Chemistry EUEE 2004 E.C

Grade 11

Unit One

1. What is the number of moles of atoms and number of atoms in a 10.0-g sample of copper? Answer 63.5=1

   10=? = 0.16

   A. 0.08 mol Cu atoms and 2.16 x 10^{23} atoms
   B. 0.16 mol Cu atoms and 9.63 x 10^{22} atoms
   C. 0.16 mol Cu atoms and 9.63 x 10^{23} atoms
   D. 0.31 mol Cu atoms and 4.16 x 10^{23} atoms

   63.5=6.02x10 *23

   10=? === 9.5 x 10*22

2. How many atoms are present in 22g CO_2?

   A. 3.01 x 10^{23}
   B. 6.02 x 10^{23}
   C. 2 x 6.02 x 10^{23}
   D. 1.5 x 6.02 x 10^{23}

Chemistry EUEE 2005 E.C

Grade 11

Unit One

1. Which of the following is NOT a basic SI unit?
   A. Candela B. Gram C. Mole D. Second
2. What is the number of significant figures in 0.0030050?
   A. 4 B. 5 C. 7 D. 8
3. Which of the following properties of a substance does NOT represent an intensive physical property?
   A. Boiling point
   B. Color
   C. Density
   D. Volume
4. What is the number of chloride ions(Cl^-) present in 1.0 x 10^5mol of $AlCl_3$?
   A. 1.80x 10^{19} B. 6.02 x 10^{18} C. 6.02 x 10^{23} D. 6.02 x 10^{28}
5. If a piece of aluminum (Al) foil measuring 24 cm by 31 cm has a mass of 10.35 g, (density of Al = 2.70g cm^{-3}). What is the thickness of the foil in millimeters?
   A. 5.15 x 10^{-3} B. 5.15 x 10^{-2} C. 3.833 D. 744
6. What is the Kelvin scale (k) corresponding to the temperature readings when the degree Celsius (°C) is identical to the degree Fahrenheit (°F)?
   A. 0 K B. 37K C. 233k D. 273K

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Grade 11

Unit One

1.Which of the following is correct ?
A.1L=1dm3 B.1L=10dm3 C. Saponification D. Oxidation

2.When 0.68 is divided by 14.364, the actual answer is 0.0473405. What will be the correct answer ?

A.0.05 B.0.047 C.0.0473 D.0.04734

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Unit One

1. The first step of the scientific method involves
   A. Forming a hypothesis.
   B. Making observations.
   C. Performing an experiment.
   D. Predicting the result of an experiment.
2. Which of the following is correct?
   A. 1L = 1 dm^3
   B. 1L = 10 dm^3
   C. 10 L = 1cm^3
   D. 1K = 0.1 dm^3
3. The distance between two carbon atoms in a diamond is 154 pm. What is the distance between the carbon atoms in millimeters?
   A. 7.7 x 10^{-5} B. 7.7 x 10^{-7} C. 1.54 x 10^{-7} D. 1.54 x 10^{-7}
4. In which one of the following numbers are all of the zeros significant?
   A. 100.090090 B. 0.143290 C. 0.1000 D. 00.0030020
5. What type of solute – solvent interaction should be the most important in a solution of iodine in carbon tetrachloride?
   A. London forces C. Ion – dipole forces

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B. Ionic bonding D. Dipole – dipole forces

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Grade 11

Unit One

DIRECTIONS: Each of the following questions is followed by four possible alternatives. Choose the best answer and **blacken** the letter of your choice on the separate answer sheet provided.
You may refer to the information given below when you work on some of the questions.

PHYSCAL CONSTANTS

a) Gas constant, R= 8.314 J mol^{-1} K^{-1} = 0.0821 L-atm mol^{-1} K^{-1}
b) Avogadro's number = 6.023 $x10^{23}$ mol^{-1}
c) Plank's constant, h = 6.626 x 10^{-34} Js^{-1}
d) Speed of light, c = 2.9979 x 10^{8} ms^{-1}
e) Faraday's Constant (f) = 9.6485309 x 10^{4} C mol^{-1}
f) Charge of 1 mol of electrons = 96500 C

SI Units and Conversion Factors

a) 1 ton = 907.185 kg
b) 1 mile = 1.6 km
c) 1 metric ton = 1000 kg
d) 1 $\overset{0}{A}$ = 10^{-10}m
e) 1 L-atm = 101.3J
f) Coulombs = amperes x seconds
g) Vapor pressure of pure water (25^0C) = 23.8 torr
h) Vapor pressure of pure water (35^0C) = 100 torr

ATOMIC NUMBERS (Z) AND ATOMIC WEIGHTS (A)

Element	H	He	Li	B	C	N	O	F	Ne	Na	Mg	S	Cl	Ca
Z	1	2	3	5	6	7	8	9	10	11	12	16	17	20
A	1.0	4.0	6.9	10.8	12.0	14.0	16.0	19.0	20.2	22.98	24.30	32.1	35.5	40.1

Element	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ag	Cd	Au	Hg
Z	1	2	3	5	6	7	8	9	10	11	12
A	1.0	4.0	6.9	10.8	12.0	14.0	16.0	19.0	20.2	22.98	24.30

1. Which of the following is correct when 34495 is rounded to three significant figures?
   A. 345 B. 34500 C. 344 D. 3840
2. Which of the following represents a tentative explanation of a certain scientific law?
   A. Hypothesis B. Observation C. Experimentation D. Theory
3. In order to advance to the level of a theory, a hypothesis should
   A. Be obviously accepted by most people. C. Be a fully functional experiment.
   B. Be repeatedly confirmed by experimentation. D. Report the past experience.

Chemistry EUEE 2004 E.C

Grade 11

Unit Two

1. The compound CuCl emits blue light having a wavelength of 450nm when heated at about 200°C. What is the increment in energy (quantum) that is emitted at 450nm?
   A. 2.25 x 10^{-19}J C. 8.20 x 10^{-19}J
   B. 4.41 x 10^{-19}J D. 16.20 x 10^{-19}J
2. What is the difference between chlorine – 35 and chlorine -37?
   A. Chlorine – 37 has two more protons than chlorine -35
   B. Chlorine – 37 has two more neutrons than chlorine -35
   C. Chlorine – 37 has two more electrons than chlorine -35

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D. Chlorine – 37 has two more protons and more neutron than chlorine -35

3. Which one of the following electromagnetic radiations has the shortest wavelength?
   A. X – rays B. UV rays C. gamma rays D. microwaves
4. Which of the following quantum number/s determine the energy of an electron in a hydrogen atom?
   A. n B. n and 1 C. n, 1 and m D. n,1,m and s
5. Which of the following electron transitions requires the smallest energy to be absorbed by the hydrogen atom?
   A. from n = 1 to n = 2 C. from n = 3 to n = 4
   B. from n = 2 to n = 3 D. from n = 4 to n = 5
6. For an electron that has quantum numbers n = 4 and m ℓ = 0, which of the following is true?
   A. It must have the quantum number n = 0
   B. It must have the quantum number = 0
   C. It must have the quantum number m_s = +1/2
   D. It may have the quantum number ℓ = 0,1,2,3
7. Which group of elements is characterized with ns^2np^2 outer – electron configuration?
   A. Group 2A B. Group 4A C. Group 4B D. Group 3B
8. For elements in the left-most column of the periodic table, properties that have increasing values as the atomic number increases include which of the following?
   I. Ionization energy II. Atomic radius III. Atomic mass
   A. III only B. I,II, and III C. I and II only D. II and III onl

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Grade 11

<u>Unit Two</u>

1. Which of the following statements is TRUE?
   A. Ultraviolet light has longer wavelength than visible light
   B. The energy of radiation decreases as the wavelength decreases
   C. The frequency of radiation increases as the wavelength decreases
   D. Wave number of an electromagnetic radiation increases as wavelength increases
2. Which one of the following groups in the periodic table has paramagnetic atoms?
   A. Group zero B. Group IIA C. Group IIB D. Group IVA
3. Which of the following quantum number(s) is (are) related to the size and energy of an electron in a hydrogen atom?
   A. n B. n,l C. n,l,m D. n,l,m,s
4. Which of the following represents the genial configuration of the transition elements?
   A. ns^2np^6 B. ns(n-l)d C. ns(n-2)f D. $ns^2np^6(n-1)d^{10}$
5. An electron has a spin quantum number, s = +1/2 and a magnetic quantum number , m_1 = +1. In which of the following orbital will it NOT be present?
   A. s-orbital B. p-orbital C. d-orbital D. f-orbital
6. What is the wavelength associated with an electron of mass, m= 9.11 x 10^{-28}g, travelling at 40% of the velocity of light?
   A. 6.06 x 10^{-15}m C. 6.06 x 10^{-12}m
   B. 2.42 x 10^{-15}m D. 2.42 x 10^{-11}m
7. What sizes of particles and velocities can one consider quantum effect?
   A. Particles with very large mass and large velocities
   B. Particles with large mass and small velocities
   C. Particles with very small mass and large velocities
   D. Particles with small mass and small velocities

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<u>Unit Two</u>

1. Which electron transition in a hydrogen atom releases the largest energy?
   A. n = 2 $\rightarrow$ n = 1 B. n = 4 $\rightarrow$ n = 2 C. n = 6 $\rightarrow$ n = 3 D. n = 7 $\rightarrow$ n = 6
2. What is the ration of the energy of a photon of 300nm wavelength radiation to that of 600nm radiation?
   A. 1:2 B. 1:1 C. 2:1 D. 3:1
3. Which of the following particles contains more electrons than neutrons?

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$I.{}^{1}_{1}H$ $II.{}^{35}_{17}Cl^{-}$ $III.{}^{39}_{19}K^{+}$

A. I only B. II only C. I and II only D. II and III only

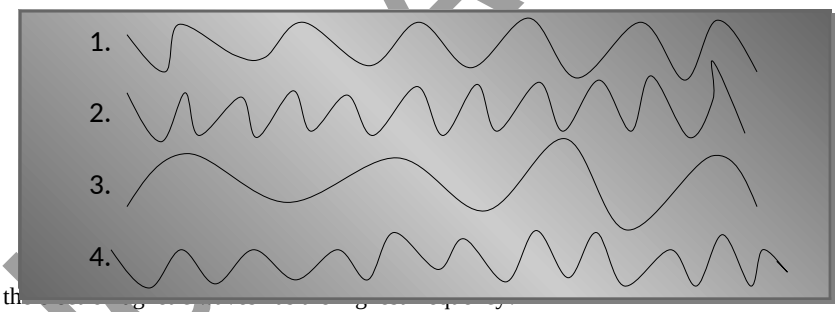
4. Which one of the following atoms in its ground state has the greatest number of unpaired electrons?
   A. $_{13}Al$ B. $_{14}Si$ C. $_{15}P$ D. $_{16}S$
5. What is the ionization energy of an iron atom if it requires a radiation of 276 nm to completely remove its outer most electron in the gaseous state?
   (plank's constant, h = 6.626 x 10^{-34}Js, speed of light , c = 3 x 10^{8} ms^{-1})
   A. 7.21 x 10^{-19}J B. 7.21 x 10^{-19}kJ C. 7.21 x 10^{19}J D. 7.21 x 10^{19}kJ
6. Which of the electron configurations describes the ground state electron configuration of Cl1?
   A. $1s^2 2s^2 2p^6 3s^2 3p^6$ C. $1s^2 2s^2 2p^6 3p^1$
   B. $1s^2 2s^2 2p^6 3s^1$ D. $1s^2 2s^2 2p^6 3s^2 3p_x^2 3p_y^1$
7. How many 3d electrons are present in the ground state of chromium atom?
   A. 4 B. 5 C. 6 D. 10

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Grade 11

Unit Two

1. Of the three types of radioactivity characterized by Rutherford. Which of the following are particles?
   A. γ - rays C. α – rays and β – rays
   B. β - rays D. α - rays, β - rays, and γ – rays
2. Which one of the following represents an acceptable possible set of quantum numbers (in the order n, I, m_l, m_s) for an electron in an atom?
   A. 2, 1, 0, 0 C. 2, 1, -1, 1/2
   B. 2, 0, 2, +1/2 D. 2, 0, 1, -1/2
3. How many orbitals are there in an atom with n = 4?
   A. 2 B. 8 C. 16 D. 25
4. Consider the three electromagnetic waves shown below.



   Which of th
   A. 1 B. 2 C. 3 D. 4
5. The wave number of an electromagnetic radiation is 1 x 10^{5} cm^{-1}. The frequency of the radiation would be
   A. 3 x 10^{8} s^{-1} B. 3 x 10^{6} s^{-1} C. 3 x 10^{10} s^{-1} D. 3 x 10^{15} s^{-1}
6. The maximum number of electrons in p-orbital with n = 6, $m^{\ell} = 0$ is
   A. 2 B. 6 C. 16 D. 14
7. Which of the following transitions will emit maximum energy in the hydrogen atom?
   A. n = 4 $\rightarrow$ n = 3 C. n = 2 $\rightarrow$ n = 1
   B. n = 4 $\rightarrow$ n = 2 D. n = 3 $\rightarrow$ n = 2
8. Which of the following statements is true?
   A. All forms of electromagnetic radiation are visible.
   B. Radio waves have shorter wavelengths than visible light.
   C. Ultraviolet light has longer wavelengths than visible light.
   D. The frequency of radiation increases as the wavelength decreases.

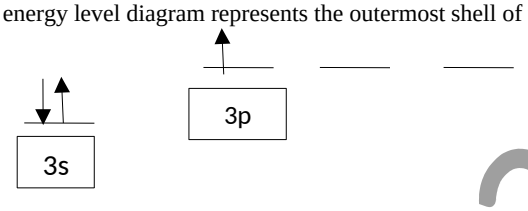
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Grade 11

Unit Two

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1. What is the first step of the scientific method?
   A. Making observations
   B. Forming a hypothesis
   C. Performing an experiment
   D. predicting the result of an experiment
2. Which of the following are NOT electromagnetic waves?
   A. Infrared waves
   B. Gamma waves
   C. Radio waves
   D. sound waves
3. What is the distance that a radio wave will travel in 0.250s?
   A. 1.2×10^7m B. 12×10^7m C. 7.5×10^7m D. 5.6×10^7m
4. What values of l are permitted for an electron with n = 4?
   A. 1, 2, 3 B. 1, 2, 3, 4 C. 0, 1, 2, 3, 4 D. 0, 1, 2, 3
5. Which of the following electrons, identified only by their n and l quantum numbers have the highest energy?
   n = 3, 1 = 0
   n = 4, 1 = 1
   n = 3, 1 = 2
   n = 4, 1 = 2
   A. n = 3, 1 = 2 B. n = 4, 1 = 1 C. n = 4, 1 = 2 D. n = 3, 1 = 0
6. What is the maximum number of unpaired electrons in a d subshell?
   A. 2 B. 5 C. 3 D. 4
7. The following energy level diagram represents the outermost shell of what ground state element?



