Name Key

# Review of Atomic Theory / Periodic Table / Bonding

1. What main contribution did each of the following scientists make? Match!

a) Dalton 2
b) Thompson 6
c) Rutherford 5
d) Bohr 3
e) Schrödinger 7
f) Mendeleev 4
g) Lewis 1

~~1~~. Electron dot diagrams show valence e⁻
~~2~~. Each element has a unique atom
~~3~~. Electrons travel in discreet orbits
~~4~~. Elements can be arranged periodically
~~5~~. The atom has a dense nucleus
~~6~~. Discovery of the electron "Plum pudding"
~~7~~. Orbits are areas of space where there is a high probability of finding an electron

2. Give the number of protons, neutrons and electrons in the following:

| *Isotope* | *Protons* | *Neutrons* | *Electrons* |
|---|---|---|---|
| $^{177}Hf^{3+}$ | 72 | 105 | 69 |
| $^{209}Po^{2+}$ | 84 | 125 | 82 |
| $^{243}Am$ | 95 | 148 | 95 |

3. Give the nuclear notation of the following:

| *Isotope* | *Protons* | *Neutrons* | *Electrons* |
|---|---|---|---|
| $^{96}Mo^{3+}$ | 42 | 54 | 39 |
| $^{74}Ge$ | 32 | 42 | 32 |
| $^{265}Hg^{3+}$ | 108 | 157 | 105 |

4. What is meant by an orbital or energy level in Schrödinger's quantum model?

Areas of space where there is a high probability of finding an electron.

5. Using the Energy Level Diagram for Many Electron Atoms give the electron configuration for each of the following: (You may use core notation)

Si $[Ne]\,3s^2\,3p^2$

Cr $[Ar]\,4s^2\,3d^4$

$Mg^{2+}$ $[Ne]$

$Br^-$ $[Ar]\,4s^2\,3d^{10}\,4p^6$

6. As you move from left to right in the third period of the periodic table, what happens to the atomic radius of the elements. Explain why this happens.

Radius decreases more $p^+$ in nucleus attract more $e^-$

7. What happens to atomic radius as you move down a column? Explain why this happens

It increases as $e^-$ fill higher energy levels.

8. For each of the following pairs , circle the one with the larger radius:

Mg (Ba) B (Tl) Ne (Xe) (Pb) Si, (Cs) Li

9. What is the difference between electronegitivity and ionization energy?

Electronegativity is the tendancy to attract $e^-$ Ionization energy is the energy required to remove one $e^-$

10. For each of the following pairs , circle the one which is most electronegative:

(Be) Ba, (Al) In, He (C) Pb (Si) Cs (Pt) Au (Te)

11. What happens to ionization energy as you move down a vertical column? Explain why this happens

It decreases because atoms are bigger so $e^-$ are further from the pull of the nucleus.

12. What happens to ionization energy as you move across a period from left to right? Explain why this happens.

It increases because atoms get smaller and outer $e^-$ are closer to the pull of the nucleus.

13. For each of the following pairs, circle the one which is more reactive:

Ca (Ba) (Rb) Ag, Se (O) N (Be) (Cs) Na, At (Cl) (Br) Kr, Si (Cl) C (F)

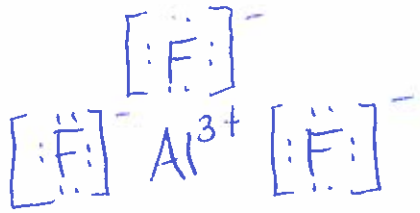
14. Explain what happens in an ionic bond vs. a covalent bond.

In an ionic bond e⁻ are transferred from a metal to a non-metal. The resulting + and − ions attract. In a covalent bond, e⁻ are shared to fill valence shell and obey the octet rule

15. Draw Lewis Structures (Electron-dot diagrams) for the following ionic compounds: (2 marks)

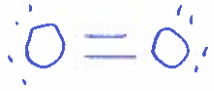
a) $CaF_2$

b) $AlF_3$

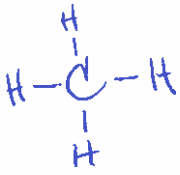


16. Draw Lewis Structures (Electron-dot diagrams) for the following diatomic elements or covalent compounds:

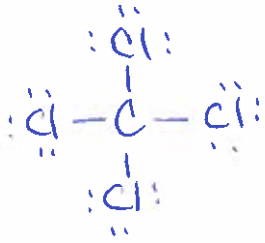
a) $O_2$



b) $CH_4$



c) $CCl_4$



d) $N_2Br_4$