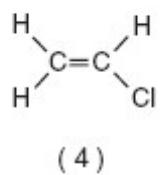
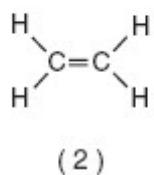
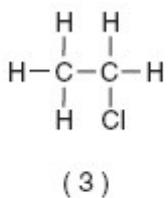
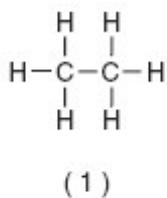


## **Organic Review – Cut from Jan 2007 – Jan 2008 Exams**

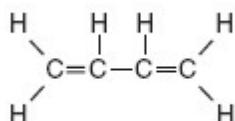
15. Which formula represents an unsaturated hydrocarbon?



16. A compound has a molar mass of 90. grams per mole and the empirical formula CH<sub>2</sub>O. What is the molecular formula of this compound?

- (1) CH<sub>2</sub>O      (3) C<sub>3</sub>H<sub>6</sub>O<sub>3</sub>  
(2) C<sub>2</sub>H<sub>4</sub>O<sub>2</sub>      (4) C<sub>4</sub>H<sub>8</sub>O<sub>4</sub>

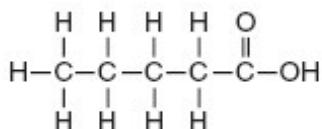
17. Given the formula of a substance:



What is the total number of shared electrons in a molecule of this substance?

- (1) 22      (3) 9  
(2) 11      (4) 6

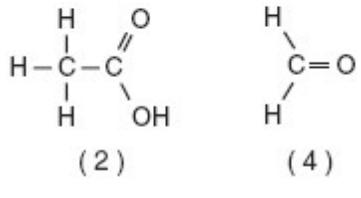
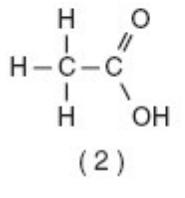
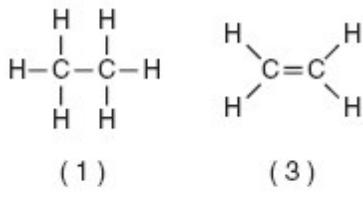
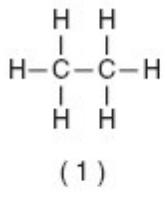
18. Given the structural formula:



What is the IUPAC name of this compound?

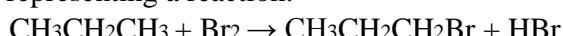
- (1) pentanal      (3) methyl pentanoate  
(2) pentanol      (4) pentanoic acid

19. Which structural formula represents an unsaturated hydrocarbon?



20. Two substances have different physical and chemical properties. Both substances have molecules that contain two carbon atoms, one oxygen atom, and six hydrogen atoms. These two substances must be  
(1) isomers of each other  
(2) isotopes of each other  
(3) the same compound  
(4) the same hydrocarbon

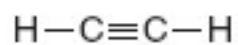
21. Given the balanced equation representing a reaction:



This organic reaction is best classified as

- (1) an addition reaction  
(2) an esterification reaction  
(3) a polymerization reaction  
(4) a substitution reaction

23 Given the structural formula:



What is the total number of electrons shared in the bond between the two carbon atoms?

- (1) 6      (3) 3
- (2) 2      (4) 4

Base your answers to questions 23 and 24 on the information below.

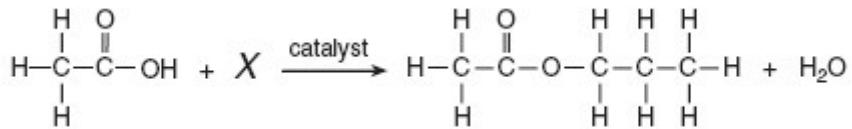
Ozone gas, O<sub>3</sub>, can be used to kill adult insects in storage bins for grain without damaging the grain. The ozone is produced from oxygen gas, O<sub>2</sub>, in portable ozone generators located near the storage bins. The concentrations of ozone used are so low that they do not cause any environmental damage. This use of ozone is safer and more environmentally friendly than a method that used bromomethane, CH<sub>3</sub>Br. However, bromomethane was more effective than ozone because CH<sub>3</sub>Br killed immature insects as well as adult insects.