   A. B B. He C. Al D. Be
8. Which of the following types of rays combine to form atoms of helium?
   A. Gamma (γ) rays B. beta (β) rays C. alpha (α) rays D. X-rays
9. What is the relationship between frequency (v) , wavelength (λ) and the speed of light (c)?
   A. $\frac{\lambda}{\nu}$ = c B. vc = hλ C. $\frac{hc}{\lambda} = \nu$ D. c = vλ
10. What is the magnitude of quantum energy and the frequency for an object whose wavelength is 0.6×10^{-6} m?
    A. 3.31×10^{-19}J, $5 \times 10^{14}_S{}^{-1}$ C. 1.99×10^{-25}J, $3.98 \times 10^{-4}0_S{}^{-1}$
    B. 3.98×10^{-40}J, $2 \times 10^{-15}_S{}^{-1}$ D. 9.94×10^{-12}J, $1.99 \times 10^{-25}_S{}^{-1}$
11. What new concept did Bohr adapt and use to formulate his model of the atom?
    A. Electromagnetic theory developed by Maxwell.
    B. The quantum concept developed by Planck.
    C. Photoelectric theory developed by Thompsohn.
    D. Neutron theory developed by Chadwick.

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Grade 11

Unit Three

1. What is the total number of valence – shell electrons in BrO_3
   A. 20 B. 26 C. 32 D. 36
2. Which term describes the units that make up compounds with covalent bonds?
   A. ions B. acids C. salts D. molecules
3. There is a strong covalent bond between the N atoms in nitrogen gas N_2. Why, then, does nitrogen have such a low boiling points of 196°C?
   A. The bond between the N-atoms is triple
   B. N is very electronegative, only next to F and O
   C. The strong bond, an intramuscular one, determines the boiling point of the substance
   D. Boiling point is determined by intermolecular force, which in this case is weak as the molecule is non-polar
4. Which of the following species has the smallest H-X-H bond angle where X is the central atom?
   A. OH_2 B. NH_3 C. CH_4 D. BH_3
5. What is the hybridization of phosphorus atom in PCl_5?

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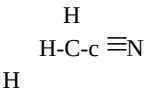
A. sp^3d B. sp^3d^2 C. sp^3 D. sp^2

6. Which molecule has a Lewis structure that does NOT obey the octet rule?
   A. NO B. CS_2 C. PF_3 D. HCN

7. Which of the following explains why, at room temperature, I_2 is a solid, Br_2 is a liquid and CL_2 is a gas?
   A. Ionic bonding
   B. Hybridization
   C. Hydrogen bonding
   D. London dispersion forces

8. Which molecule listed below has two sigma (δ)and two pi(π) bonds?
   A. N_2 B. C_2H_4 C. N_2F_2 D. HCN

9. What is the hybridization of the carbon atom attached to nitrogen in acetonitrile shown below?



   A. Sp B. sp^2 C. sp^3 D. sp^4

10 Which of the following element has the highest melting point?
   A. iodine B. tungsten C. mercury D. bromine

11. Which of the following compounds is unlikely to contain ionic bonds?
   A. CO B. NaF C. LiCl D. $MgBr_2$

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Unit Three

1. Which of the following ionic compounds is formed from the reaction between magnesium and nitrogen?
   A. MgN_2 B. Mg_2N_2 C. Mg_3N_2 D. Mg_2N_3
2. Which of following molecules represents a non-polar covalent bodn?
   A. B-Cl B. C-Cl C. Cl-Cl D. Mg-Cl
3. What would be the solubility of $HOCH_2(CH_2)_6CH_2OH$ compared to $CH_3(CH_2)_6CH_2OH$?
   A. Less soluble in water
   B. More soluble in water
   C. The same solubility in water
   D. More soluble in a non-polar solvent such as dichloromethane
4. How Many types of cubic unit cells are known?
   A. 2 B. 3 C. 4 D. 5
5. Which of the following molecules has a trigonalbipyramidal structure?
   A. SF_4 B. IF_5 C. ICl_4^- D. BrF_5
6. The total number of electrons participating in the bond formation of carbonate anion, CO_3^{2-}, in the molecule of carbonic acid are:
   A. 16 B. 10 C. 8 D. 5
7. Which of the following crystals possess high electrical and thermal conductivities?
   A. Ionic crystals C. Molecular crystals
   B. Metallic crystals D. Covalent network crystals
8. Which of the following is the most important type of solute – solvent interaction in a solution of n-butanol in water?
   A. Dispersion B. Ion-dipole C. Dipole – dipole D. Hydrogen bonding
9. The quantum numbers listed below are meant for four different electrons in an atom
   I. n = 4, 1 = 0, m_l = 0, ms = +1/2
   II. n = 3, 1 = 1, m_l = 1, ms = +1/2
   III. n = 4, 1 = 2, m_l = 0, ms = +1/2
   IV. n = 4, 1 = 1, m_l = 0, ms = -1/2
   When these sets of quantum numbers are arranged in order of increasing energy, one may ge:
   A. I < II < III < IV C. II < I < III < IV
   B. I < III < II < IV D. IV < III < II < I
10. Which one of the following molecules/molecular ions is paramagnetic accordion to the molecular orbial theory?
   A. O_2^{2-} B. O_2 C. F_2 D. O_2^{2+}
11. Which of the following molecules has a dipole moment?
   A. XeF_4 B. H_2S C. SO_3 D. CH_4

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Unit Three

1. The unit cell in a certain lattice consists of a cube formed by an anion in the center, and a cation at the center of each face. How many cations and how many anions does the unit cell have?

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A. 5 anions and 6 cations. C. 2 anions and 3 cations.
B. 5 anions and 3 cations. D. 3 anions and 4 cations.

2. Which compound contains both covalent and ionic bonds?
A. Sodium carbonate, Na_2CO_3 C. Dichloromethane, CH_2Cl_2
B. Magnesium bromide, $MgBr_2$ D. Ethanoic acid, CH_3COOH

3. Why are metals soft and malleable?
A Because they are very shiny.
|**B** Because they experience electrostatic repulsion.
CBecause of the presence of mobile electrons.
D Because the metal cations can slip over each other fairly easily.

4. Which molecule or ion does NOT have a tetrahedral shape?
A. XeF_4 B. $SiCl_4$ C. BF_4^- D. NH_4^+

5. How many π bonds are present in CO_2?
A. One B. Two C. Three D. Four

6. In which region of the periodic Table would the element with the electronic structure below be located?
$1s^22s^22p^63s^23d^{10}4s^24p^64d^65s^2$
A. Group 6 B. Noble gases C. s block D. d block

7. Which of the following molecules or ions will exhibit delocalized bonding?
NO_2^-, NH_4^+, N_3^-
A. No_2^- and N_3^- B. NH_4^+ and N_3^- C. NO_2^- D. NO_2^- and NH_4^-

8. What is the correct molecular electronic configuration for the molecular ion, B_2^+?
A. $\sigma 1s^2\sigma^*1s^2\sigma 2s^2\sigma^*2s^2\sigma 2p^2$
B. $\sigma 1s^2\sigma^*1s^2\sigma 2s^2\sigma^*2s^2\pi 2py^2$
C. $\sigma 1s^2\sigma^*1s^2\sigma 2s^2\sigma^*2s^2\pi 2px^1$
D. $\sigma 1s^2\sigma^*1s^2\sigma 2s^2\sigma^*2s^2\pi 2px^1\pi 2py^1$

9. Based on molecular orbital theory, the bond orders of H_2, H_2^+, and H_2^- are ____, respectively.
A. 1,0, and 0 B. 1, ½, and 0 C. 1,0, and ½ D. 1, ½, and ½

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6. The type of compound that is most likely to contain a covalent bond is one that is
A. a solid metal.
B. composed of only non metals.
C. composed of a metal from the far left and a non-metal from far right of the periodic table.
D. held together by the electrostatic forces between oppositely charged ions.

7. According to valence bond theory, which orbital on bromine atoms overlap in the formation of the bond in Br2?
A. 3s B. 3p C. 4s D. 4p

8. How many sigma and pi bonds are present in the following molecule?
H_3C-CH=CH-CH_3
A. 8 σ bonds and 1 π bond C. 10 σ bonds and 2 π bonds
B. 8 σ bonds and 2 π bonds D. 11 σ bonds and 1 π bond

9. Which of the following diagrams describes the electron density in the d_{xy} orbital?

A. B. C. D.

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10. Which of the following ionic compounds has the greatest lattice energy?
    A. LiF B. LiCl C. LiBr D. LiI
11. What hybridization change does the carbon atom undergo in the combustion of methane?
    $CH_4(g) = 2O_2(g) \rightarrow CO_2(g) = 2H_2O(g)$
    A. $sp \rightarrow sp^2$ C. $sp^3 \rightarrow sp$
    B. $sp^2 \rightarrow sp^3$ D. $sp^2 \rightarrow sp$
12. How many unpaired elections are there in the Lewis structures of a n^{3-} ion?
    A. 0 B. 1 C. 2 D. 3
13. Which one of the following compound does NOT follow the octet rule?
    A. CS_2 B. PBr_3 C. IBr D. BrF_5
14. The molecular geometry of the H_3O^+ ion is
    A. linear C. bent
    B. tetrahedral D. trigonal pyramidal
15. The hybridization of the central atom in the XeF_4 molecule is
    A. Sp^2 B. sp^3 C. sp^3d D. sp^3d^2
16. Which of the following molecules has a dipole moment?
    A. XeF_2 B. IF3 C. BF_3 D. SF_5^+
17. A compound is formed by the combination of V and X as follows.

    $\dot{V}$ $\ddot{W}$ X Y Z

    What is the empirical formula for the compound?
    A. VX B. V_2X C. V_3X D. V_3X_2

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Unit Three

1. Which one of the following is **NOT** a form of chemical bonding?
   A. Covalent bonding C. Ionic bonding
   B. Metallic bonding D. Hydrogen bonding
2. Which of the following statement is **NOT** true about covalent bonding?
   A. Covalent bonds are least likely to be formed between atoms of the same element.
   B. Covalent bonds are least likely to be formed between atoms of different elements on the right side of the periodic table.
   C. Covalent bonds are least likely to be formed between an element in Group I and an element in Group VII.
   D. Covalent bonds are least likely to be formed by head of the group elements with high ionization energies.
3. Formic acid, which is released by ants, has a molecular formula of HCOOH. What are the possible hybridizations that exist in the molecule?
   A. sp^2 and sp^3 B. sp and sp^3 C. sp, sp^2 and sp^3 D. sp and sp^2
4. What would happen to the O_2 molecule upon ionization to O_2^+?
   A. The bond length will increase and the bond energy will increase.
   B. The bond length will increase and the bond energy will decrease.
   C. The bond length will decrease and the bond energy will increase.
   D. The bond length will decrease and the bond energy will decrease.
5. How many bonding pairs and lone pairs, respectively does the ion ICl_4 have?
   A. 3, 2 B. 4, 2 C. 5, 1 D. 4, 1
6. Which of the following molecules does **NOT** have a tetrahedral central atom?
   A. SF_4 B. AlH_4^- C. BF_4^- D. $SiCl_4$
7. Acrylonitrile has the following Lewis structure with designation of x, y , and z for each carbon atom:

   x y z

   $CH_2 = C - C \equiv N$

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H

What will be the value of the bond angle and geometry of

y z
C—CN

A. 109^0, tetrahedral
B. 120^0, trigonal pyramidal
C. 180^0, linear
D. 90^0, T-shaped

8. Antimony (Sb) is a group V element. What will be the molecular geometry and number of lone pair electrons, respectively that exist in the ion $[SbCl_5]^{2-}$?
   A. Seesaw, 1 B. Square planar, 2 C. Seesaw, 2 D. Linear, 3
9. Which of the following molecules does NOT have a trigonalbipyramidal electron-pair geometry?
   A. SF_4 B. ClF_3 C. XeF_2 D. BrF_5
10. How many atomic orbitals are required for an sp^3 hybridization?
    A. 2 B. 6 C. 4 D. 8
11. Which of the following is NOT true about carbonyl compounds?
    A. Carbonyl compounds contain 3σ - bond 1π - and bond.
    B. The carbon oxygen bond is both longer and weaker.
    C. The bond angle in carbonyl is about 120^0.
    D. Carbonyl compounds may be hydrolyzed.

Chemistry EUEE 2004 E.C
Grade 11

Unit Four

1. What is the half-life, ½ for a zero order reaction A⟶B, (k is rate constant_?
   A. ln2k B. $[A]_0/2k$ C. $lnk[A]_0$ D. $ln2[A]_0k$
2. What mass of aluminum is produced in one hour by the electrolysis of molten $AlCl_3$ with a current of 10A?
   A. 1.5g B. 2.5g C. 3.4g D. 4.3g

3. The reaction 2X + Y ⟶ Z was studied and the following data were obtained

Expt	[X]	[Y]	Rate (mole. L-1.S-1)
1	3.0	3.0	1.8
2	3.0	1.5	0.45
3	1.5	1.5	0.45

What is the proper rate expression?

