CHE 111 - Homework - Ch 3g

OER Ch 3 **Periodic Trends** Score: _____/60

Name: _____ Date: _____

[4 pt] 1. What is meant by the term Effective Nuclear Charge (Z_{eff})? Explain what each term of the equation means.

[3 pt] 2. Why does atomic radius increase down a column?

[3 pt] 3. Why does atomic radius decrease across a row?

[4 pt] 4. On the basis of periodic trends, choose the large atom in each pair (if possible). Explain.

(a) C or F 4(a) _____

(b) Al or Ga 4(b) _____

(c) Ga or P 4(c) _____

(d) B or Si 4(d) _____

[3 pt] 5. Which is larger a Na atom or the corresponding Na^+ cation? Explain. 5. _____

[3 pt] 6. Which is larger the Cl or the corresponding Cl^- anion? Explain. 6. _____

[4 pt] 7. Write an equation showing the first and second ionization of a Al atom. Include energy in your reaction. Is the reaction endothermic or exothermic? Explain.

[2 pt] 8. Ionization energy is always positive. Why?

[3 pt] 9. Ionization energy (increases, decreases, remains the same) down a column. Why?

[3 pt] 10. Ionization energy (increases, decreases, remains the same) across a row. Why?

[4 pt] 11. Explain the **EXTRA** large increase in ionization energy needed to remove the third electron from magnesium compared with that needed for the second electron (See Table 6.2 in slides or in OER book Table 3.3 and look at Ca)

[5 pt] 12. Circle the atom from the following pair has the higher indicated ionization energy. Do **NOT** use the tables in your book (you will not have access to them on the exam), instead use your knowledge of periodic trends.

K vs Br S vs Te Ga vs Se Ne vs Sr Cl vs Se

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[2 pt] 13. Define Electron Affinity.

[3 pt] 14. Write a reaction(s) (including the change in energy) showing the formation of a O^{-2} anion from a neutral O atom.

[3 pt] 15. Why is the Electron Affinity of Oxygen greater that that of Magnesium.

[3 pt] 16. Zinc, cadmium, and mercury all have near-zero electron affinities. Explain.

[3 pt] 17. Explain the trend in the Electron Affinity going from C to N to O.

[3 pt] 18. Why is the Electron Affinity of Cl more negative than F?

[2 pt] 19. What type of ion is Phosphorus likely to make. Explain your answer in terms of electron configurations.