2018E.C 1st semester Chemistry work sheetFor Grade 10th Students

✉170175

I. Choose the correct answer.

1. Choose the molecule that is **incorrectly** matched with the electronic geometry about the central atom.
   A. CF_4 - tetrahedral C.H_2O – tetrahedral
   B. NH_3 - tetrahedral D. PF_3 – pyramidal
2. Choose the species that is incorrectly matched with the electronic geometry about the central atom.
   (A) NO_2^- - trigonal planar (C) ClO_4^- - tetrahedral
   (C) SO_3^{2-} - pyramidal (D) ClO_3^- - tetrahedral
3. Which of the following pairs of molecules and their molecular geometries is WRONG?
   (A) NF_3 - trigonal planar (C) H_2O - bent
   (B) BF_3 - trigonal planar (D) SeF_6 – octahedral
4. Which molecule has a linear arrangement of all component atoms? (A) CH_4(B) CO_2(C) H_2O(D) NH_3
5. Which polyatomic ion is incorrectly matched with its ionic geometry?
   (A) $SiCl_6^{2-}$ - trigonal bipyramidal (C) ClO_2^- - angular
   (B) PH_4^+ - tetrahedral (D) SO_4^{2-} - tetrahedral
6. Which of the following species is planar? (A) NH_3 (C) H_3O^+ (B) SO_3^{2-} (D) NO_3^-
7. Which of the four molecules are polar, PH3, OF2, HF, SO3?
   (A) all except SO_3 (B) only HF and OF2 (C) only HF (D) none of these
8. Which molecule is nonpolar? (A) H_2Se (B) PF_3(C) BeH_2 (D) $CHCl_3$
9. The F-S-F bond angles in SF_6 are (A) 90º and 180º (b) 90º and 120º (C) 120º only (D) 45º and 90º
10. Which response contains all of the characteristics listed that should apply to phosphorus trichloride, PCl3, and no other characteristics?
    (1) trigonal planar
    (2) one unshared pair of electrons on P
    (3) sp2 hybridized at P
    (4) polar molecule
    (5) polar bonds
    (A) 1, 4, 5 (C) 2, 3, 4(B) 1, 2, 4(D) 2, 4, 5
11. The perchloric acid molecule contains:
    (A) 13 lone pairs, 1 bond, and 4 bonds. (C) 2 lone pairs, 3 bonds, and 4 bonds
    (B) 8 lone pairs, 2 bonds, and 7 bonds. (D) 11 lone pairs, no bonds, and 5 bonds.

II. Answer the questions

12. The electron configuration of a particular metal cation M^{3+} is [Ar] $3d^2$.
    (a) Identify the corresponding metal.
    (b) Write the electron configuration of the metal atom.
13. Write the electron configurations for the following atoms and ions: (A) Fe3+(B) V(C) Cr3+(D) Al+
14. Write the electron configuration of an element with (Z = 20 and A = 40 mu).
15. Draw the orbital diagrams for the valence electrons of the atoms: C, N, O, F and Ne and determine the number of unpaired electrons for each atom.
16. Write the electron configuration for the Co^{3+}, Cl^-, Cr, As^-, and Cu.
17. What is the electron capacity of the n^{th} energy level? What is the capacity of the fourth energy level?

18. What is the configuration of the electrons in the outermost shell in the Group 3A elements? In Group 5A elements?
19. What subshell(s) is (are) being filled in each of the following regions of the periodic table?
    a)Group 1A and 2A
    b)Group 3A through 7A
    c)The transition elements
    d)The lanthanides and actinides
20. Propose a probable electron configuration for the unknown and as yet undiscovered element with Z =114
21. Why the sizes of atoms do not increase uniformly with increasing atomic number?
22. Why the difference in atomic radius between the elements Z = 11 (Na; 186 pm) and Z = 12 (Mg; 160 pm) is so large, where as between Z = 24 (Cr; 125pm) and Z = 25 (Mn; 124 pm) the difference is negligible
23. Arrange each set of elements in order of increasing atomic radius and explain the basis for this order. a) Al, C, Si, b) Ca, Rb, Sr
24. Arrange the atoms (ions) in each of the following groups in order of increasing size based on their location in the periodic table.
    (A) Mg^{2+}, O^{2-}, Na^{+}, F^{-}, Al^{3+} (B) Ne, N^{3-}, F^{-}, Na^{+}, C^{4-} , Be, (C) C, B, Li d. K^{+}, S^{2-}, As^{3-}, Cl–, Ca^{2+}
25. Why does sulphur have a lower first ionization energy than phosphorus?
26. The second ionization energy of lithium is much greater than that of beryllium. Explain.
27. For strontium, which quantity will be greater, the difference between IE1 and IE2 or the difference between IE2 and IE3?
28. Arrange the following in order of increasing ionization energy: Li, Na, Ne, N, O
29. Arrange each of the following sets of elements in order of increasing first ionization energy.
    a. Ca, Mg, Sr b. Cl, P, S b. As, Ge, Sn d. Br, Cl, Se
30. The first and second ionization energies of K are 419 kJ mol^{-1} and 3052 kJ mol^{-1} and those of Ca are 590 kJ mol^{-1} and 1145 kJ mol^{-1}, respectively, compare their value and comment on the differences. Why does
    potassium have a lower first ionization than calcium?
31. Which group of elements has electron affinities with the largest negative values and lowest negative values? Explain why.
32. Silicon has an electron affinity of –134 kJ/mol. The electron affinity of phosphorus is–72 kJ/mol. Give a plausible reason for this difference.
33. Based on their positions in the periodic table, predict which atom of the following pairs will have larger first ionization energy: a. Br, Sb b. K, Cr, b. O, Ne a Ga, Ge d. Mg, Sr
34. What happens to the size of an atom when it becomes an anion? Why?
35. What happens to the size of an atom when it becomes a cation? Why?

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