A. rate = k[X] B. rate = k[y] tC. rate = $k[Y]^2$ D. 2rate = $k[X]^2[Y]$

4. The reaction between NO and I_2 is second – order in NO and first – order in I_2. What change occurs in the rate of the reaction if the concentration of NO is doubled and I_2 left unchanged?
   A. double C. eight times
   B. quadruple D. three times
5. A reaction is 50% complete in 2 hours and 75% complete n 4 hours. What is the order of this reaction?
   A. 0 B. 1 C. 2 D. 3
6. Suppose reactions A ⟶ B and B ⟶ A are both elementary processes with rate constants of $8 \times 10^2 s^{-1}$ and $4 \times 10^4 s^{-1}$, respectively. What is the value of the equilibrium constant for the equilibrium?
   A. 2×10^{-2} B. 0.5×10^2 C. 4×10^2 D. 4 x

Chemistry EUEE 2005 E.C

Grade 11

Unit Four

M.S

Falcon Academy

1. What is a valid rate expression for the following reaction?
   $2NO + 2H_2 \longrightarrow N_2 + 2H_2O$

   A. $\frac{1}{2}\frac{\Delta[H_2]}{\Delta t}$ B. $-\frac{1}{2}\frac{\Delta[H_2O]}{\Delta t}$ C. $-\frac{1}{2}\frac{\Delta[NO]}{\Delta t}$ D. $-\frac{\Delta[N_2]}{\Delta t}$

2. Which of the following hybrid orbitals is favoring the formation of trigonalbipyramidal?
   A. sp^3d B. sp^3 C. sp^3d^2 D. sp^3d^3

3. For the reaction:
   $2A + B \rightarrow C$
   The following experimental results were obtained:

Experiment	[A]	[B]	Rate (mol $L^{-1}s^{-1}$)
1	0.50	0.50	0.300
2	0.50	0.25	0.075
3	0.25	0.25	0.075

   What is the value of the rate constant?

   A. 0.6 mol $L^{-1}s^{-1}$ B. 0.6 L $mol^{-1}s^{-1}$ C. 1.2 L $mol^{-1}s^{-1}$ D. 2.4 mol $L^{-1}s^{-1}$

4. Increase in temperature of rate of a given reaction is due to the increase in the:
   A. extent of molecular dissociation
   B. activation energy of the reaction
   C. frequency of collision of the reacting species
   D. numerical value of the rate constant of the reaction

Chemistry EUEE 2006 E.C

Grade 11

Unit Four

1. In a reaction, $A + B \rightarrow$ product, the rate is doubled when the concentration of B is doubled, and the rate increases by a factor of 8 when the concentrations of both the reactions (A and B) are doubled, the rate law for the reaction can be written as:
   A. Rate = k[A] [B] C. Rate = $K[A]^2$ [B]
   B. Rate = K[A] $[B]^2$ D. Rate = $K[A]^2[B]^2$

2. Which factors will influence the rate of the reaction shown below?
   $NO_2(g) + CO(g) \rightleftharpoons NO(g) + CO_2(g)$
   I. The number of collisions per second
   II. The energy of the collisions
   III. The geometry with which the molecules collide
   A. I only B. II only C. I and II only D. I, II and III

3. The mechanism of a reaction is shown below.
   $HOOH + I^- \rightarrow HOI + OH^-$ (slow)
   $HOI + I^- \rightarrow I_2 + OH^-$ (fast)
   $2OH^- + 2H_3O^+ \rightarrow 4H_2O$ (fast)
   What is the rate law based on this mechanism?
   A. Rate = $k[HOOH][I^-]$ C. Rate = $K[HOOH][I]^2$
   B. Rate = $k[HOOH]^2[I^-]$ D. Rate = K[HOOH]

4. What is the equilibrium constant expression for the following reaction?
   $2Hg(g) + O_2(g) \rightleftharpoons 2HgO(s)$
   A. $K = 1/([Hg]^2[O^2])$ C. $K = [HgO]^2/([Hg]^2[o^2])$
   B. $K = [Hg]^2[O^2]$ D. $K = [2HgO]/(2Hg][O^2])$

5. In a zero-order reaction for every 10° rise of temperature, the rate is doubled. If the temperature is increased from 10°C to 100°C, the rate of the reaction will become
   A. 64 times B. 128 times C. 256 times D. 512 times

6. The half life for the first order decomposition of nitro methane, CH_3NO_2, at 500k is 650 seconds. If the initial concentration of CH3NO2 is 0.500M, what will its concentration be (M) after 1300 seconds have elapsed?
   A. 0.125 B. 0.140 C. 0.250 D. 0.425

7. The kinetic data below are for the reaction:
   $A + B \rightarrow C$

   From these data what are the orders of the reaction with respect to A and B?

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[A]	[B]	Initial Rate (mol dm^{-3} sec^{-1})
0.1	0.1	1×10^{-5}
0.1	0.2	4×10^{5}
0.2	0.1	1×10^{-5}

A. order of A = 1 order of B = 0
C. order of A = 0 order of B = 4
B. order of A = 0 order of B = 2
D. order of A = 1 order of B = 2

Chemistry EUEE 2007 E.C

Grade 11

Unit Four

1. The decomposition of nitrosyl chloride was studied as
   $2NOCl\ (g) \rightarrow 2NO(g) = Cl_2(g)$
   The following data were obtained where

$$R = \frac{\Delta[NOCl]}{\Delta t}$$

$[NOCl]_0$ (molecules/cm^3)	Initial Rate (molecules/cm^3.s)
3.0×10^{16}	5.98×10^{4}
2.0×10^{16}	2.66×10^{4}
1.0×10^{16}	6.64×10^{3}
4.0×10^{16}	1.06×10^{5}

   What is the rate law in the above decomposition?
   A. $r = k[NOCl]^2$
   B. $r = k[NOCl]$
   C. $r = k[NOCl]\ [NO]$
   D. $r = k[NOCl]\ [Cl]$
2. Considering the mechanism for a reaction below, which of the following statements is correct?
   Step 1: $HBr + O_2 \rightarrow HOOBr$
   Step 2: $HBr + HOOBr \rightarrow 2HOBr$
   Step 3: $2HOBr + 2HBr \rightarrow 2Br_2 + 2H_2O$
   A. Br_2 is a reactant.
   B. HBr is a product.
   C. HOBr is a catalyst.
   D. HOOBr is a reaction intermediate.
3. The reaction A + 3B = 2C + D is first order with respect to reactant A and second order with respect to reactant B. if the concentration of A is doubled and the concentration of B is halve, the rate of the reaction would _____ by a factor of _____.
   A. increase, 2
   B. decrease, 2
   C. increase, 4
   D. decrease, 4
4. For the reaction,
   $N_2 + 3H_2 \rightleftharpoons 2NH_3$
   the rate of disappearance of H_2 is 0.01 mol L^{-1} min^{-1}. The rate of appearance of NH_3 would be
   A. 0.01 mol L^{-1} min^{-1}
   B. 0.02 mol L^{-1} min^{-1}
   C. 0.007 mol L^{-1} min^{-1}
   D. 0.002 mol L^{-1} min^{-1}
5. The decomposition of carbon disulfide, CS_2, to carbon monosulfide, CS, and sulfur is first order with k = 2.8×10^{-7} s^{-1} at 1000°C. What is the half-life of the reaction below at 1000°C?
   $CS_2 \rightarrow CS + S$
   A. 5.0×10^{7} s
   B. 4.7×10^{-6}s
   C. 3.8×10^{5}s
   D. 2.5×10^{6}s

Chemistry EUEE 2008 E.C

Grade 11

Unit Four

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1. If we increase the concentration of a reactant, what happens to the collision between particles?
   A. There are more collisions.
   B. There are fewer collisions.
   C. There are the same number of collisions, but they have less energy.
   D. There are the same number of collisions, but they have more energy.
2. A drug decomposes by zero-order kinetics with a rate constant of 2 mg mL^{-1}. If the initial concentration is 100 mg mL^{-1}, how long will it take for the drug to decompose by 10%?
   A. 2 months B. 3 months C. 5 months D. 4 months
3. For a first-order reaction, a plot of _____ versus _____ is linear.
   A. $\frac{1}{[A]_t}, t$ B. $Ln\frac{1}{[A]_t}, t$ C. $[A]_t, t$ D. $Ln[A]_t, t$
4. The rate law of the overall reaction is

   $$A + B \longrightarrow C$$

   is: rate = $k[A]^2$

   Which of the following will NOT increase the rate of the reaction?
   A. Increasing the concentration of reactant A.
   B. Increasing the concentration of reactant B.
   C. Increasing the temperature of the reaction.
   D. Adding a catalyst for the reaction.
5. Which of the following statement(s) is (are) applicable to a balanced chemical equation of an elementary reaction?
   (i) Order is same as molecularity.
   (ii) Order is less than the molecularity.
   (iii) Order is greater than the molecularity
   (iv) Molecularity can never be zero.
   A. i B. i, ii C. i, iv D. i, iii
6. At high pressure, the following reaction is zero order

   $$2NH_3(g) \longrightarrow N_2(g) + 3H_2(g)$$

   Which of the following options is (are) correct for this reaction?
   (i) Rate of reaction = rate constant.
   (ii) Rate of reaction depends on the concentration of ammonia.
   (iii) Rate of decomposition of ammonia remains constant until ammonia decomposes completely.
   (iv) Further increase in pressure will change the rate of reaction.
   A. i B. i, iii, iv C. i, ii D. i, ii, iv
7. Which of the following expressions is correct for the rate of reaction given below?

   $$5Br^-(aq) + BrO_3^-(aq) + 6H^+(aq) \longrightarrow 3Br_2(aq) + 3H_2O(1)$$

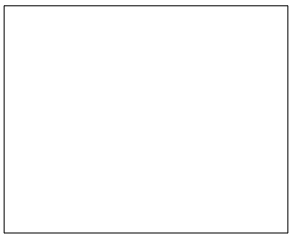
   A. $\frac{\Delta[Br]}{\Delta t} = 5\frac{[\Delta H]}{\Delta t}$ C. $\frac{\Delta[Br]}{\Delta t} = 6/5\frac{[\Delta H]}{\Delta t}$
   B. $\frac{\Delta[Br]}{At} = 5/6\frac{[\Delta H]}{\Delta t}$ D. $\frac{\Delta[Br]}{\Delta t} = 6\frac{[\Delta H]}{\Delta t}$
8. Rate law for the reaction A + 2B ⟶ C is found to be

   Rate = $k[A][B]$

   If the concentration of reactant 'B' is doubled, keeping the concentration of 'A' constant, what will be the value of the rate constant?
   A. The same B. halved C. quadrupled D. doubled

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1. Consider the following phase Diagram for CO_2
   What happens when in a CO_2 sample initially at 1 atm and -70°C, the temperature increases from -70°C to -10°C at a constant pressure of 60 atm?



   A. $CO_2(g)$ $CO_2(s)$ C. $CO_2(g)$ $CO_2(g)$
   B. $CO_2(s) \rightarrow CO_2(l)$ D. $CO_2(g) \rightarrow CO_2(l)$

2. Consider the following reaction:
   $HOCl + H_2O$ ..... OCl^-
   What willhappen if NaOCl is added to the above reaction at equilibrium?
   A. The concentration of both HOCl and H_2O^+ would increase
   B. The concentration of both HOCl and H_3O^+ would decrease
   C. The Concentration of both HOCl would increase and concentration of H_3O^+ would decrease
   D. The concentration of both HOCl would decrease and the concentration of H_3O^+ would increase

3. Consider the following equilibrium $CaCO_3$ $CaO_{(s)} + CO_{2(g)}$
   Which of the following mixture, each placed in a closed container and allowed to stand is not capable of reaching the equilibrium given above?
   A. Pure $CaCO_3$
   B. $CaCO_3$ and CaO
   C. Some CaO and a pressure of CO_2 greater than the value of K_p
   D. Some $CaCO_3$ and pressure of CO_2 greater than the value of K_p

4. Which of the following statement correctly describes a chemical reaction at equilibrium?
   A. The concentrations of the products and reactants are equal
   B. The change in the concentration of the products and reactants is constant
   C. The rate of the forward reaction is less than the rate of the reverse reaction
   D. The rate of the forward reaction is greater than the rate of the reverse reaction

5. If the following reaction is at equilibrium, which one of the following changes will shift the equilibrium to the left?
   $N_2 + 3H_2 \rightleftharpoons 2NH_3$ + heat
   A. Increase pressure C. adding more N_2 and H_2
   B. Decreasing temperature D. increasing the volume of the reaction containe

Chemistry EUEE 2005 E.C

Grade 11

Unit Five

1. The reaction for the formation of nitrosyl chloride
   $2NO(g) + Cl_2(g) \rightleftharpoons 2NOCl(g)$
   Was studied at 25°C. The value of k_p for this reaction at 25°C is 1.9×10^3 atm^{-1}. What is the value of K at 25°C?
   A. 1.9×10^{-3} L/mol C. 4.6×10^4 L/mol
   B. 3.8×10^{-3} L/mol D. 4.6×10^5 L/mol

2. Which of the following statements is TRUE about equilibrium reaction?
   A. No more reactants are transformed into products
   B. There are equal amounts of reactants and products
   C. The rate constant for the forward reactions equals that of the reverse reaction
   D. The rate for the forward reactions equals that of the reverse reactions

3. Three gases are in equilibrium in a closed chamber sealed with a piston. The following equilibrium is established:
   $2NH_3(g) \rightleftharpoons N_2(g) + 3H_2(g)$
   What willhappen if the piston is pushed into the chamber?
   A. The mole fraction of N_2 increases
   B. The mole of N_2 decreases
   C. The mole fraction of N_2 remains the same
   D. The mole fraction of N_2 increase and then decreases

Chemistry EUEE 2006 E.C

Grade 11

Unit Five

1. Answer the following question using the phase diagram below.

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At which point can only the solid and liquid phases coexist?

A. 1 B. 2 C. 3 D. 4

2. Which statement is true about chemical reactions at equilibrium?
   A. The forward and backward reactions proceed at equal rates.
   B. The forward and backward reactions have stopped.
   C. The concentrations of the reactants and products are equal.
   D. The forward reaction is exothermic.

3. Which changes will increase the amount of $SO_3(g)$ at equilibrium?

   $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$ $\Delta H° = -197kJ$

   I. Increase the temperature
   II. Decreasing the volume
   III. Adding a catalyst

   A. I only B. II only C. I and II only D. I, II and III

4. The value of Kc for the following equilibrium reaction is 4.0 at a temperature of 373K.
   $CH_3COOH + C_2H_5OH \rightleftharpoons CH_3COOHC_2H_5 + H_2O$
   What mass of ethyl ester ($CH_3COOHC_2H_5$) would be present in the equilibrium mixture if 15g of acetic acid and 11.5g of e4hanol were mixed and equilibrium was established at this temperature?

