Tutorial 6

1. Consider the reaction of H_2SO_4, with NaOH. Suppose a flask contains 35.0 mL of 0.175 M H_2SO_4. How many millilitre is of 0.250 M NaOH must be added to react completely with the acid?
2. A flask containing a solution with an unknown amount of HCl. This solution is titrated with 0.207 M NaOH. It takes 4.47 mL of NaOH to reach the equivalent point. What is the mass in grams of HCl?
3. 25.00 mL of NaOH was standardized using 17.00 mL of 0.1 M HCl solution. Determine the concentration of the standardized NaOH.
4. A 5.00 g sample of vinegar is titrated with 0.108 M NaOH. If the vinegar requires 39.10 mL of the NaOH solution for the reaction mixture to change colour to pink. What is the mass percentage of acetic acid CH_3COOH in vinegar?
5. To determine the molar mass of an organic, HA, we titrated 1.056 g of HA with standardized NaOH. Calculate the molar mass of HA assuming the acid reacts with 33.78 mL of 0.256 M NaOH.
6. What is the Principle Quantum number (n) of the first shell to have d orbitals?
    (a) 1
    (b) 2
    (c) 3
    (d) 4
7. s orbitals have angular momentum quantum number (l) of?
    (a) 0
    (b) 1
    (c) 2
    (d) 3
8. 3p orbitals have angular momentum quantum number (l) of?
    (a) 0
    (b) 1
    (c) 2
    (d) 3

9. d orbitals have an azimuthal quantum (l) number of?
    (a) 0
    (b) 1
    (c) 2
    (d) 3
10. There are how many values of m_l are there for l= 2 (d orbitals)?
    (a) 1
    (b) 2
    (c) 5
    (d) 7
11. Which quantum number describes the "shells" and "size" of orbitals?
    (a) Principle
    (b) Azimuthal
    (c) Magnetic
12. Which quantum number describes the shapes of the orbitals?
    (a) Principle
    (b) Azimuthal
    (c) Magnetic
    (d) Spin
13. Which quantum number describes the orientation of an orbital?
    (a) Principle
    (b) Azimuthal
    (c) Magnetic
    (d) Spin
14. Which quantum number determines the energy of an electron in a hydrogen atom?
    (a) n
    (b) l
    (c) ml
    (d) ms

15. The spin quantum number is a result of.
    (a) aufbau principle
    (b) pauli exclusion principle
    (c) heisenberg uncertainty principle
    (d) mendeleev's principle
16. The total number of electrons that can occupy the principle energy level n is?
    (a) 2
    (b) 8
    (c) n
    (d) $2n^2$
17. For an electron with angular momentum quantum number $\ell = 2$, the magnetic quantum number ml can have?
    (a) an infinite number of values
    (b) only one value
    (c) one of two possible values
    (d) one of three possible values
    (e) one of five possible values
18. The total number of electrons allowed in a $\ell = 1$ subshell is?
    (a) 2 electrons
    (b) 6 electrons
    (c) 8 electrons
    (d) 10 electrons
    (e) 14 electrons
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    (a) 2 electrons
    (b) 6electrons
    (c) 8 electrons
    (d) 10 electrons
    (e) 14 electrons

20. A 3p electron can have possible magnetic quantum number ml values of
    (a) 1, 2, and 3
    (b) +½ or -½
    (c) 0, 1, and 2
    (d) -1, 0 and 1
    (e) -2, -1, 0, 1 and 2
21. Which of the following set of quantum numbers would represent an electron in a 3d orbital?
    (a) 3, 2, 1, -½
    (b) 3, 2, 1, +½
    (c) either a or b
    (d) neither a nor b
22. Calcium has an atomic number of 20. A stable calcium atom has an electronic configuration of?
    (a) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$
    (b) $1s^2 1p^6 1d^{10} 1f^2$
    (c) $1s^2 2s^2 2p^6 3s^2 3p^6 3d^2$
    (d) $1s^2 2s^2 2p^6 3s^2 3p^6$
    (e) $1s^2 1p6^2 s^2 2p^6 3s^2 3p^2$
23. Phosphorus has an atomic number of 15. A stable phosphorus atom has an electronic configuration of
    (a) $1s^2 1p^6 2s^2 2p^5$
    (b) $1s^2 2s^2 2p^6 3s^2 3p^3$
    (c) $1s^2 2s^2 2p^6 3s^2 3p^1 4s^2$
    (d) $1s^2 1p^6 1d^7$
24. Which of the following electron configuration is possible? Explain why others are not.
    (a) $1s^1 2s^2 2p^7$
    (b) $1s^2 2s^2 2p^6 3s^2 3d^7$
    (c) $1s^2 2s^2 2p^5$
    (d) $1s^2 2s^3 2p^5$
25. Give the electron configuration of the ground state of iodine, using the building up principle (Aufbau principle).

26. Use the building principle to obtain the electron configuration of the ground state of manganese