FEDERAL UNIVERSITY OF TECHNOLOGY OWERRI
SCHOOL OF AGRICULTURE AND AGRICULTURAL TECHNOLOGY
DEPARTMENT OF SOIL SCIENCE TECHNOLOGY
2006/2007 HARMATTAN SEMESTER EXAMINATION
AGRICULTURAL CHEMISTRY AGR 205
TIME ALLOWED: 3 HOURS

INSTRUCTION. Answer all questions in SECTION A and three others from SECTION B.

SECTION A.

1. --------- surrounds the nucleus of an atom?
2. Neutrons of an atom is characterized by ----------?
3. --------- and ---------- constitutes the mass number of atom?
4. Atoms with the same proton/electron but different neutron are -----?
5. Given an atom 231 87 What are the atomic No, No. of protons, electron & Neutron?
6. What is the average atomic mass of the isotope ^{10}K with relative abundance of 20.5% and isotopic mass of 10.13 amu and ^{11}K with relative abundance of 79.5% and isotopic mass of 11.009 amu?
7. The element Mg exists in 3 isotopic forms with the following abundances; 78.70% ^{24}Mg, 19.13% ^{25}Mg and 11.17% ^{26} Mg. Calculate the atomic mass of Mg.
8. Element D exists as ^{35}D and ^{37}D. The atomic mass is 35.455amu. Calculate the % abundance if the exact isotopic mass of ^{35}D is 34.9689 and that of ^{37}D is 36.959.
9. An orbital is defined as ----------
10. ------- is the symbol for the principle quantum number?
11. Mathematical relation for maximum number of electrons in an atom ----------.
12 Electrons in each sub shell have exactly the same ----------
13. What are the possible L values and types of orbital with K equal to 4.
14. -------- refers to the way electrons fill the various energy levels?
15. Write the structures of two atoms with (a) single bond (b) double bond.
16. A certain neutral atom has 2 electrons in the 1st energy level, 8 in the 2nd, 18 in the 3rd and 5 in the 4th. What are the (a) atomic no., (b)no S electrons,(c) total no. of P electrons , (d) no of d electrons and no. of protons.
17 Atoms come together to attain stable configuration with ---- electrons in the outermost shell.
18. What is the electronic configuration of Zn (30)?
19 what is a coordinate covalent bond. Using phosphoric acid (H_3PO_4) as an example, show the structure of a covalent bond indicating the position of the coordinate bond and why?
20 Two examples of polyatomic ions are ---- and ----.
21. A measure of attraction of atoms for electrons is --------
22. What kind of bond and polarity exists in (a) H_20 (b) Cl2 (c) $C0_2$ (d) Kcl, if the electronegativity values of H = 2.1, K = 0.8, Cl = 3.0, 0 = 3.5 and C = 2.5.
23. Covalent bonds with no electronegativity difference are referred as ----------.
24. What is solubility product and write the solubility constants of Agcl and Ag_3PO_3

25. The solubility product of $AgCl_2$ is 2.8×10^{-10} mol^2 l^{-2}. What is the solubility of $AgCl_2$ in pure water?
26. If the solubility product of $PbSO_4$ is 1.3 x 10-8. What is the concentration of $PbSO_4$ in g/l (Pb = 207.19, S = 32 and 0 = 16).
27. A sample of hard water has a calcium concentration of 10^{-3} moll^{-1}. Calculate the maximum concentration of the fluoride ion that can be obtained for the water, assuming the solubility product of CaF_2 is 1.7×10^{-10}.
28. Determine the oxidation numbers of (a) Cr_2O and C_2H_5OH .
29. Balance the redox equation $Zn + 2NO_3^- \text{------} Zn^{2+} + N_2H_4$.
30. Write the equilibrium constant of the reactions
(a) $2SO_2$ (g) + O_2 (g) ===== $2SO_3$ (g) (b) Br_2 (l) === Br_2 (g)
31. Elements are arranged in order of their atomic number in a periodic table in such a way as to show the elements that ------
32. The periodic law states that the properties of elements depend upon ----
33. Columns and rows in a periodic table are termed ----- and ---- respectively.
34. ns and (n-1) d electronic configurations are characteristic of which block elements?
35 As we move from left to the right of a periodic table elements progress from - to –
36. F block elements are made up of which group of elements.
37. S group elements have an outer electronic configuration of --- and ---.
38. Why do elements in any one group behave similarly?
39. – block elements are characterized by a condensed electronic configuration of ns^2 (n-1) dx
40. How many unpaired electrons are present in the following transition elements. X (26), Y (30) and Z (28).

SECTION B.

2 a (i) What do you understand by the term organic acids (ii) With appropriate chemical equations illustrate two important reactions of organic acids.
(b).Write short notes on the following (i) Waxes (ii) Fatty acid (iii) Esters (iv) Saponification.

3. (a) With simple equation show what happens when a molecule of water is split from 2 molecules of alcohol using a dehydrating agent e.g H_2S04
(b) Enumerate 3 industrial, biological and laboratory uses of ether?

4. a (i) Triacylglycerols are said to be the major reservoir of fatty acids in mammals. Explain? (ii) With appropriate chemical equation show the process by which fatty acid can be made available to organisms from triacylglycerol?
(b) List three important functions of fatty acids in mammals.

5 (a) Write short notes on 4 of the following (i) Ionization energy
(ii) Electonegativity (iii) Ionization radius (iv) Activation energy
(v) Periodic table
(b) (i) Distinguish between alkaline metal and alkaline earth metals ii Group O and group 2B elements.