   A. 5.2 B. 10.1 C. 12.6 D. 14.1

5. Which of the following mathematical relationships between K, K_1 and K_2 is correct

   $CO_2(g) + H_2(g) \rightleftharpoons CO(g) + H_2O(g)$ K

   $Fe(s) + CO_2(g) \rightleftharpoons FeO(s) + CO(g)$ K_1

   $Fe(s) + H_2O(g) \rightleftharpoons FeO(s) + H_2(g)$ K_2

   A. $K = K_1 + K_2$ B. $K = K_1 \times K_2$ C. $K = K_1/K_2$ D. $K = K_2/K_1$

Chemistry EUEE 2007 E.C

Grade 11

Unit Five

1. At which point can only the solid and liquid phases coexist in the phase diagram of water given below?



   A. 3 B. 4 C. 5 D. 8

2. In the reaction
   $(2SO_2 + O_2 \rightleftharpoons 2SO_3$, Keq = 100)
   What will be the concentration of O_2, if the concentration of SO_2 is the same as that of SO_3?
   A. $[O_2] = [SO_2]$ C. $[O_2] = 100$ M
   B. $[O_2] = 0.01$M D. $[O_2] = 0.1$ M

3. For the gas phase reaction
   $N_2 + O_2 \quad 2NO \quad \Delta H = +180$ kJ mol^{-1}
   the value of K changes with the
   A. change in pressure.
   B. introduction of NO.
   C. change in concentration of H_2.
   D. change in temperature.

4. Considering the reaction below, in which of the following will the effect of concentration and temperature simultaneously cause and increase in the rate at which products are formed?

   $CaCO_3(s) + 2HCl(aq) \rightarrow CO_2(g) + CaCl_2(aq) + H_2O(l) + heat$

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A. Decrease [HCl] and decrease temperature.
B. Increase [HCl] and increase temperature.
C. Increase [HCl] and decrease temperature.
D. Grind up the $CaCO_3$ and decrease temperature.

5. The conventional equilibrium constant expression (Kc) for the system

$2ICl(s) \rightleftharpoons I_2(s) + Cl_2(g)$ is

A. $[I_2][Cl_2]/[ICl]^2$ C. $[Cl_2]$
B. $[I_2][Cl_2]/2[ICl]$ D. $([I_2] + [Cl_2])/2[ICl]$

6. At 445°C, Kc for the following reaction is 0.020.

$2HI(g) \rightleftharpoons H_2(g) + I_2(g)$

A mixture of H_2, I_2, and HI in a vessel at 445°C has the following concentrations: [HI] = 2.0 M,. $[H_2]$ = 0.50 M and $[I_2]$ = 0.10 M. which one of the following statements concerning the reaction quotient, Qc, is true for the above system?

A. Qc is less than Kc; more HI will be produced.
B. Qc is greater than Kc; more HI will be produced.
C. Qc is less than Kc; more H_2 and I_2 will be produced.
D. Qc is greater than Kc; more H_2 and I_2 will be produced.

7. A 0.1 M solution of HCl is dissolved in water. What species of ions are present at equilibrium, and what will be their equilibrium concentrations?

A. $[H_3O^+]$ = 0.1 M $[OH^-] = 10^{-13}$ M $[Cl^-]$ = 0.1 M
B. $[H_3O^+]$ = 0.1 M $[HO^-]$ = 0.1 M $[Cl^-]$ = 0.1 M
C. $[H_3O^+]$ = 0.1 M $[OH^-] = 10^{-13}$ M $[Cl^-]$ = 0 M
D. $[H_3O^-]$ = 10-13 M $[Cl^-]$ = 0.1 M $[OH^-]$ = 0.1

8. At 298 K the following two gaseous equilibria involving SO_2, SO_3 and O_2 are established.

$SO_2(g) + 1/2\ O_2(g) \rightleftharpoons SO_3$; K1
$2SO_3(g) \rightleftharpoons 2SO_2(g) + O_2(g)$; K_2

Which of the following equilibrium expression is correct?

A. $K_1 = K_2$ B. $K_2 = K_1$ C. $K_2 = 1/K_1^2$ D. $K_2 = 1/K_1$

Chemistry EUEE 2008 E.C

Grade 11

Unit Five

1. The value of Keq for the following reaction is 0.25.

$SO_2(g) + NO_2(g) \rightleftharpoons SO_3(g) + NO(g)$

What is the value of K_{eq} at the same temperature for the reaction below?

$2SO_2(g) + 2NO_2(g) \rightleftharpoons 2SO_3(g) + 2NO(g)$

A. 0.25 B. 0.062 C. 0.50 D. 16

2. The following equilibrium constants were determined at 300^0C.

$2N_2O(g) \rightleftharpoons 2N_2(g) + O_2(g)$ $K_c = 4.0 \times 10^{18}$

$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$ $K_c = 4.0 \times 10^{-31}$

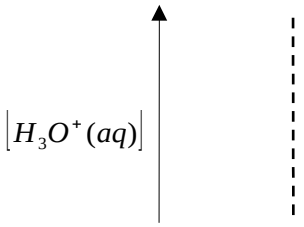
What will be the equilibrium constant at 300^0C for the gaseous reaction of

$2N_2O(g) + O_2(g) \rightleftharpoons 4NO(g)$?

A. 3.2×10^{-12} B. 2×10^{-13} C. 5.0×10^{50} D. 1.6×10^{-49}

3. Consider the following graph, which relates to the equilibrium system:

$CH_3COOH(aq) + H_2O \rightleftharpoons CH_3COO^-(aq) + H_3O^+(aq)$ $\Delta H < 0$



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t Time ⟶

Which of the following actions caused the change in the concentration of $\left[H_3O^+(aq)\right]$ at time t?

A. Addition $CH_3COO^-(aq)$
B. Addition of HCl
C. Decreasing of temperature
D. Increasing the volume of the container

4. In which of the following systems will the position of equilibrium shift to the left upon an increase in pressure, but to the right upon an increase in temperature?

A. $CO_2(g) + H_2(g) \rightleftharpoons CO(g) + H_2O(g)$ $\Delta H > 0$

B. $C_2H_4(g) + H_2O(g) \rightleftharpoons C_2H_5OH(g)$ $\Delta H < 0$

C. $C_2H_6(g) \rightleftharpoons C_2H_2(g) + H_2(g)$ $\Delta H > 0$

D. $2SO_2(g) + O_2(g) \rightleftharpoons 2SO3(g)$ $\Delta H < 0$

5. The hydrogen used in the Haber process is made by the following reaction:

$CH_4(g) + H_2O(g) \rightleftharpoons CO(g) + 3H_2(g)$ $\Delta H^0 = +206kJ$

Which of the following sets of conditions will favor the formation of H2?

A. Low pressure and high temperature.
B. Low pressure and low temperature.
C. High pressure and low temperature.
D. High pressure and high temperature.

6. In which direction will the following equilibrium shift, if a solution of CH_3CO_2Na is added?

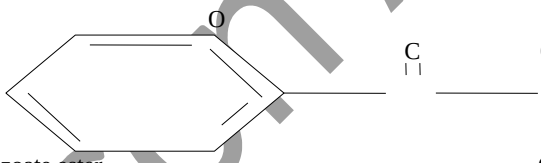
CH3COOH (aq) ⟷ CH3CO2-(aq) + H+ (aq)

A. The equilibrium shifts to the right (more products)
B. No change
C. The equilibrium shifts to the left (more reactant)
D. Cannot be predicted

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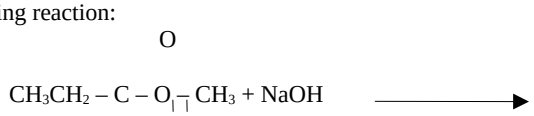
Grade 11

Unit Six

1. What is the name of base – promoted ester hydrolysis reaction?
   A. Acylation B. Esterification C. Condenstation D. Saponification
2. What is the name of the following compound?
3. 

   A. Benzoate ester
   B. Ethyl benzoate
   C. Phenyl butyrate
   D. Ethylbenzylketone

4. Which one of the following organic molecules has the highest water solubility?
   A. $HOCH_2CH_2CH_2OH$
   B. $CH_3CH_2CH_2CH_2OH$
   C. $HOCH_2CH_2CH_2CH_2OH$
   D. $CH_3CH_2CH_2CH_2CH_2OH$
5. Which of the following statements is TRUE about esters?
   A. Esters can form intermolecular hydrogen bonds
   B. Ester molecules can form intermolecular hydrogen bonds
   C. Ester molecules cannot form intermolecular hydrogen bonds
   D. Ester have higher boiling points than alcohols of comparable molecular weight
6. The organic compound CH3C(O)CH3 is:
   A. aldehyde B. ester C. carbonyl D. ketone
7. Consider the following reaction:



What are the products of this reaction?

A. Sodium acetate and ethanol
B. Sodium acetate and methanol
C. Sodium propanoate and methanol
D. Methyl propionic acid and methanol

8. Why does a pressure cooker reduce cooking time?
   A. The heat is more evenly distributed

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B. A stronger flame is used for cooking
C. The high pressure tenderizes the food
D. The boiling point of water inside the cooker is increased

Chemistry EUEE 2005 E.C

Grade 11

Unit Six

1. What is the process that converts liquid vegetable oils to solid fats?
   A. Hydration B. Hydrogenation C. Hydrolysis D. Saponification
2. Which of the following reactions will produce an akyl carboxylic acid?
   A. Heating a methyl ketene with acid and iodine
   B. Reacting an alkyl halide with hydrogen gas and platinum
   C. Reacting an alcohol with ozone
   D. Oxidation of a primary alcohol with hot permanganate or chromate
3. Which of the following statements is NOT TRUE?
   A. Naturally derived soaps consist of a soluble salt of a long chain fatty acid
   B. Triacylglycerols are esters of glycerol and long chain carboxylic acids
   C. Long chain carboxylic acids are also known as fatty acids
   D. The major acidic component of vinegar is formic acid
4. What is the product of the hydrolysis of esters in the presence of a mineral acid catalyst?
   A. Alcohol B. carbon dioxide C. ether D. ketones
5. To which organic functional group does the following molecular representation, i.e., R_1R_2CHCOH belong? (R_1 and R_2 represent different alkyl chains)
   A. Amides B. Aldehyde C. Ethers D. Organic acids
6. Which of the following reactions will convert carboxylic acids to primary amines?
   A. Decarboxylation with HBr and peroxide, then reaction of the alkyl bromide with ammonia
   B. Reduction of the acid to the alcohol with NaOH/formaldehyde, then reaction with ammonium chloride and heat
   C. A two-step conversion, first to the amide with ammonia and heat, and then by reduction with lithium aluminum hydride or hydrogen plus catalyst
   D. Lactase fermentation in the presence of ammonia atmosphere

Chemistry EUEE 2006 E.C

Grade 11

Unit Six

1. Commercially, liquid vegetable oils are converted to solid fats such as margarine by:
   A. Hydrogenation C. Saponification
   B. Hydration D. Oxidation
2. What is the chemical name for Aspirin?
   A. Acetyl salicylic acid C. Methyl salicylate
   B. Salicylic acid D. Sodium salicylate
3. Which compound is a carboxylic acid?
   A. CH_3COOH B. $(CH_3CO)_2O$ C. $(CH_3)_2CHOOCH_3$ D. $(CH_3)_2O$
4. Which compound is an ester?
   A. CH_3COOH B. $CH_3OC_2H_5$ C. C_2H_5CHO D. $HCOOCH_3$
5. A triacylglyceol that is solid at room temperature is called:
   A. Lecithin B. Fat C. Wax D. Oil
6. When the following substances are arranged in order of increasing melting point (lowest melting point first), the correct order is:
   A. $CH_3CH_2CH_3$,CH_3COCH_3,CH_3,CH_2CH_2OH
   B. $CH_3CH_2CH_3$,$CH_3CH_2CH_2OH$,CH_3COCH_3
   C. CH_3COCH_3,$CH_3CH_2CH_2OH$,$CH_3CH_2CH_3$
   D. CH_3CH2CH_2OH,$CH_3CH_2CH_3$,CH_3COCH_3
7. Which of the following gives the correct order of decreasing acidity of carboxylic acids?
   A. Cl_3CCOOH, $Cl_2CHCOOH$,FCH_2COOH,CH_3COOH
   B. FCH_2COOH,CH_3COOH,$Cl_2CHCOOH$,Cl_3CCOOH
   C. CH_3COOH,FCH_2COOH,$Cl_2CHCOOH$,Cl_3CCOOH
   D. Cl_2CHOOH,CH_3COOH,FCH_2COOH,Cl_3CCOOH
8. Which of these compounds is the ester formed from the reaction of acetic acid and 1-propanol?

OH
|

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A) CH_3COH
$OCH_2CH_2CH_3$

B) CH_3CH_2COH
OH
OCH_2CH_3

C) $CH_3CH_2CH_2OCH_2COH$
O

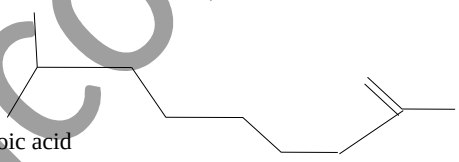
D) $CH_3COCH_2CH_2CH_3$
O

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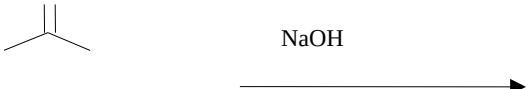
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Unit Six

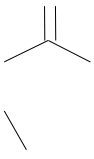
1. Chemically, fats and oils are
   A. acids B. alcohols C. esters D. alkenes
2. Which of the following is used in the reaction called saponification?
   A. Strong base C. Hydrogen
   B. Strong acid D. Nickel
3. What is the IUPAC name for the compound
   $(CH_3)_2CHCH_2CHCOH$?
   CH_3
   O
   A. 2,4-dimethylpenatanoic acid
   B. 1,1,3- trimethylbutanoic acid
   C. 1- hydroxyl -2,4- dimethylpentanone
   D. 2- carboxyisohexane
4. Which of the following is an acceptable IUPAC name for the organic compound shown below?

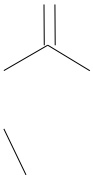


   A. Octanoic acid C. δ - Methyl heptanoic acid
   B. 7 – Methyl heptanoic acid D. 7 – Methyl octanoic acid
5. Given the following reaction:

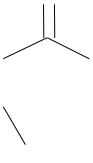


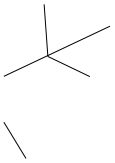
   What is the major product of the reaction?
   A. C.





