Unit 3 Atomic Structure and Periodic Table Review Worksheet

1. What are the allowed values for *l*, the angular momentum quantum number when *n*, the principle quantum number is equal to 3? **0, 1, 2**
2. List the orbitals present in the 4p subshell (include subscript designations). **4px 4py 4pz**
3. How many electrons can the *n* = 3 shell hold?  **18 electrons**
4. How many orbitals are contained in a 6d subshell? **5 orbitals**
5. Describe the shape of an *s* orbital. **sphere**
6. What are the values for the four quantum numbers for the two electrons of He? **1,0,0, +1/2 and 1,0,0, -1/2**
7. What is the value of the principle quantum number for the top row of the transitions metals? **3**
8. How many elements are located in the 4f subshell? **14**
9. Indicate if 2, 1, -1, +1/2 is a (valid/invalid) set of quantum numbers. **valid**
10. Which subshell has a lower energy, 5d or 4p? **4p**

Identify the element described below using its atomic symbol.

1. Third period element in group 16. **S**
2. Has an electron configuration of [Ar]4s23d9 **Cu**
3. The liquid halogen. **Br**
4. The molecular element in period 4. **Br**
5. Has an average atomic mass equal to 40. **Ar or Ca**
6. The smallest alkaline earth metal. **Be**
7. The *n* = 3 element in group 6B. **Cr**
8. The first element in the 5p subshell. **In**
9. Has an electron configuration of [Xe]6s24f8 **Gd**
10. The noble gas with an atomic number between 35 and 45. **Kr**

21. Circle the atom or ion in each pair that has the largest radius. Justify your choice.

#  a. **Mg** or Cl b **Na** or Na+

 Mg and Cl have same n Cations are smaller than the corresponding atom

 Cl has higher atomic # so is smaller

 Mg is to the left of Cl

22. Circle the atom in each pair that has the greater ionization energy Justify your choice.

 a. Kr or **Ar** b. **Br** or K

 Ar is smaller than Kr Br is to the right of K

 Ar is above Kr Alkali metals are the lowest I.E.

23. Circle the atom in each pair that has the greater electronegativity. Justify your choice. a. **O** or N b. Pb or **Se**

 O is to the right of N Se is to the right and above Pb

24. Give the orbital notation for the following:

a) nitrogen b) Li+

 1s 2s 2p 3s 3p 1s 2s 2p 3s 3p

25. Give the complete electron configuration for the following:

a) iron b) argon

 **1s22s22p63s23p64s23d6  1s22s22p63s23p6**

26. Give the abbreviated electron configuration for the following:

a) titanium b) lead

 **[Ar]4s23d2 [Xe]6s24f145d106p2**

27. A 15.00 g sample of a compound of iron and oxygen was found to contain 6.35 g of iron. What is the percent composition of each element in this compound? 15.00 g – 6.35 g = 8.65 g O

$$\frac{6.35 g}{15.00 g}×100=42.3\%Fe$$

$$\frac{8.65 g}{15.00 g}×100=57.7\%O$$

28. When 12.5 grams of calcium are burned in oxygen, 17.5 grams of calcium oxide are formed. How many grams of oxygen were consumed in this reaction?

**17.5 g – 12.5 g = 5.0 g**

29. Use the data below to determine the average atomic mass of Silicon

 mass percent abundance

28Si 27.976927 92.2297

29Si 28.976495 4.6832

30Si 29.973770 3.0872

(27.976927 x 0.922297) + (28.976495 x 0.046832) + (29.973770 x 0.030872) =

25.80303584 + 1.357027214 + 0.925350227 = 28.08541328 **= 28.085**

**Agrees with the periodic table.**