CHEMISTRY
SAMPLE TEST

MULTIPLE CHOICE **Choose the one alternative that best completes the statement or answers the question.**

1. How many protons, neutrons and electrons would be found in a $^{32}_{16}S^{2-}$ ion

   A) 16 protons, 32 neutrons and 18 electrons
   B) 32 protons, 16 neutrons and 34 electrons
   C) 16 protons, 16 neutrons and 18 electrons
   D) 16 protons, 16 neutrons and 16 electrons
   E) 32 protons, 30 neutrons and 16 electrons

2. How many bonding and how many nonbonding electron pairs are there in an NH_3 molecule?

   A) 3 bonding and 0 nonbonding
   B) 6 bonding and 0 nonbonding
   C) 3 bonding and 2 nonbonding
   D) 3 bonding and 1 nonbonding
   E) 5 bonding and 0 nonbonding

3. How many Cl atoms are there in 2.5 moles of Cl_2?

   A) 3×10^{24}
   B) 30
   C) 1.5×10^{24}
   D) 5
   E) 3×10^{23}

4. Which of the following substances will exhibit dipole-dipole forces?

   A) N_2
   B) Ne
   C) H_2O
   D) CCl_4
   E) CO_2

5. How many grams of ascorbic acid having the molecular formula of $C_6H_8O_6$ are needed to prepare 580 mL of a 0.42 M solution?

   A) 1.384 g
   B) 42.874 g
   C) 22.411 g
   D) 7.846 g
   E) 42873.6 g

6. Which of the following statemenst is **NOT** true of halogens?

A) Elemental halogens exist as diatomic molecules containing single covalent bonds.
B) Their outermost electron configuration is: ns^2np^6.
C) Fluorine and chlorine are gases, bromine is liquid, and iodine is solid at room temperature.
D) They are strong oxidizing agents.
E) Fluorine is the most reactive among them.

7. What is the oxidation number of chlorine in $NaClO_3$?

A) –1
B) +1
C) +3
D) +5
E) +7

8. Which of the following equilibrium reactions is shifted to the right by increasing the pressure?

A) $C(s) + O_2(g) \leftrightarrows CO_2(g)$
B) $2\ NO\ (g)\ +\ O_2\ (g)\ \leftrightarrows\ 2\ NO_2\ (g)$
C) $CO_2(g)\ +\ NO(g)\ \leftrightarrows\ CO(g)\ +\ NO_2(g)$
D) $2\ SO_3\ (g)\ \leftrightarrows\ 2\ SO_2\ (g)\ +\ O_2\ (g)$
E) $H_2(g) + I_2(g)\ \leftrightarrows\ 2\ HI(g)$

9. Which of the following is **NOT** a redox reaction?

A) $CuSO_4 + Fe \rightarrow FeSO_4 + Cu$
B) $Na_2CO_3 + 2\ HCl \rightarrow 2\ NaCl + CO_2 + H_2O$
C) $Zn + 2\ HCl \rightarrow ZnCl_2 + H_2$
D) $Ni + 2\ AgNO_3 \rightarrow 2\ Ag + Ni(NO_3)_2$
E) $2\ NaBr + Cl_2 \rightarrow 2\ NaCl + Br_2$

10. The salt formed when phosphoric acid reacts with potassium hydroxide is ____

A) K_3PO_4
B) $PoPO_3$
C) POH
D) K_2PO_3
E) K_2PO_4

11. In a basic solution,

A) $[OH^-] \times [H^+] = 14$
B) the $[OH^-]$ is equal to the $[H^+]$
C) $pH = -\log[OH^-]$
D) the $[OH^-]$ is greater than the $[H^+]$
E) the $[OH^-]$ is less than 1×10^{-7} M

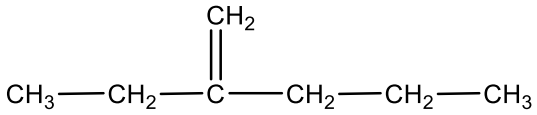
12. Which of the following types of crystalline solids is a hard substance, has a high melting point, and is generally a nonconductor of electricity even in melted form?

A) ionic solid
B) covalent-network solid
C) molecular solid
D) metallic solid
E) all of the above

13. Which of the following compounds is the most soluble in water?

A) heptanal
B) decanoic acid
C) cyclobutane
D) diethyl ether
E) 2-propanol

14. What is the IUPAC name of the following hydrocarbon?



A) 3-methylenehexane
B) 2-propyl-1-butene
C) 2-ethyl-1-pentene
D) 3-propyl-3-butene
E) 4-ethyl-4-pentene

15. Which of the following compounds is a structural (constitutional) isomer of 2-methylbutane?

A) pentane
B) butane
C) pentene
D) cyclopentane
E) cyclobutane

16. The characteristic chemical reaction of alkanes is

A) addition
B) addition and substitution
C) addition and polymerization
D) elimination
E) substitution

17. Which of the following compounds is a heterocyclic base?

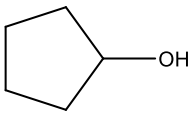
A) propanone
B) propyl methanoate
C) purine
D) ethanal
E) sodium benzoate

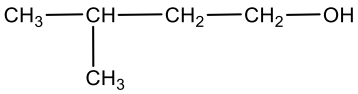
18. Give the type of the following reaction:

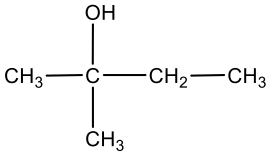
$$CH_3COOH + CH_3CH_2OH \xrightarrow{H^+ \text{ catalyst}} CH_3COOCH_2CH_3 + H_2O$$

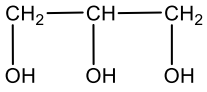
A) An addition
B) A hydrolysis
C) An elimination
D) An esterification
E) None of the above

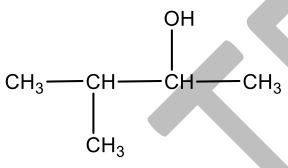
19. Which of the following is a tertiary alcohol?

A) 

B) 

C) 

D) 

E) 

20. Choose the set of compounds that consists of disaccharides only.

A) Cellobiose, cellulose, maltose.
B) Sucrose, ribose, fructose.
C) Starch, glucose, cellulose.
D) Maltose, sucrose, cellobiose.
E) Fructose, lactose, ribose