   B. D.





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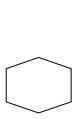
Unit Six

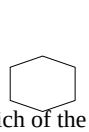
1. Which of the following would react to form pentylethanoate?
   A. 1-propanol and pentanoic acid
   B. Ethanol and pentanoic acid
   C. 1-pentanol and ethanoic acid
   D. ethanol and ethanoic acid
2. The difference between fats and oils is that:
   A. Oils are liquid at room temperature.
   B. Oils have more calories.
   C. oils are solid at room temperature.
   D. fats are liquid at room temperature.

3. Consider the following reaction:

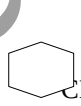


What will be the main product of the reaction above?

A. 

B. 

C. 

D. 

4. Which of the following statements concerning the carbonyl group in aldehydes and ketoes is NOT true?
   A. The bond is polar, with a slight negative charge on the oxygen atom.
   B. The bond angles about the central carbon atom are 120^0.
   C. In condensed form, the carbonyl group can be written as CHO.
   D. The bond is polar. Therefore, carbonyl groups readily form hydrogen bonds with each other.
5. Which of the following statements concerning fats and oils is INCORRECT?
   A. They are also called triacylglycerols.
   B. They are also fatty acid salts.
   C. they are fatty acid salts.
   D. They are glycerol trimesters.
6. Which of the following types of compounds are expected products from the saponification of a fat?
   A. Glycerol and fatty acid salts
   B. Glycerol and fatty acids
   C. Fatty acid salts and fatty acids
   D. Glycerol, fatty acid salts and fatty acids

Chemistry EUEE 2004 E.C

Grade 12

Unit One

1. Which of the following is NOT a solution?
   A. Milk B. brass C. whisky D. coca cola drink
2. How much water has to be evaporated from 250 ml of 1M Ca $(OH)_2$ to make it 3 M?
   A. 100 ml B. 150 ml C. 167 ml D. 200 ml
3. How many ml of water is required to dilute 50 ml of 3.5 M H_2SO_4 to 2.00 M H_2SO_4?
   A. 37.5 B. 45 C. 75 D. 87.5
4. The solubility of sodium selenate, Na2SeO4, is 84g/100g of water at 35°C. if a solution is obtained by dissolving 92 g of Na_2SeO_4 in 200g of water at 35°C, what do you call this solution?
   A. diluted B. saturated C. Unsaturated D. supersaturated
5. which law relates the concentration of a dissolved gas, Cg, to its partial pressure?
   A. Henry's law B. Raoult's law C. Boyle's law D. Ideal gas law
6. What did Rutherford's alpha particle experiment show?
   A. Electrons have a negative charge

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B. A proton is a hydrogen atom without electron
C. Electrons circle the nucleus of an atom in orbits
D. Most of the mass and all of the positive charge of an atom's found in a tiny cucleus

7. Which of the following compounds would give the lowest freezing point depression when 100g of each are dissolved in 1kg of water (kf for water = 1.86°C/m)? assume complete dissociation.
   A. NaCl B. NH_4NO_3 C. $(NH_4)_2SO_4$ D. glucose, $C_6H_{12}O_6$
8. Which of the following is most likely to deviate from ideal gas behavior?
   A. He B. Ar C. Cl_2 D. CCl_2F_2
9. Consider the following balanced equation:
   $3Ba(NO_3)_2(aq) + Fe2(SO_4)_3(aq) \rightarrow 3BaSO_4(s) + 2Fe(NO_3)_3(aq)$
   The net ionic equation to describe this balanced equation is
   A. $3Ba^{+}(aq) + SO_4^{2-}(aq) \rightarrow 3BaSO_4(s)$
   B. $3B^{2+}(aq) + SO_4^{2-}(aq) \rightarrow 3BaSO_4(s)$
   C. $6NO_3^{-}(aq) + 2Fe^{2+}(aq) \rightarrow 2Fe(NO_3)_3(aq)$
   D. $3Ba^{2+}(aq) + 2NO^{3-}(aq) + 2Fe^{3+}(aq) + 3SO_4^{2-}(aq) \rightarrow 3BaSO_4(s) + 2Fe^{3+}(aq) + 6NO^{3-}(aq)$
10. What is the molarity of a solution containing 10g of sulfuric acid in 500 ml of solution?
    A. 0.02 B. 0.03 C. 0.12 D. 0.2

Chemistry EUEE 2005 E.C

Grade 12

Unit One

1. What is the quantity of water, in mL, required to prepare 0.5 M of HCl from a concentrated solution of 3.5 M in 50 mL is?
   A. 50 mL B. 100 mL C. 300 mL D. 350 mL
2. Which of the following statements is TRUE about colligative properties?
   A. Both vapor pressure and freezing point increase when a non-volatile solute is added to a solvent
   B. Both freezing point and boiling point increase when a non-volatile solute is added to a solvent
   C. Both vapor pressure and boiling point decrease when a non-volatile solute is added to a solvent
   D. Colligative properties depend only upon the number of solute particles in a solution and not upon their identity
3. What is the equivalent weight of HNO_3, as an oxidizing agent, in the following balanced reaction?
   $3Fe^{2+} + 4H^{+} + NO_3^{-} \rightarrow 3Fe^{3+} + NO + 2H_2O$
   A. 10.50 B. 15.75 C. 21.00 D. 31.50
4. A solution was prepared by adding 48 g of methanol (CH_3OH) 81 g of water (H_2O). what is the mole fraction of methanol in this solution?
   A. 0.25 B. 0.75 C. 1.5 D. 4.5
5. A solution was prepared by dissolving 3.75 g of pure hydrocarbon in 95.0 g of cyclohexane. The boiling point of pure cyclohexane was observed to be 80.70°C and that of the solution was 81.45°C. what is the approximate molecular weight of the hydrocarbon? (k_b for cyclohexane = 2.79°C/m)

   A. 71.0 g/mol B. 105 g/mol C. 147 g/mol D. 312 g/mol

6. How many mL conc. HNO_3 and how many mL of water are required to prepare 500 mL of 0.1 M HNO_3 from a conc. 13 M HNO_3?
   A. 1 mL HNO_3 and 496.15 mL H_2O
   B. 3 mL HNO_3 and 500 mL H_2O
   C. 3.85 mL HNO_3 and 500 mL H_2O
   D. 3.85 mL HNO_3 and 796.15 mL H_2O

Chemistry EUEE 2006 E.C

Grade 12

Unit One

1. Which of the following statement(s) is (are)true of an ideal liquid-liquid solution?
   I. It obeys Pv=nRT.
   II. It obeys Raoult's law.
   III. Solute – Solute, solvent – solvent , and solute – solvent interactions are very similar.
   IV. Solute – solute, solvent – solvent, and solute – solvent interactions are quite different
   A. I, II, and III B. I, II and IV C. II and III D. II and IV

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2. A beaker filled to the 100mL mark with (the salt has a mass of 100g) and another to the 100mL mark with water (the water has a mass of 100g) are mixed together in a bigger beaker until the salt is completely dissolved. What will be the mass of the solution?
   A. It will be much more than 200g.
   B. It will be much smaller than 200g
   C. It will be exactly 200g
   D. It will be slightly more than 200g.
3. How many moles of sodium hydroxide are present in 2.5L of 0.5 M aqueous solution?
   A. 0.2 B. 0.5 C. 1.25 D. 12.5
4. If a solution dissolves in an endothermic process.
   A. H bonds must exist between solvent and solute.
   B. Strong ion-dipole forces must exist in the solution.
   C. The entropy of the solution must be greater than that of its pure components.
   D. The solution must be a gas
5. A solution is made by dissolving 250.0g of potassium chromate crystals (K_2CrO_4, molar mass, 194.2 g) in 1.00kg of water. What will be the freezing point of solution? ?(K_f for water is 1.86°cm^{-1}).
   A. -8.87°C B. -7.18°C C. -5.73°C D. -1.86°C
6. If the solute-solvent interactions are greater than the solute-solute and solvent-solvent interactions, what will be the total vapor pressure of the solution?
   A. Greater than that calculated from Raoult's law.
   B. Less than that calculated from Raoult's low.
   C. The same as calculated from Raoult's law.
   D. Raoult's law cannot be applied for such interactions.
7. An aqueous solution is 70.0% nitric acid (HNO3) by mass. What is the concentration of HNO3 expressed in morality?
   A. 0.559 B. 8.62m C. 11.1m D. 37.0m
8. A lab instructor is preparing 5.0 liters of a 0.10 M $Pb(NO_3)_2$ (molecular mass 331) solution. What is the mass required?
   A. 165.5 g of $Pb(NO_3)_2$ and add 5.0 kg of H_2O.
   B. 165.5 g of $Pb(NO_3)_2$ and add H_2O unit the solution has a volume of 5.0 liters.
   C. 33.1 g of $Pb(NO_3)_2$ and add H_2O until the solution has volume of 5.0 liters.
   D. 33.1 g of $Pb(NO_3)_2$ and add 5.0 liters of H_2O.

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Grade 12

Unit One

1. The process of solute particles being surrounded by solvent particles is known as
   A. Saturation C. salvation
   B. Agglomeration D. dehydration
2. The decreasing order of electrochemical characteristics of some metals is given as: Mg > Al > Zn > Cu > Ag. What will happen if a copper spoon is used to stir a solution of aluminum nitrate ($Al(NO_3)_3$)?
   A. There is no reaction.
   B. The solution becomes blue.
   C. The spoon will get coated with aluminum.
   D. An alloy of copper and aluminum is formed.
3. What is the molarity of a 5g hydrogen peroxide (H_2O_2) in 100 mL solution that is used for hair bleaching?
   A. 0.015 M B. 0.15 M C. 1.5 M D. 3 M
4. What is the concentrations of sodium chloride in water needed in order to produced an aqueous solution that has an identical osmotic pressure (isotonic) with blood ($\pi = 7.70$ atom 25°C?
   A. 0.003 mol L^{-1} C. 0.1575 mol L^{-1}
   B. 0 0006 mol L^{-1} D. 0.315 mol L^{-1}
5. The acid-base indicator bromocresol green is a weak acid. The yellow acid and blue base forms of the indicator are present in equal concentrations in a solution when the pH is 4.68. What is the pKa of bromocresol green?
   A. 4.48 B. 4.68 C. 5.68 D. 6.68
6. What is the final concentration of C- ion when 250 mL of 0.20 M CaCl2 solution is mixed with 250 mL of 0.40 M KCl solution?
   A. 1.60 M B. 0.40 M C. 0.20 M D. 0.60 M

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7. If a student wishes to prepare approximately 100 milliliters of an aqueous solution of 6 M HCl using 12 M HCl, which procedure is correct?
   A. Adding 50 mL of 12 M HCl to 50 mL of water while stirring the mixture steadily.
   B. Adding 25 mL of 12 M HCl to 50 mL of water while stirring the mixture steadily.
   C. Adding 50 mL of water to 50 mL of 12 M HCl while stirring the mixture steadily.
   D. Adding 25 mL of water to 50 mL of 12 M HCl while stirring the mixture steadily.
8. The dissolution of water in octane (C_8H_{18}) is prevented by
   A. Dipole-dipole attraction between octane molecules.
   B. Hydrogen bonding between water molecules.
   C. London dispersion forces between octane molecules.
   D. Repulsion between like-charged water and octane molecules
9. The solubility of oxygen gas in water at 25°C and 1.0 atm pressure of oxygen is 0.041 g/L. the solubility of oxygen in water at 3.0 atm and 25°C is _____ g/L.
   A. 0.014 B. 0.31 C. 0.041 D. 0.123

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Grade 12

Unit One

1. How many moles of NH_4Cl must be added to 1.5L of 0.2 M solution of NH3 to form a buffer whose pH is 9.00 ($K_b = 1.8 \times 10^{-5}$)?
   A. 0.36 B. 0.65 C. 0.54 D. 0.8
2. What kind of solution forms when gasoline evaporates in air?
   A. Gas in gas solution C. Liquid in liquid solution
   B. Gas in liquid solution D. Liquid in gas solution
3. What is the solvent in 70% alcohol solution?
   A. Water B. Alcohol C. Sugar D. Kerosene
4. How many moles of H2SO4 are needed to prepare 5.0 liters of a 2.0 M solution of H_2SO_4?
   A. 2.5 B. 5.0 C. 20 D. 10
5. When a small amount of crystal solute is added to the supersaturated solution, the solute crystals will:
   A. grow bigger C. remain unchanged.
   B. slightly dissolve. D. dissolve completely.
6. Which of the following is correct?
   A. 1 Pa = 10 Nm^{-2} C. 0.00072 = 7.2 x 10^{-3}
   B. 1 N = 10kg m s^{-2} D. 1 L = 1dm^3
7. Which of the following does NOT affect the solubility of a gas dissolved in a liquid?
   A. Nature of solute and solvent C. Temperature
   B. Pressure D. Rate at which the gas dissolves
8. Equal masses of He and Ne are placed in a sealed container. What is the partial pressure of Ne, if the total pressure is 6 atm?
   A. 2 B. 3 C. 1 D. 5
9. What is the molarity of a solution made by dissolving 10 g of glucose ($C_6H_{12}O_6$) in sufficient water to form 200 mL solution?
   C. 0-18 B. 0.251 C. 0.362 D. 0.278

Chemistry EUEE 2004 E.C

Grade 12

Unit Two

1. A solution is labeled 0.500 M HCl. What is [H^+]?
   A. 0.5 B. 1.5 C. 1.6 D. 1.69
2. Which of the following compounds would be the most basic?

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A. 0.1 M acetic acid
B. 0.1 M sodium acetate
C. 0.1 M hydrochloric acid
D. 0.1 M ammonium

3. How is a buffer solution prepared?
   A. By mixing a weak acid and a strong acid
   B. By mixing a weak acid and its conjugate base
   C. By mixing a strong acid and its conjugate base
   D. By mixing a strong acid and its conjugate acid
4. The day bromothymol blue (HBb) is a weak acid whose ionization can be represented as follows:

   HBb(aq) $\rightleftharpoons$ H+(aq) + Bb-(aq)

   Which way will the equilibrium shift when NaOH is added?

