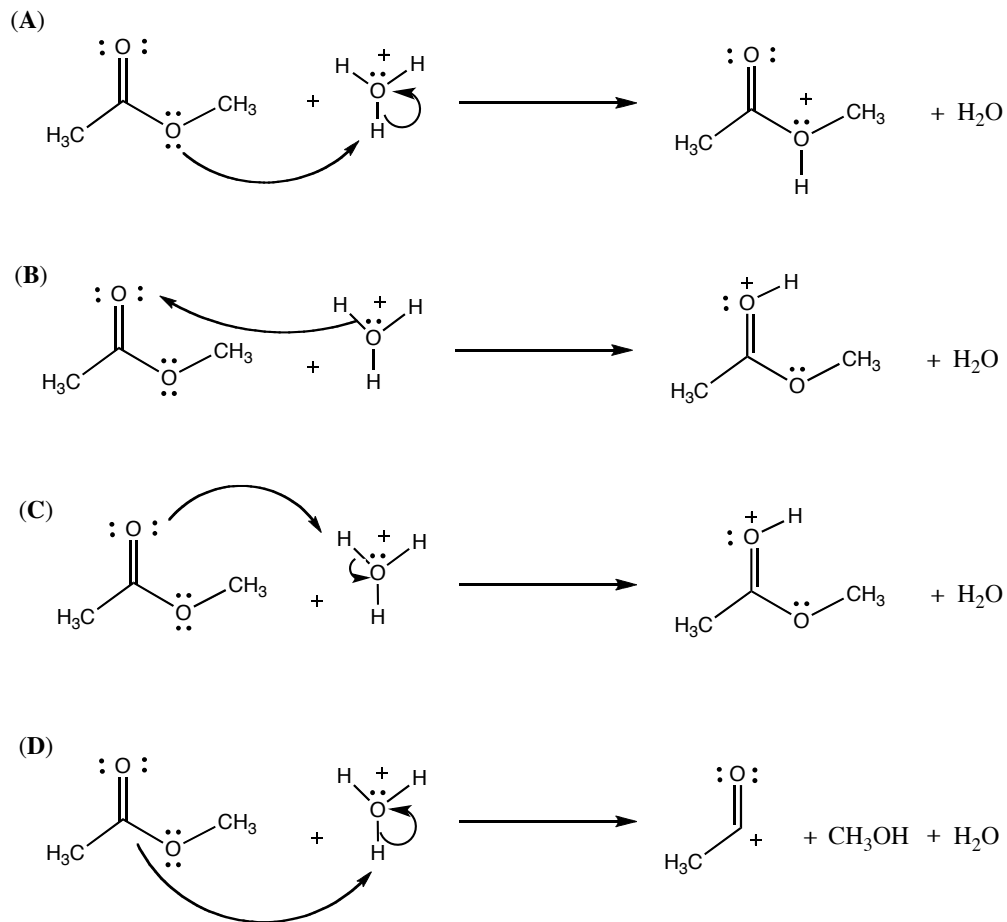
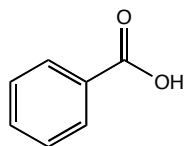


Appendix A: Longitudinal Assessment Assignment, Revised 2016 (new questions: *)

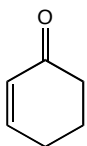
1. Which best represents a step in the mechanism for the saponification of methyl acetate?



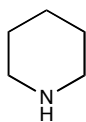
2. A mixture of the following four compounds is dissolved in diethyl ether and shaken with a 2M NaOH solution. Which compound(s) remain in the organic (ether) phase?



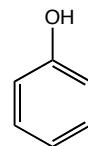
A



B



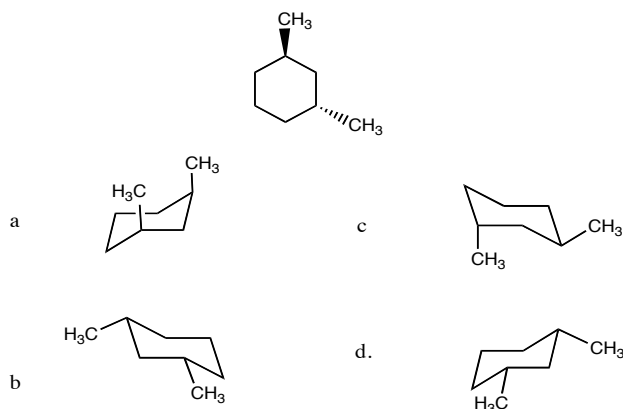
C



D

- (A) A, B and D
 (B) B and C
 (C) B, C, and D
 (D) B and D

3. The correct chair conformation of the following structure is:



4. Which of the following molecules are expected to have a net dipole moment?

- (A) BF_3
- (B) CCl_4
- (C) CH_2O
- (D) CH_4

5. What are the chief products of aerobic metabolism?*

- (A) Sugars, fats and amino acids.
- (B) Water and oxygen
- (C) Carbon dioxide, oxygen and adenosine triphosphate (ATP)
- (D) Carbon dioxide, water and adenosine triphosphate (ATP)
- (E) Oxygen, nicotinamide adenine dinucleotide in its oxidized form (NAD^+) and adenosine triphosphate (ATP).