Adapted From: *The Sunday Gazette* (Schenectady, NY) 3/9/03

- 24 Determine the total number of moles of CH<sub>3</sub>Br in 19 grams of CH<sub>3</sub>Br (gram-formula mass = 95 grams/mol). [1]
- 25 Given the balanced equation for producing bromomethane: Br<sub>2</sub> + CH<sub>4</sub> → CH<sub>3</sub>Br + HBr  
Identify the type of organic reaction shown. [1]
- 26 Write the empirical formula for the compound C<sub>8</sub>H<sub>18</sub>.
- 

Base your answers to questions 26 through 28 on the information below.

The incomplete equation below represents an esterification reaction. The alcohol reactant is represented by X.



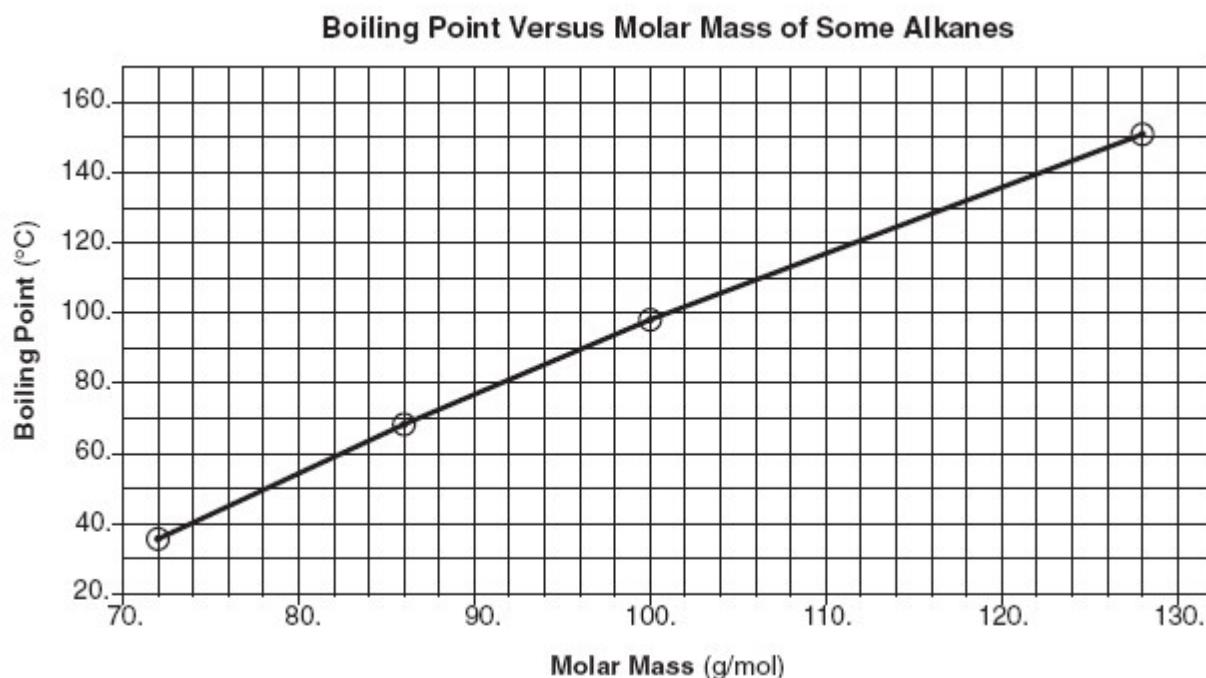
- 27 On the reaction above, circle the acid functional group.[1]
- 28 Write an IUPAC name for the reactant represented by its structural formula in this equation.  
[1] \_\_\_\_\_
- 29 Draw the structural formula for the alcohol represented by X.

- 30 Explain, in terms of molecular structure or distribution of charge, why a molecule of methane is nonpolar.

[1]

Base your answers to questions 30 and 31 on the information below.

The graph below shows the relationship between boiling point and molar mass at standard pressure for pentane, hexane, heptane, and nonane.



- 31 Octane has a molar mass of 114 grams per mole. According to this graph, what is the boiling point of octane at standard pressure? [1]

- 32 State the relationship between molar mass and the strength of intermolecular forces for the selected alkanes. [1]