   A. To the left
   B. To the right
   C. Initially to the left and after a while to the right
   D. Initially to the left and after a while to the left
5. Which one of the following statements is NOT true about acids?
   A. An acid is a proton donor
   B. An acid is an electrons pair donor
   C. An acid is an electron pair acceptor
   D. An acids is a substance that is ionized in water to produce $H^+(aq)$
6. Consider the following acids:
   I. CH_3COOH, Ka = 1.8×10^{-5}
   II. HCO_2H, Ka = 1.8×10^{-4}
   III. HOBr, Ka = 2.4×10^{-9}
   IV. C_6C_4OH, Ka = 1.0×10^{-10}
   Which one of the following aqueous solutions will have the HIGHEST pH?
   A. 0.10 M NaOBr
   B. 0.10 M HCO_2Na
   C. 0.10 M C_6H_5OHa
   D. 0.10 M CH_3COONa
7. What is the hydroxide ion concentration for a solution with a pH of 10 at 25°C?
   A. 10^{-14}M B. 10^{-10}M C. 10^{-7}M D. 10^{-4}M
8. Which of the following titrations will have an equivalence point at a pH < 7?
   A. Strong acid with weak base
   B. Weak acid with weak base
   C. Strong acid with strong base
   D. Weak acid with strong base
9. All of the following can act as Bronsted – Lowery bases EXCEPT
   A. I- B. NH_3 C. HCO_3^- D. H_2CO_3
10. Which of the following is a conjugate acid/base pair?
    A. HCl/OC^-
    B. H_3O^+/OH^-
    C. NH_4^+/NH_3
    D. H_2SO_4/SO_4^{2-}
11. The pH at room temperature of a 0.1M solution of formic acid (HCHO2) was measured to b 4.50. What is the hydrogen ion concentration?
    A. 3.16×10^{-5}M C. 6.32×10^{-3}M
    B. 3.16×10^{-12}M D. 6.32×10^{-4}M

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Grade 12
<u>Unit Two</u>

1. Which one of the mixture of the following pairs will NOT give a buffer solution?
   A. HCN and NaCN
   B. NH_3 and NH_4Cl
   C. H_3PO_4 and KH_2PO_4
   D. HNO_3 and $NaNO_3$
2. Which one of the following is TRUE for slats formed from strong acids and strong bases?
   A. No hydrolysis takes place
   B. Produces ions that are proton donors
   C. Produces ions which are proton acceptors
   D. Depends on the pK_a and pK_b of the parent acids and bases, respectively
3. Give the following equilibrium and equilibrium constants:
   (I) $HC_2H_3O_2 + H_2O \rightleftharpoons H_3O^+ + C_2H_3O_2^-$; $K_a = 1.80 \times 10^{-5}$
   (II) $H_2H_3O_2 + H_2O \rightleftharpoons H_3O^+ + HCO_3^-$; $K_a = 4.20 \times 10^{-7}$
   (III) $NH_4^+ + H_2O \rightleftharpoons H_3O^+ + NH_3$; $K_a = 5.6 \times 10^{-10}$

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(IV) $HCOOH + H_2O \rightleftharpoons H_3O^+ + COOH^-$; $K_a = 1.80 \times 10^{-4}$

What is the strength of the acids in DECREASING order?

A. I,IV,II and III C. III,II,I and IV
B. II,III,IV and I D. IV,I,II and III

4. Give the reaction:
$H_2PO_4^- + H_2O \rightleftharpoons H_3O^+ + HPO_4^{2-}$
Which of the following represents a conjugate acid-base pair?
A. $H_2PO_4^-$ and H_2O C. $H_2PO_4^-$ and H_3O^+
B. $H_2PO_4^-$ and HPO_4^{2-} D. H_2O and HPO_4^{2-}
5. What is the pH of 0.005 M solution $Ca(OH)_2$?
A. 2.3 B. 10 C. 12 D. 14
6. The indicator Bromthymol Blue (HBb) is a weak acid with $Ka = 1.0 \times 10^{-7}$ ionizes as follows:
HBb(aq, yellow) $\rightleftharpoons$ H^+ (aq, colourless) + In^-(aq, blue)
Which way will the equilibrium shift when NaOH is added and what will the color of the NaOH solution be containing this indicator?
A. Equilibrium will shift to the right and the color or NaOH solution will turn green
B. Equilibrium will shift to the right and the color of NaOH solution will turn blue
C. Equilibrium will shift to the left and the color of NaOH solution will turn yellow
D. Equilibrium will shift to the left and the color of NaOH solution will turn blue
7. To 0.2 M solution of a weak monoprotic acid, HA, enough quantity of its sodium salt, NaA, was dissolved to give a concentration of 0.2 M of the salt. What will be the acid concentration, $[H_3O^+]$, in the final solutions? (k_a of HA = 1.80×10^{-5})
A. 3.60×10^{-6} M C. 1.80×10^{-5} M
B. 1.00×10^{-5} M D. 1.90×10^{-3} M
8. A 50 mL solution of H_2SO_4 of 0.205 M is titrated with NaOH solution of unknown concentration. The endpoint against phenolphthalein indicator was signaled when 41.0 mL of NaOH was added. What is the concentration of NaOH solution?
A. 0.10 M B. 0.25 M C. 0.41 M D. 0.50 M
9. What is the pH of an aqueous solution prepared to contain 1.3 x 10-3 M sodium nitrite ($NaNO_2$) if the acid dissociation equilibrium constant, K_a, for nitrous acid (HNO_2) is 5.1×10^{-4}? $K_w = 1.0 \times 10^{-14}$
A. 3.1 B. 5.1 C. 6.0 D. 7.3

Chemistry EUEE 2006 E.C
Grade 12
Unit Two

1. Which of the following is NOT a conjugate acid-base pair?
A. HNO_3/NO_3 B. H_2SO_4/HSO_4 C. NH_3/NH_2^- D. H_3O^+/Oh^-
2. During the titration of a known volume of a strong acid with a strong base, there is
A. A steady increase in pH.
B. A sharp increase in pH around the end point
C. A steady decrease in pH
D. A sharp decrease in pH around the end point
3. A solution with a pH of 7.5 would be described as:
A. Very basic C. Slightly acidic
B. Slightly basic D. Very acidic
4. Which of the following procedures will produce a buffered solution?
I. Equal volumes of 0.5 M NaOH and 1 M HCl solutions are mixed.
II. Equal volumes of 0.5 M NaOH and 1 M CH_3 COOH solutions are mixed.
III. Equal volumes of 1 M $NaCH_3CO_2$ and 1 M CH_3COOH solutions are mixed.
IV. Equal volumes of 0.1 M NaOH and 1 M HCl solutions are mixed.
A. I B. III C. I and II D. II and III
5. Which of the following statements is true?
A. A universal indicator is a mixture of indicators that will give a different colour for a different pH.
B. Phenolphthalein is a universal indicator
C. A universal indicator can only be used in either strongly acidic or basic solution.
D. The colour of a universal indicator is red in a weak acid.
6. Which species **CAN NOT** act as a Lewis acid?
A. NH_3 B. BF_3 C. Fe^{2+} D. $AlCl_3$
7. Three acids, HA, HB, HC have the following Ka values.

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$K_a(HA)=1 \times 10^{-5}$ $K_a(HB)=2x10^{-5}$ $K_a(HC)=1x10^{-6}$
What is the correct order of increasing acid strength (weakest first)?
A. HA, HB, HC B. HC, HB, HA C. HC, HA, HB D. HB, HA, HC

8. What volume of 0.500 M NaOH is required to neutralize 25.0 mL of 1.2 M H_2SO_4? (Assume complete ionization of the acid).
A. 60 mL B. 90 mL C. 100 mL D. 120 mL
9. Which of the following statements is true about the percent ionization of a weak acid?
A. It decreases with increasing concentration
B. It increases with decreasing concentration.
C. It increases with increasing concentration.
D. It decreases with decreasing concentration.

Chemistry EUEE 2007 E.C
Grade 12
Unit Two

1. According to the Arrhenius concept, an acid is a substance that
A. is capable of donating one or more H^+ to any solvent.
B. Causes an increase in the concentration of H+ in aqueous solution.
C. Can accept a pair of electrons to form a coordinate covalent bond.
D. Reacts with the solvent to form the cation formed by autoionization of that solvent.
2. For the acid-base equilibrium.
$HCO_3^- + H_2O \rightleftharpoons H_2CO_3 + OH^-$
theBronsted – Lowry acids are
A. H_2O and OH^- C. H_2O and H_2CO_3
B. HCO_3^- and O^{H-} D. HCO_3^- and H_2CO_3
3. If $NaNO_2$ is added to a solution of HNO_2, which of the following statements is true?
A. The pH of the solution will increase.
B. The pH of the solution will decrease.
C. The pH will remain the same.
D. The equilibrium will not be affected.
4. The concentration of nitrate ion in a solution that contains 0.900 M aluminum nitrate is
A. 0.90 B. 0.45 C. 0.30 D. 2.70
5. pKa values of three acids X,Y and Z are 4.5, 3.5 and 6.5, respectively. Which of the following represents the correct order of acid strength?
A. X > Y > Z B. Z > X > Y C. Y > X > Z D. Z > Y > X
6. The following data were collected at the endpoint of a titration performed to find the molarity of an HCl solution.
Volume of acid (HCl) used = 14.4 mL
Volume of base (NaOH) used = 22.4 mL
Molarity of standard base (NaOH) = 0.20 M
On the basis of the above data, what is the molarity of the acid solution?
A. 1.6 M B. 0.64 M C. 0.31 M D. 0.13 M
7. The pK_a of a weak monoprotic acid is 4.8. What should be the ratio of [Acid]/[Salt] of a buffer, if pH = 5.8 is required?
A. 0.1 B. 1.0 C. 2.0 D. 10
8. The following bases and their conjugate acids (as the chlorides) are available in the laboratory: $NH_3(K_b=1.8 \times 10^{-5})$, $C_6H_5N(K_b=1.7 \times 10^{-9})$, $CH_3CH_2NH_2(K_b=6.4 \times 10^{-4})$ and $CH_3NH_2(K_b=4.4 \times 10^{-4})$, which of these acid-base pairs are the best to prepare a buffer solution having a pH of about 9?
A. NH_3 + conjugate acid C. CH_3NH_2 + conjugate acid
B. C_6H_5N + conjugate acid D. $CH_3CH_2NH_2$ + conjugate acid

Chemistry EUEE 2008 E.C

Grade 12

Unit Two

1. Which one of the following combinations CANNOT produce a buffer solution?
A. $HClO_4$ and $NaClO_4$ C. HNO_2 and $NaNO_2$
B. HCN and NaCN D. NH_3 and $(NH_4)_2SO_4$
2. The Ka of hypochlorous acid (HClO) is 3.0×10^{-8} at 25^0C. What is the % ionization of hypochlorous acid in a 0.015 M aqueous solution of HClO at 25^0C?
A. 2.1×10^{-5} B. 0.14 C. 1.4×10^{-2} D. 3.3×10^{-1}

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3. What is the ionization constant for a weak acid, HA, that is 1.60% ionized in 0.0950 M solution?
   A. 2.26×10^{-3} B. 3.77×10^{-2} C. 2.47×10^{-5} D. 9.91×10^{-6}
4. When 0.50 mol of N2O4 is placed in a 4.0 liter reaction vessel and heated to 400 K, 80% of the N2O4 decomposes to NO2 gas as follows:

   $N_2O_4(g) \rightleftharpoons 2NO_2(g)$

   What will be the value of Kp, in units of pressure, at 400 K for this reaction?
   A. 2.62 B. 13.12 C. 50.48 D. 16.20
5. A 1.0 M solution of a weak acid is found to dissociate by only 1.37%. Which of the following acid is it likely to be?
   A. HF $K_a = 7.2 \times 10^{-4}$
   B. HNO_2 $K_a = 6.9 \times 10^{-4}$
   C. CH_3COOH $K_a = 1.8 \times 10^{-5}$
   D. HCOOH $K_a = 1.9 \times 10^{-4}$
6. A 1.0×10^{-4} M solution has a pH of 10.00. The solute is a
   A. weak acid B. weak base C. strong base D. strong acid
7. What is the molar solubility of Fe(OH)3 in a solution that is buffered at pH = 3.50 at 25^0C? (K_{sp} $(Fe(OH)_3 = 4 \times 10^{-38}$)
   A. 1×10^{-5} B. 1.1×10^{-6} C. 2.0×10^{-6} D. 1.26×10^{-6}
8. Which of the following types of elements are good oxidizing agents?
   A. Alkali metals B. Halogens C. Lanthanides D. Transition elements

Chemistry EUEE 2004 E.C
Grade 12
Unit Three

1. Under what conditions will the enthalpy change of a process equals the amount of heat transferred into or out of the system?
   A. Under constant volume
   B. Under constant pressure
   C. Under constant pressure and volume
   D. Under constant pressure and temperature
2. For the reaction A + B⟶C+ D, $\Delta H° = +40$kJ and $\Delta S° = +50$J/k.
   Therefore, the reaction under standard conditions is
   A. Spontaneous at all temperatures
   B. Non spontaneous at all temperatures
   C. Spontaneous at temperature greater than 800k
   D. Spontaneous only at temperature between 10k and 800k
3. What is the change in internal energy, ΔE of a system is it absorbs 300 kJ of heat from the surroundings and does 500 kJ of work on the surroundings?
   A. 100kJ B. -200kJ C. 400kJ D. 500kJ
4. For the conversion of C(diamond) C(Graphite), $\Delta H = -3$kJ. What does this mean?
   A. Both are equally stable C. Diamond is more stable than graphite
   B. Graphite is stable than diamond D. Graphite has more stable energy than diamond
5. Why does a pressure cooker reduce cooking time?
   A. The heat is more evenly distributed
   B. A stronger flame is tenderizes the food
   C. The high pressure tenderizes the food
   D. The boiling point of water inside the cooker is increased

