

REVIEW QUESTIONS

Chapter 8

Use only a periodic table to answer the following questions.

1. Write complete electron configuration for each of the following elements:

a) Aluminum (Al)

b) Sulfur (S)

c) Manganese (Mn)

2. Write condensed orbital notation diagrams for each of the following elements and determine the number of unpaired electrons in each:

a) Zinc (Zn)

b) Selenium (Se)

c) Lead (Pb)

3. Identify the element that belongs to each of the following electron configurations:

a) $1s^2 2s^2 2p^6 3s^2$ _____

b) $[\text{Ne}] 3s^2 3p^1$ _____

c) $[\text{Ar}] 4s^1 3d^5$ _____

d) $[\text{Kr}] 5s^2 4d^{10} 5p^4$ _____

4. A section of the periodic table with all identification features removed is shown below.

V	W	X
	Y	Z

Which element has the smallest atomic radius? Give a brief explanation for your choice.

5. A period 3 element has the following ionization energies. What is the identity of this element?

$IE_1 = 801 \text{ kJ/mol}$
 $IE_2 = 2427 \text{ kJ/mol}$
 $IE_3 = 3660 \text{ kJ/mol}$
 $IE_4 = 25025 \text{ kJ/mol}$

6. Arrange each of the following elements in order of increasing atomic radius.

- a) F, P, S, As
- b) B, Ca, Ga, Cs
- c) Na, Al, P, Cl, Mg

7. Arrange the following in order of increasing first ionization energy.
- a) Na, Cl, Al, S, Cs
 - b) F, K, P, Ca, Ne
 - c) Ne, Na, P, Ar, K
8. The first four ionization energies of yttrium ($Z=39$) are $IE_1= 616$, $IE_2= 1180$, $IE_3= 1980$, $IE_4= 5960$ kJ/mol. Answer the following questions based on these data:
- a) Explain the increasing trend in the successive energies of yttrium.
 - b) Explain the large increase in IE_2 compared to IE_1 .
 - c) Explain the large increase in IE_4 compared to IE_3 .
9. Explain why alkali metals have a greater electron affinity than alkaline earth-metals.

10. Which element in each of the following sets would you expect to have the highest second ionization energy (IE_2)?

a) Na, K, Fe

b) Na, Mg, Al

11. Until the early 1960s the group 8A elements were called inert gases. They are no longer referred to as such, since Xe and Kr were found to react with some substances. Suggest a reason why Xe would react with fluorine, but Ne would not.

12. The table below gives the electron affinities in kJ/mol for group 1B and 2B elements.

1B	2B
Cu -119	Zn >0
Ag -126	Cd >0
Au -223	Hg >0

a) Explain why group 1B elements have negative electron affinities, while group 2B elements have positive values.

b) Explain why group 1B electron affinities become more negative moving down the group.