbitals that can exist at a given main energy level,  $n$ , is equal to
- $n$ .
  - $2n^2$ .
  - $n^2$ .
  - $n - 1$ .
- \_\_\_\_\_ 24. How many possible orientations does an s orbital have?
- 1
  - 2
  - 3
  - 5
- \_\_\_\_\_ 25. How many possible values are there for the spin quantum number?
- 2
  - 3
  - 4
  - 5