Chemistry EUEE 2005 E.C
Grade 12
Unit Three

1. Which of the following statements is TRUE?
   A. Ultraviolet light has longer wavelength than visible light
   B. The energy of radiation decreases as the wavelength decreases
   C. The frequency of radiation increases as the wavelength decreases
   D. Wave number of an electromagnetic radiation increases as wavelength increases
2. Enthalpy is defined as the heat content of the system at constant:
   A. heat B. moles C. pressure D. volume
3. How many kilojoules of heat are absorbed when 20 g of NaCl (s) is decomposed into Na(s) and Cl_2(g) at constant pressure according to the following reaction?
   $2Na(s) + Cl_2(g) \rightarrow 2NaCl(S)$ $\Delta H = -821.8$ Kj
   A. -281.0 B. -140.5 C. +14.5 D. +281.0

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4. What is the quantity of heat required to raise the temperature of 80 g of ethanol from 25°C to 75°C ? (specific heat of ethanol = 2.46 J $g^{-1} K^{-1}$)
   A. 2.46 kJ B. 4.0 kJ C. 9.84 kJ D. 18.68 kJ
5. Consider the following gaseous reaction at 25°C:
   $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$ $\Delta H = -802$ kJ
   Which energy change would occur if 3.2 moles of CH_4 is completely combusted?
   A. 2.57 x 10^2 kJ will be released
   B. 2.57 x 10^2 kJ will be absorbed
   C. 6.43 x 10^3 kJ will be released
   D. 6.43 x 10^3 kJ will be absorbed
6. Geaseous petrol in a combustion system has done 375 kJ of work during its expansion in the piston. Simultaneously, it absorbed 586 kJ heat from the engine. What is the internal energy change during the process?
   A. +211 kJ B. +961 kJ C. -211 kJ D. -961 kJ
7. Which of the following reactions is expected to have negative value of entropy change (ΔS)?
   A. $C_6H_6(s) + 6O_2(g) \rightarrow 6CO_2(g) + 6H_2O(l)$
   B. $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$
   C. $N_2O_4(g) + Cl_2(g) \rightarrow 2NOCl(g) + O_2(g)$
   D. $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$

Chemistry EUEE 2006 E.C
Grade 12
Unit Three

1.Which one of the following is NOT an intensive property ?
A.Mss B.Temperature C. Colour D. Density

2.A solution is is made by dissolving 250.0 g of potassium chromate crystals (K_2CrO_4,molar mass, 194.2g)in 1.00kg of water. What will be the freezing point of the solution ?(K_f for water is $1.86^0 cm^{-1}$)
A-8.87^0C B.-7.18^0C C.-5.73^0C D.-1.86^0C

3.A gas is confined to a cylinder under constant atmospheric pressure. When the gas undergoes a particular chemical reaction, it relases 35kJ of heat to its surroundings and does 63kJ of P-V work on its surroundings. What are the values of ΔH and ΔE for the process?

A. ΔH= 135kJ, ΔE=63kJ
B. ΔH=-135kJ, ΔE-63kJ
C. ΔH=135kJ, ΔE=138kJ
D. ΔH=- 135kJ, ΔE=-198kJ

4.Which statement about the following reaction is correct ?

$2FeS(s) + 3CO_2(g) \rightarrow Fe_2O_3(s) + 3CO(g)$ $\Delta H^o = +26.6$kJ
A.26.6kJ of energy are released for every mole of Fe reacted.
B. 2.6 kJ of energy are absorbed for every mole of Fe reacted.
C. 53.2kJ of energy are relapsed for every mole of Fe reacted.
D. 13.3 kJ of energy are absorbed for every mole of Fe reacted

5.Which of the following is true about an open system ?
A.A system that exchanges both energy and matter with its surroundings .
B. A system that cannot exchange both matter and energy with its surroundings.
C. A system that only exchanges matter with its surroundings
D. A system that only exchanges energy with its surroundings

6.What is the value of ΔH for the reaction $S(s) \rightarrow S(g)$?

$S(s) + O_2(g) \rightarrow SO_2(f)$ $\Delta H = -395$kJ
$S(g) + O_2(g) \rightarrow SO2(g)$ $\Delta H = -6185$kJ
A.-1013kJ C. +223kJ
B. -223kJ D. +1013kJ

Chemistry EUEE 2007 E.C
Grade 12
Unit Three

1. A system which can exchange both matter and energy with its surroundings is said to be a/an
   A. isolated system C. ideal system
   B. open system D. closed system
2. The enthalpy of combustion of solid carbon to form carbon dioxide is – 393.5 kJ/mol carbon and the enthalpy of combusation of carbon monoxide to form carbon dioxide is -283.3 kJ/mol CO. what will be the enthalpy change, ΔH for the reaction?

   $2C(s) + O_2(g) \rightarrow 2CO(g)$

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A. -11.4 kJ B. -220.8 kJ C. +172.9 kJ D. +1354.0 kJ

3. The enthalpies of formation of gaseous N_2O and NO at 298 K are 82 and 90 kJ/mol, respectively. The enthalpy change for the reaction $N_2O(g) + ½ O_2(g) \rightarrow 2NO(g)$ is

A. -8 kJ B. 98 kJ C. -74 kJ D. 8 kJ

4. If the enthalpy change for a certain reaction A $\rightarrow$ B is -2 kJ at 300K, what would be the entroy change in the surroundings?

A. -40 J/K B. 40 J/K C. -3.6 x 106 J/K D. 3.6 x 106 J/K

5. ΔH foraolid to liquid transitions for compound A is 2.73 Kcal/mol and for compound B is 3.0 Kcl/mol. The melting point for compound A is 0°C and the melting point for compound B is 30°C. The entropy changes ΔS_A and ΔS_B at the two transition temperatures are related as

A. $\Delta S_A = \Delta S_B$ B. $\Delta S_A < \Delta S_B$ C. $\Delta S_B < \Delta S_A$ D. $\Delta S_A = \frac{300\Delta S_A}{273}$

Chemistry EUEE 2008 E.C
Grade 12
Unit Three

1. Sodium acetate spontaneously crystallizes out of a supersaturated solution on standing. Which of the following is true for the thermodynamic quantities of this system for such a process?

A. $\Delta S < 0, \Delta H < 0$ C. $\Delta S > 0, \Delta G < 0$

B. $\Delta G < 0, \Delta H > 0$ D. $\Delta S > 0, \Delta H > 0$

2. Which one of the following statements best describes the standard enthalpy of formation of any element?

A. The value of $\Delta H^0{}_f$ (element) depends on temperature.

B. The value of $\Delta H^0{}_f$ (element) is zero for any element in the standard state.

C. The value of $\Delta H^0{}_f$ (element) is zero only for elements in the solid state.

D. The value of $\Delta H^0{}_f$ (element) is zero only at absolute zero temperature

Chemistry EUEE 2004 E.C
Grade 12
Unit Four

1. Consider the following reaction:
$I_2O_5(s) + 5CO(g) \rightarrow 1_2(s) + 5CO_2(g)$
What is the magnitude of the change in the oxidation number of the elements?

A. I, + 5 to 0, C, + 2 to + 4 C. I, + 0 to 0, C, + 2 to + 4
B. I, + 5 to 0, C, + 4 to + 4 D. I, + 4 to 0, C, + 2 to + 4

2. Consider the following oxidation – reduction equation:

$2H_2O(I) + Al(s) + MnO_4^-(aq) \rightarrow AlOH_4(aq) + MnO_2(s)$
What are the reducing and the oxidizing agents in this reaction?

A. Al(s) is the reducing agent and H_2O is the oxidizing
B. Al(s) is the oxidizing agent and H_2O is the reducing agent
C. Al(s) is the oxidizing agent and $MnO_4^-(aq)$ is the reducing agent
D. Al(s) is the reducing agent and $MnO_4^-(aq)$ is the oxidizing agent

3. Which one of the following substances is a NON-CONDUCTOR of electricity?

A. Graphite C. Silver(s)
B. $MgCl_2(s)$ D. $H_2SO_4(aq)$

4. A solution It 25°C contains the metal ions Ni^{2+}, pt^{2+} and pd^{2+}, all at 1.0M concentrations. Consider the following standard reduction potentials:
$Nt^{2+} + 2e^-$ Ni $E^0 = -0.23V$
$Pt^{2+} + 2e^-$ pt $\rightarrow$ $E^0 = 1.20V$
$pd^{2+} + 2e^-$ pd $\rightarrow$ $E^0 = 0.99$ V
which metal (s) will plate out first when the solution is electrolyzed?

A. Ni B. pd C. pt D. Ni and pd

5. Which of the following statements is true?

A. A battery is rechargeable

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B. A battery produced electricity spontaneously
C. A battery has generally no liquid components
D. A battery produces the same amount of electricity, regardless of composition

6. All of the following when added to water will produce an electrolytic solution EXCEPT.
A. N2(g) B. NaI(s) C. HCl(g) D. KOH(s)

Chemistry EUEE 2005 E.C

Grade 12

Unit Four

1. In the electroplating of nickel from a solution containing Ni^{2+} ion, what will be the weight of the metal deposited on the cathode by a current of 8 A flowing for 500 minutes?
A. 73 g B. 103 g C. 117.4 g D. 145 g
2. A 1M solution of $Cu(NO_3)_2$ is placed in a beaker with a strip of Cu metal. A 1M of SnSO4 is placed in a second beaker with a strip of Sn metal. The two beakers are then connected by a slat bridge and the two metal electrodes are connected by wires to a voltammeter. Which of the following electrode serves as the anode and which electrode gains mass?
Given that E^0 $Cu^{2+}/Cu = 0.34V$ and E^0 $Sn^{2+}/Sn = -0.14V$
A. Anode, Sn, Sn electrode gains mass
B. Anode, Sn, Cu electrode gains mass
C. Anode, Cu, Sn electrode gains mass
D. Anode, Cu, Cu electrode gains mass
3. Consider the following unbalanced redox reaction in acidic solution:
$MnO_4^- + Fe_2^+ \longrightarrow Mn^{2+} + Fe^{3+}$
What is the change in oxidation state for both the substances oxidized and reduced, and the coefficients of Fe^{2+} and Mn^{2+} respectively, after balancing?
A. 2 and 7 , and 2 and 5
B. 3 and 2, and 4 and 1
C. 1 and 5, and 5 and 1
D. 2 and 5, and 5 and 2

4. What reactions occur at the anode and cathode when an aqueous solution of Na2SO4 is electrolyzed?

		E^0 red
(I)	$S_2O_8 2^- + 2e^-$ 2SO42-	2.01V
(II)	$O_2 + 4H^+ + 4e^- \longrightarrow 2H_2O$	1.23 V
(III)	$2H_2O + 2e^- \longrightarrow H_2 + 2OH^-$	-0.83 V
(IV)	$Na^+ + e \longrightarrow Na$	2.71 V

A. H_2 at cathode and O_2 at anode
B. Na at cathode and $S_2O_8^{2-}$ at anode
C. H_2 at cathode and $S_2O_8^{-2}$ at anode
D. Na at cathode and O_2 at anode
5. For the following hypothetical equation, in aqueous solution, what is the correct representain of the cell notation?
$A(s) + B^{2+}(aq) \longrightarrow A^{2+}(aq) + B(s)$
A. $A(s) | A^{2+}(aq) || B^{2+}(aq) | B(s)$
B. $B^{2+}(aq) | B(s) || A^{2+}(aq) | A(s)$
C. $A^{2+}(aq)|A(s)||B(s)|B^{2+}(aq)$
D. $B(s)|B^{2+}(aq)||A^{2+}(aq)|A(a)$

Chemistry EUEE 2006 E.C

Grade 12

Unit Four

1.The electrolysis of molterNaCl is an industrial process. What does the electrolysis produce?
A. Na and Cl_2 B. H2 and O_2 C. Na+ and Cl- D. NaOH and Cl_2
2.For what conversion is an oxidizing agent required ?
A. $2H^+(aq) \longrightarrow H_2(g)$
B. $2Br^-(aq) \longrightarrow Br_2(aq)$
C. $SO3(g) \longrightarrow SO_4^{2-}(aq)$
D. $MnO2(s) \longrightarrow Mn^{2+}(aq)$
3.The oxidation number s of nitrogen in NH3,HNO3 and NO2 are _____ respectively.
A.-3,-5,+4 B.+3,+5,+4 C.-3,+5,-4 D.-3,+5,+4
4.Which of the following metals is extracted by thermal reduction process?
A. Cu B. Fe C. Al D. Mg

5.The two standard electrode potentials involved in the nickel cadmium rechargeable cell are given below. Calculate the ΔG^O in KJ of the cells.
$NiO_2(s)+2H2S(1)+2e \longrightarrow Ni(OH)_2(s)+2OH^-$ Eo=+0.49v
$Cd(OH)_2(s)+2e \longrightarrow Cd(s)+_2OH(aq)$

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A.-184 B.-153 C.-241 D.-206

6.Which one of the following reaction is NOT a redox reaction ?

A.$Ag^+(aq)+Cl^-(aq) \longrightarrow AgCl(s)$

B.$2Na(s)+Cl_2(g) \longrightarrow 2NaCl(s)$

C.$Mg(s)+2HCl(aq) \longrightarrow MgCl2(aq)+H_2(g)$

D.$Cu^{2+}(aq)+Zn(s) \longrightarrow Cu(s)+Zn^{2+}(aq)$

7.The half- reaction for formation of magnesium metal upon electrolysis of molten $MgCl_2$is

$Mg^{2+}+2e \longrightarrow Mg$

What is the mass of magnesium formed upon passage of a current of 60.0A for a period of $2.00x\ 10^3$s ?

A.5.0 B.10.0g C.15.1g D.30.2g

3.Which of the following is NOT a characteristic of the electrolytic cell containing aqueous solution of NaCl used in the manufacture of sodium hydroxide ?