6. Which level of protein structure is described by the amino acid sequence of a protein?*

- (A) Primary
- (B) Secondary
- (C) Tertiary
- (D) Quaternary
- (E) Primary and secondary are both described by the amino acid sequence.

7. What is the chief thermodynamic driving force causing the formation of lipid bilayers by polar lipids such as phosphatidylcholine? *

- (A) The polar head groups are attracted to each other forming hydrogen bonds and ionic interactions with neighboring polar head groups.
- (B) The fatty alkyl chains become dispersed in the water solvent which is entropically favorable.
- (C) The polar head groups assemble in a head-to-tail fashion with the fatty alkyl chains which forms lots of strong hydrogen bonds.
- (D) When the fatty alkyl chains interact and orient themselves toward the center of the bilayer, waters-of-solvation are released to the bulk solvent which is entropically favorable.
- (E) None of these are correct.

8. Which of the enzymes below produces adenosine triphosphate (ATP) during glycolysis? *
- (A) 3-Phosphoglycerate Kinase
 - (B) Triosephosphate Isomerase
 - (C) Pyruvate Kinase
 - (D) Hexokinase
 - (E) Both a and c are correct
9. Which of the following is true about how enzymes catalyze reactions: *
- (A) They accelerate reaction rates by stabilizing the reaction product(s).
 - (B) They accelerate reaction rates by stabilizing the transition state of the reaction.
 - (C) They shift the reaction equilibrium to the right, favoring product(s).
 - (D) They stabilize the reactant, thereby lowering the ΔG of the overall reaction.
 - (E) Both A and C are correct.
10. Which solution should be mixed with 50.0 mL of 0.050 M HF to make an effective buffer?
- (A) 50.0 mL of 0.10 M NaOH
 - (B) 25.0 mL of 0.10 M NaOH
 - (C) 50.0 mL of 0.050 M NaOH
 - (D) 25.0 mL of 0.050 M NaOH
11. In the dissociation of a monoprotic weak acid in aqueous solutions, HA, which leads to the assumption that $[H^+] \approx [A^-]$?
- (A) The autoprotolysis of water is the dominant source of H^+
 - (B) The concentration of the acid is sufficiently high such that the dissociation of the acid is the dominant source of $[H^+]$
 - (C) The concentration of the acid has no effect on the approximation; $[H^+]$ is always approximately equal to $[A^-]$
12. The confidence interval for a set of measurements represents for a defined confidence level that
- (A) The true value lies within a certain range about the mean value
 - (B) The results from two different methods will agree with each other
 - (C) The variances of two different methods will agree with each other
 - (D) An experimental value lies within a certain range about the mean value
13. Which choice is not a requirement of a primary standard solid?
- (A) Its reactions must be known and stoichiometric
 - (B) It can be dried to remove surface moisture
 - (C) Its purity must be accurately known
 - (D) It must have a low formula weight

14. Glass pH electrodes must be soaked in water prior to conducting measurements in order to
- (A) Clean the glass surface
 - (B) Allow the internal reference electrode to reach its equilibrium potential
 - (C) Hydrate the glass to allow ion-exchange between the sample solution and the glass surface
 - (D) Adjust the concentration of the internal filling solution with respect to the external sample solution
15. The addition of traces of antimony to crystalline silicon produces a material having
- (A) a lower conductivity than silicon.
 - (B) a higher conductivity than silicon.
 - (C) no conductivity
 - (D) superconductivity
 - (E) metallic conductivity
16. The bonding interactions in SmF_3 are stronger than the bonding interactions in SmI_3 . Therefore, one can conclude that
- I. Sm^{3+} is a soft acid.
 - II. Sm_2O_3 will be more stable than Sm_2S_3 .
 - III. Sm^{3+} is a hard acid.
- (A) only I
 - (B) only III
 - (C) I and II
 - (D) II and III
17. What substitution mechanism is most common for square planar complexes?
- (A) associative
 - (B) dissociative
 - (C) migratory insertion
 - (D) reductive elimination

18. In a dissociative reaction, how does an increase in the nucleophilicity of the incoming ligand affect the rate of the reaction?
- (A) The rate of the reaction increases
 - (B) The rate of the reaction decreases
 - (C) The rate of the reaction is unchanged
 - (D) The change in the rate of the reaction depends on the oxidation state of the metal.
19. Square planar complexes containing metal atoms in a low oxidation state typically undergo
- (A) ligand dissociation
 - (B) migratory insertion
 - (C) oxidative addition
 - (D) reductive elimination
20. How does “negative overlap” in Molecular Orbital Theory lead to “antibonding” between atoms?
- (A) The opposing charges of two orbitals cancel each other out.
 - (B) The opposing phases of two orbitals cancel each other out.
 - (C) The like charges of two orbitals repel each other.
 - (D) The concentration of electron density between nuclei pushes them apart.
 - (E) The negative phases of two orbitals repel each other.