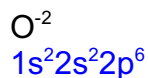


Name:

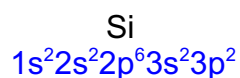
Chem 112
Final Exam

Section I. Recent material. All problems worth 20 points. Do ALL problems.

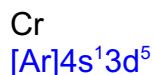
1. Write the electron configuration for the following atoms or ions:



-or-
[Ne]



-or-
[Ne]3s²3p²



Ce



Is the answer you would get from what I covered in class

The real answer is: [Xe]6s²5d¹4f¹ (this makes sense if you look at how the periodic table is written)

2. What is the periodic trend? (Circle the correct term in parenthesis)

Ionization energy gets (larger or smaller) as you go DOWN the periodic table?

Atomic radius gets (larger or smaller) as you go from LEFT TO RIGHT across the periodic table?

Electron affinity gets (larger or smaller) as you go UP the periodic table?

Electronegativity gets (larger or smaller) as you go RIGHT TO LEFT across the periodic table?

The size of isoelectronic ions gets (larger or smaller) as you increase the atomic number?

3. Give the names that correspond to the following chemical reactions. I'll do the first one for you so you understand what I want.

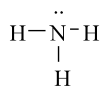
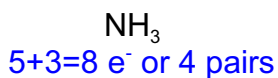
| <u>Reaction</u> | <u>Name</u> |
|---|--------------------------|
| $\text{Na(g)} \rightarrow \text{Na}^{\text{+}}(\text{g}) + \text{e}^{-}$ | <i>Ionization energy</i> |
| $\text{F(g)} + \text{e}^{-} \rightarrow \text{F}^{-}(\text{g})$ | Electron Affinity |
| $\text{H}_2\text{O(s)} \rightarrow \text{H}_2\text{O(g)}$ | Sublimation |
| $\text{Na}^{\text{+}}(\text{g}) + \text{Cl}^{-}(\text{g}) \rightarrow \text{NaCl(s)}$ | Lattice Energy |
| $\text{H}_2(\text{g}) \rightarrow 2\text{H(g)}$ | Bond Energy |
| $\text{Na(aq)} \rightarrow \text{Na}^{\text{+}}(\text{aq}) + \text{e}^{-}$ | Oxidation |

4. Estimate the ΔH for the reaction $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O(g)}$ using any of the following bond energies:

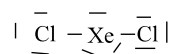
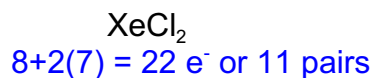
| Bond | Energy (kJ/mol) |
|------|-----------------|
| C-H | 413 |
| C-C | 347 |
| C=C | 614 |
| O-O | 146 |
| O=O | 495 |
| O-H | 467 |
| C-O | 358 |
| C=O | 745 |

$$\begin{aligned}
 & [4(\text{C-H}) + 2(\text{O=O})] - [2(\text{C=O}) + 4(\text{O-H})] \\
 & [4(413) + 2(495)] - [2(745) + 4(467)] \\
 & [1652 + 990] - [1490 + 1868] \\
 & 2642 - 3358 \\
 & = -716 \text{ kJ}
 \end{aligned}$$

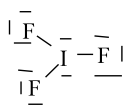
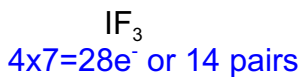
5. Give the (A.) Lewis Structure, (B.) Electron Geometry (C.) Molecular geometry (D) Bond Angle and determine if the compound is (E) Polar or Non-polar. For each of the following compounds



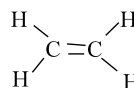
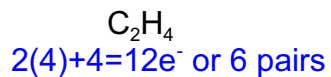
Tetrahedral
 Trigonal pyramid
 <109
 Polar



Trigonal bipyramid
 Linear
 180
 Non-polar



Trigonal bipyramid
 T-shaped
 90
 Polar



Trigonal planar
 Trigonal planar
 120
 Non-polar