A.The sodium hydroxide solution is produced in the electrolytic cell

B. The electrolyte must be a dilute solution of NaCl

C. Hydrogen is produced at the cathode

D. The production of chlorine gas occurs at the anode

Chemistry EUEE 2007 E.C

Grade 12

Unit Four

1. What kind of energy is converted in a galvanic cell?
   A. Chemical energy is converted into electrical energy.
   B. Chemical energy is converted to heat.
   C. Chemical energy is obtained from heat.
   D. Electrical energy is converted into chemical energy.
2. Standard electrode potential Sn^{4+}/Sn^{2+} couple is +0.15 V and that for the Cr^{3+}/Cr couple is -0.74 V. These two couples in their standard state are connected to make a spontaneous electrochemical reaction. The cell potential will be
   A. +1.83 V B. +1.19 V C. +0.89 V D. +0.18 V
3. How many electrons will appear when the following half-reaction is balanced?
   $S_4O_6^{2-} \longrightarrow S_2O_3^{2-}$
   A. 3 B. 2 C. 4 D. 1
4. Electrolysis of dilute aqueous NaCl solution was carried out by passing 10 milliampere current. The time required to liberate 0.01 mol of H_2 gas at the cathode is
   A. 9.65×10^4 s B. 19.3 x $x10^4x$ C. 28.95×10^4 s D. 38.6×10^4 s
5. During the electrolysis of an aqueous solution of copper sulphate using platinum electrodes, the reaction takes place at the anode is
   A. $Cu^{2+} + 2e^- \rightarrow Cu$
   B. $Cu \rightarrow Cu^{2+} + 2e^-$
   C. $2H_2O \rightarrow 4H^+ + O_2 + 4e^-$
   D. $4H^+ + O_2 + 4e^- \rightarrow H_2O$
6. An aqueous solution contains 0.100 M NaOH at 25.0°C. the pH of the solution is?
   A. 0.100 B. 1.00 C. 7.00 D. 13.0
7. Which of the following describes the balanced molecular equation when perchloric acid is mixed with solid iron (III) hydroxide?
   A. $HClO_4(aq)+Fe(OH)_3(s) \rightarrow H_2O(l)+FeClO_4(aq)$
   B. $3HClO_4(aq)+Fe(OH)_3(s) \rightarrow 3H_2O(l)+Fe(ClO_4)_3(aq)$
   C. $3HOClO_2(aq)+Fe(OH)_3(s)\ 3H_2O(l)+Fe(ClO_3)_3(aq)$
   D. $HOClO_2(aq)+Fe(OH)_3(s) \rightarrow H_2O(l)+Fe(ClO_3)(aq)$
8. A solution in an electrolytic cell contains $Cu^{2+}(E^0=0.34V)$, Ag^+ (E^0 = 0.80 V), and Zn^{2+} (E^0=-0.76 V). if the voltage is initially very low and slowly increased, in which order will the metals be plated out onto the cathode?
   A. $Zn^{2+} > Cu^{2+} > Ag^+$
   B. $Cu^{2+} > Zn^{2+} > Ag^+$
   C. $Ag^+ > Zn^{2+} > Cu^{2+}$
   D. $Ag^+ > Cu^{2+} > Zn^{2+}$

Chemistry EUEE 2008 E.C

Grade 12

Unit Four

1. What mass of magnesium is plated out upon electrolysis from molten $MgCl_2$ using a current of 60 A for a period of 4000 seconds?

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A. 30g B. 24g C. 60g D. 72g

2. For a voltaic (or galvanic) cell using Ag, Ag^+ (1.0 M) and Zn, Zn^{2+} (1.0 M) half-cells, which of the following statements is INCORRECT?
   A. The zinc electrode is the anode
   B. The zinc will flow through the external circuit from the zinc electrode to the silver electrode.
   C. The mass of the zinc electrode will decrease as the cell operates.
   D. Reduction occurs at the zinc electrode as the cell operates.
3. What is the balanced net ionic equation for the reaction of $CaCl_2$ and $AgNO_3$?
   A. $CaCl_2(aq) + 2AgNO_3(aq) \longrightarrow a(NO_3)_2(aq) + 2AgCl(s)$
   B. $Ca^{2+}(aq) + 2Cl^-(aq) + 2Ag^+(aq) + 2NO_3^-(aq) \longrightarrow Ca^{2+}(aq) + 2NO_3^-(aq) + 2AgCl(s)$
   C. $Cl\text{-}(aq) + Ag^+(aq) \longrightarrow 2AgCl(s)$
   D. $2Cl^-(aq) + 2Ag^+(aq) \longrightarrow 2AgCl(s)$
4. For the galvanic cell shown below, which on eof the following statements is correct?

   A. At the zinc electrode, zinc ions are formed.
   B. The electrode potential is measured by the voltmeter.
   C. The following reaction takes place at the magnesium electrode: $Mg^{2+} + 2e^- \longrightarrow Mg$
   D. Electrons flow from the zinc electrode to the magnesium electrode.
5. What is the purpose of a salt bridge in an electrochemical cell?
   A. To provide a source of ions to react at the anode and cathode.
   B. To maintain electrical neutrality in the half-cell through migration of ions.
   C. To provide means of electrons to travel from the cathode to the anode.
   D. To provide means of electrons to travel from the anode to the cathode.
6. What is galvanized iron?
   A. Iron that is coated with tin. C. Iron that is coated with chromium.
   B. Iron that is coated with zinc. D. Iron that is coated with aluminum.
7. The standard cell potential (E^0) for the reaction below is 1.10V. What is the cell potential for this reaction when $\left[Cu^{2+}\right] = 1x10^{-5}M$ and $\left[Zn^{2+}\right] = 1M$?
   $Zn(s) + Cu^{2+}(aq) \longrightarrow Zn^{2+}(aq) + Cu(s)$
   A. 1.10 B. 0.95 C. 1.20 D. 1.35
8. Which of the following statements is true?
   A. The more positive the value of E_{red}^0, the greater the driving force for reduction.
   B. The more exothermic the value of E_{red}^0, the greater the driving force for reduction.
   C. The more endothermic the value of E_{red}^0, the greater the driving force for reduction.
   D. The more negative the value of E_{red}^0, the greater the driving force for reduction.

Chemistry EUEE 2004 E.C

Grade 12

<u>Unit Five</u>

1. How can silver can be plated onto nickel?
   A. Electricity to a nickel anode in a solution of silver ions
   B. Electricity to a silver anode in a solution of nickel ions
   C. A solution of nickel ions to react with a piece of silver
   D. Electricity to a nickel cathode in a solution of silver ions
2. Which of the following ions is the most abundant in sea water?
   A. Na^+ B. Ca^{2+} C. Cl^- D. HCO_3^-

Chemistry EUEE 2005 E.C

Grade 12

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Unit Five

1. Which of the following gases is manufactured using the Haber process?
   A. Ammonia B. Nitric oxide C. Nitrogen D. Nitrogen dioxide
2. Which of the following metals is NOT obtained by commercial electrolytic process?
   A. Ag B. Al C. Cu D. Na
3. Which of the following metals has the highest electrical and thermal conductivities?
   A. Ag B. Co C. Cu D. Ni
4. Which of the following elements is the second most abundant element in the earth's crust?
   A. Aluminum B. Iron C. Oxygen D. Silicon
5. Which of the following plant nutrient will be produced as a result of nitrogen fixation?
   A. Carbohydrate B. Cellulose C. Mineral D. Protein
6. Which of the following metal alloys does NOT contain tin?
   A. Brass B. Bronze C. Pewter D. Plumber's solder
7. Which of the following is the most important ingredients used for productin of DAP fertilizer?
   A. Ammonia and phosphoric acid
   B. Nitric acid, urea and phosphoric acid
   C. Phosphoric acid, urea and ammonia
   D. Sulpheric acid, ammonia and urea

Chemistry EUEE 2006 E.C

Grade 12

Unit Five

1.Whcih one of the following chemicals is used to disinfect water?
A. Fluorine B. Nitrogen C. Oxygen D. Chlorine

2.Which of the following metals forms a volatile compound during the extraction process?
A.Fe B.Co C.Ni D. Cu

3.Which of the following is the most important source for the extraction of iron ?
A. Hematite B. Bauxite C. chalcopyrite D. Sphalerite

Chemistry EUEE 2007 E.C
Grade 12
Unit Five

1. The conversion of nitrogen gas to nitrates by bacteria is called
   A. nitrification. C. execretion
   B. nitrogen fixation. D. denitrification.
2. The most abundant metal on the surface of the earth is
   A. Fe B. Al C. Ca D. Na
3. Which one of the following metals is extracted by thermal reduction process?
   A. Al B. Cu C. Fe D. Mg
4. Which of the following metals forms a volatile compound that is taken as an advantage for its extraction?
   A. Co B. Fe C. Ni D. W

Chemistry EUEE 2008 E.C
Grade 12
Unit Five

1. Which is the most common ore used for the extraction of copper?
   A. CuO B. $CuSO_4$ C. $CuCO_3$ D. $CuFeS_2$
2. Which of the following material has maximum ductility?
   A. Nickel B. Aluminum C. Mild steel D. Copper
3. Which of the following statements concerning petroleum is INCORRECT?
   A. It is a renewable energy source.
   B. It is a fossil fuel.
   C. It is a mixture consisting mainly of hydrocarbons.
   D. It was formed from marine organisms, which died millions of years ago.
4. The four most abundant metals in the earth's crust in decreasing order of abundance are:
   A. Oxygen, Silicon, Aluminum, and Iron.
   B. Aluminum, Iron, Calcium, and Magnesium.

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C. Iron, Aluminum, Silicon, and oxygen.
D. Silicon, Aluminum, Magnesium, and Sodium.

Chemistry EUEE 2004 E.C
Grade 12
Unit Six

1. Which of the following is a chemical formulae that represents an amino acid?
   A. CH_4 B. CH_3NH_2 C. CH_3COOH D. NH_2CH_2COOH
2. Which catalyst is used in the hydrogenation of vegetable oils?
   A. Iron B. Nickel C. Platinum D. Molybdenum
3. Which of the following is NOT a carbohydrate?
   A. Starch B. Glucose C. Glycine D. Cellulose
4. Which element is added to natural rubber to make it harder and reduce its usceptibility to oxidation and chemical attackes?
   A. Sulfur B. Silicion C. Carbon D. Nitrogen

Chemistry EUEE 2005 E.C
Grade 12
Unit Six

1. What is the name of triacylglycerol (triglycerides) that is solid at room temperature?
   A. Lecithin B. Fat C. Wax D. Oil
2. What are the raw mateirials required to synthesize nylon 6,6, a specific kind of nylon?
   A. Diacides
   B. Diammines
   C. Diacids and Diamines
   D. Polyethylene
3. Which of the following substances are added to natural rubber to toughen it?
   A. Calcium B. Carbon C. Nitrogen D. Sulfur
4. What structural feature is usually needed to present in order for an addition polymer to be produced?
   A. A carbon – carbon sigma bond
   B. A carbon – oxygen pi bond
   C. A carbon – oxygen sigma bond
   D. A carbon – carbon pi bond
5. Which of the following bimolecular forms a zwitterions at higher or lower pH?
   A. Cellulose B. Glucose C. Protein D. Starch
6. Which of the following form of synthetic rubbers can be vulcanized to greatly enhance its mechanical strength?
   A. Noeprene B. Isoprene C. Butyl rubber D. Styrene – butadiene rubber
7. What is the range in the number of carbon atoms of the monosaccharides that are found in nature?
   A. 3 to 7 B. 4 to 10 C. 4 to 12 D. 5 to 12
8. Which synthetic polymer is produced from caprolactam?
   A. Nylon -6 B. Nylon 6,10 C. Teflon D. Terylene

Chemistry EUEE 2006 E.C
Grade 12
Unit Six

1.Commercially, liquid vegetable oils are converted to solid fast auch as margarine by:
   A.Hydrogenation C. Saponification
   B. Hydration D. oxidation
2.What is the chemical name for Aspirin?
   A. Acetyl salicic acid C. methyl salicylate
   B. salicylic acid D. sodium salicylate
3.Which compound is a carboxylic acid ?
   A.CH_3COOH C.$(CH_3)_2CHOOCH_3$
   B.$(CH_3CO)_2O$ D. $(CH_3)_2O$

4.A triacylglycerol that is solid at room temperature is called.
   A.Lecithin B. Fat C. Wax D. Oil
5.Which compound is an ester?
   A.CH_3COOH B.$CH_3OC_2H_5$ C.C_2H_5CHO D.$HCOOCH_3$
6.When the following substances are arranged in order of increasing melting point (lowest melting point first), the correct order is;

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A.$CH_3CH_2CH_3CH_3COCH_3$,$CH_3CH_2CH_2OH$
B. $CH_3CH_2CH_3$,$CH_3CH_2CH_2OH$,CH_3COCH_3
C.CH_3COC_3,$CH_3CH_2CH_2OH$,$CH_3CH_2CH_3$
D.$CH_3CH_2CH_2OH$,$CH_3CH_2CH_3$,CH_3COCH_3

7.Which of the following gives the correct order of decreasing acidity of carboxylic acids?
A.Cl_3CCOOH,$Cl_2CHCOOH$,FCH_2,$COOH$,CH_3COOH
B.$FCH_2COOH1CH_3COOH$,$Cl_2CHCOOH$,Cl_3CCOOH
C. CH_3COOH,FCH_2COOH,$Cl_2CHCOOH$,Cl_3CCOOH
D. $Cl_2CHCOOH$,CH_3COOH,FCH_2COOH,Cl_3CCOOH

8.Which of these compounds is the ester formed from the reaction of acetic acid and 1- propanol?

A. O
CH3CO
OCH2CH2

C. O
$CH_3CH_2CH_2OCH_2$
OCH_2CH_2

B. O
CH_3CH_2COH

D. O
$CH_3COCH_2CH_2CH$
OCH_2CH_2

Chemistry EUEE 2007 E.C
Grade 12
Unit Six

1. A lipid is any substance of biochemical origin that is
   A. soluble in both water and non polar solvents.
   B. insoluble in both water and non-polar solvents.
   C. soluble in water but insoluble in non-polar solvents.
   D. soluble in non-polar solvents and insoluble in water.
2. Bakelite is obtained form phenol by reacting with
   A. HCHO B. $(CH_2OH)_2$ C. CH_3CHO D. CH_3COCH_3
3. Natural rubber is a polymer of
   A. butadiene B. isoprene C. neoprene D. styrene

Chemistry EUEE 2008 E.C
Grade 12
Unit Six

1. Which of the following statements about polyvinyl chloride is NOT correct?
   A. PVC can be used in making water pipes.
   B. PVC is stiff.
   C. PVC is softened on heating
   D. The monomer of PVC is CHCl = CHCl.
2. Which of the following is a natural polymer?
   A. Keratin C. Cellulose
   B. Polythene D. Polymethyl methacrylate
3. A polysaccharide is a polymer made up of which kind of monomers?
   A. Amino acids C. Simple sugars
   B. Nucleotides D. Alternating sugar and phosphate groups

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