

# MiniQuiz 3

Chem 111, Section 2 (Martin, 10:10am)

Fall 1998

Fill out the name and student ID section of the OpScan sheet completely. Also immediately proceed to the end of this exam and enter your exam number, as indicated. **Failure to correctly do so will result in the loss of 2 points on this quiz.**

- DeBroglie proposed that the electron had wave properties, as well as particle properties. He proposed that the wavelength of a particle was related to the mass through the equation  $\lambda = h/mu$ , where  $u$  is the velocity. His original proposal was based on:
  - Einstein's explanation of the photoelectric effect.
  - Rutherford's experiment with a beam of particles passing through gold foil.
  - Boer's model of the atom.
  - Faraday's experiment of the electroplating of metals.
  - Binnig and Rohrer's demonstration of the scanning tunneling microscope.
- Hund's Rule states that the most stable arrangement of electrons is that with the maximum number of unpaired electrons. This rule can be experimentally verified through:
  - measuring the photoelectric effect.
  - measuring the attraction of an element to a magnetic.
  - passing a beam of particles through a sample of the element.
  - passing x-rays through the element.
  - none of the above.
- If the principal quantum number  $n$  is 2, the value of  $l$ , the angular momentum quantum number, can be:

|                     |                       |             |
|---------------------|-----------------------|-------------|
| a) 0.               | b) 0,1.               | c) 0, 1, 2. |
| d) -2, -1, 0, 1, 2. | e) none of the above. |             |
- The phenomenon of paramagnetism is determined by the number of electrons:
  - that have a given principal quantum number  $n$ .
  - that have a given angular momentum quantum number  $l$ .
  - that are unpaired and have the same spin.
  - that are paired and have a complete valence shell.
  - none of the above.
- One of the major factors in determining the energy of an electron is its electrostatic attraction to the positive nucleus. Shielding refers to the:
  - the number of electrons in the outer shell.
  - the electron's angular momentum quantum number.
  - the presence of other electrons between the electron and the nucleus reducing the attraction.
  - the number of unpaired electrons that have the same spin.
  - none of the above.

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6. The Pauli Exclusion Principle states that:
- a) no two electrons can be in the same subshell
  - b) no two electrons can have the same magnetic quantum number  $m_l$ .
  - c) no two electrons can have all four quantum numbers the same.
  - d) when there are  $n-2$  electrons in a shell, further electrons are excluded.
  - e) none of the above.
7. Chromium has the electron configuration  $[\text{Ar}]3d^5 4s^1$ . We would expect chromium to be:
- a) paramagnetic.
  - b) less paramagnetic than helium.
  - c) diamagnetic.
  - d) there isn't enough information to tell.
8. The electron configuration of nitrogen is:
- a)  $1s^2, 2s^2, 2p^3$ .
  - b)  $1s^2, 2s^2, 2p^2$ .
  - c)  $1s^2, 2s^2, 2p^5$ .
  - d)  $1s^2, 2s^2, 2p^6$ .
  - e)  $1s^2, 2s^2, 2p^1$ .
9. Which element below has the highest first ionization potential?
- a) C
  - b) N
  - c) O
  - d) F
  - e) Cl
10. Which species below has the largest radius?
- A) K
  - b)  $K^+$
  - c) Na
  - d)  $Na^+$
  - e)  $Ca^{2+}$

### IMPORTANT:

Place the number **1** in column **K** of your OpScan sheet. **This is essential!**