Free Response Practice #4 (7 points)

4. Suppose that a stable element with atomic number 119, symbol Q, has been discovered.
   a. Write the ground-state electron configuration for Q, showing only the valence-shell electrons. (1 point)
   b. Would Q be a metal or a non-metal? Explain in terms of atomic structure. (2 points)
   c. On the basis of periodic trends, would Q have the largest atomic radius in its group or would it have the smallest? Explain in terms of electronic structure. (2 points)
   d. What would be the most likely oxidation state of the Q ion in a stable ionic compounds? (1 point)
   e. Assume that Q reacts to form a carbonate compound. Write the formula for the compound formed between Q and the carbondate ion, CO_3^{2-}. (1 point)

(a) $8s^1$

(b) Metal, b/c Q's single valence e^- would be very far from the nucleus + thus require relatively little energy to remove, resulting in a low first ionization energy and high metallic character.

(c) Largest, b/c its outermost e^- is located in the 8th principal energy level, which is farther from the nucleus than valence e^- found in energy levels $1 \rightarrow 7$.

(d) +1

(e) Q_2CO_3