Chemistry 141 Name

Dr. Cary Willard

Quiz 7A (20 points) April 9, 2008

All work must be shown to receive credit.

1. (3 points) Write the complete electron configuration for an atom of magnesium.

Mg 1s2 2s2 2p6 3s2

1. (3 points) Write the shorthand electron configuration as predicted by the periodic table for osmium.

Os [Xe] 6s2 5d6 4f14

1. (4 points) What are valence electrons and why are they important?

Valence electrons are the outermost electrons in an atom with the highest principal quantum numbers. The valence electrons are not necessarily the last electrons added into an atom, but they are the first electrons lost.

1. (5 points) Both vanadium and its 3+ ion are paramagnetic. Use electron configurations to explain why this is so.

V [Ar] 4s2 3d3 $\frac{\uparrow \downright }{4s} \frac{\uparrow }{} \frac{ \uparrow }{} \frac{ \uparrow }{3d} \frac{ }{} \frac{ }{} $

Original atom is paramagnetic because there are unpaired d electrons. When a +3 ion is formed the ion is still paramagnetic because the outermost s electrons are lost before the inner d electrons so there are still unpaired electrons.

V+3 [Ar] 3d2 $\frac{ }{4s} \frac{\uparrow }{} \frac{ \uparrow }{} \frac{ }{3d} \frac{ }{} \frac{ }{}$

1. (3 points) Explain how effective nuclear charge and ionization energy are related.

The larger the effective nuclear charge, the more tightly the outer electrons are held and the higher the ionization energy

1. (1 points) Which is larger, at atom of bromine or an atom of chlorine?

An atom of bromine is larger than an atom of chlorine

1. (1 points) Which has the larger ionization energy, an atom of nitrogen or an atom of oxygen?

An atom of oxygen has a higher ionization energy than an atom of oxygen.

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Quiz 7B (20 points) April 9, 2008

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1. (3 points) Write the complete electron configuration for an atom of phosphorus.

P 1s2 2s2 2p6 3s2 3p3

1. (3 points) Write the shorthand electron configuration as predicted by the periodic table for seaborgium.

Sg [Rn] 7s2 6d4 5f14

1. (4 points) What are valence electrons and why are they important?

Valence electrons are the outermost electrons in an atom with the highest principal quantum numbers. The valence electrons are not necessarily the last electrons added into an atom, but they are the first electrons lost.

1. (5 points) Both vanadium and its 3+ ion are paramagnetic. Use electron configurations to explain why this is so.

V [Ar] 4s2 3d3 $\frac{\uparrow \downright }{4s} \frac{\uparrow }{} \frac{ \uparrow }{} \frac{ \uparrow }{3d} \frac{ }{} \frac{ }{} $

Original atom is paramagnetic because there are unpaired d electrons. When a +3 ion is formed the ion is still paramagnetic because the outermost s electrons are lost before the inner d electrons so there are still unpaired electrons.

V+3 [Ar] 3d2 $\frac{ }{4s} \frac{\uparrow }{} \frac{ \uparrow }{} \frac{ }{3d} \frac{ }{} \frac{ }{}$

1. (3 points) Explain how effective nuclear charge and ionization energy are related.

The larger the effective nuclear charge, the more tightly the outer electrons are held and the higher the ionization energy

1. (1 points) Which is larger, at atom of silicon or an atom of chlorine?

An atom of silicon is larger than an atom of chlorine

1. (1 points) Which has the larger ionization energy, an atom of nitrogen or an atom of arsenic?

An atom of nitrogen has a higher ionization energy than an atom of arsenic.