OROMIA EDUCATION BUREAU

GRADE 11 CHEMISTRY SECOND SEMISTER FINAL EXAMINATIONS FOR IFA BORU BOARDING AND NON-BOARDING (SPECIAL) SECONDARY SCHOOLS JUNE, 2017/2025.

TIME ALLOWED:- 1:40' HOURS

GENERAL DIRECTION

THIS BOOKLET CONTAINS SECOND SEMISTER CHEMISTRY FINAL EXAMINATION FOR **GRADE 11**. IN THIS BOOKLET THERE ARE A TOTAL OF **50 MULTIPLE CHOICE QUESTIONS.**

THERE IS ONE CORRECT ANSWER FOR EACH QUESTION. CHOOSE THE CORRECT ANSWER FROM THE GIVEN ALTERNATIVES AND WRITE THE LETTER OF YOUR CHOICE ON THE ANSWER SHEET PROVIDED.

YOU ARE ALLOWED TO WORK ON THIS EXAMINATION FOR **ONE HUNDRED MINUTES (1:40').** WHEN THE TIME IS CALLED, YOU MUST IMMEDIATELY STOP WORKING ON THE QUESTIONS AND PUT DOWN YOUR PEN /PENCIL AND WAIT FOR WHAT YOU MIGHT BETOLD TO DO.

ANY FORM OF **CHEATING** OR ANY ATTEMPT TO CHEAT IN THE EXAMINATION HALL WILL RESULT IN AN **AUTOMATIC DISMISSAL** FROM THE EXAMINATION HALL AND CANCELLATION OF YOUR SCORE.

PLEASE, MAKE SURE THAT YOU HAVE WRITTEN ALL THE REQUIRED INFORMATION ON THE ANSWER SHEET BEFORE YOU START TO WORK ON THE EXAM.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO

CHOOSE THE CORRECT ANSWER FROM THE SUGGESTED OPTIONS AND WRITE THE LETTER OF YOUR CHOICE ON THE ANSWER SHEET PROVIDED.

Gas constant R= 8.314 J $mol^{-} K^{-}$ = 0.0821 L atm $mol^{-1} K^{-1}$

- **Atomic Number (Z) and Atomic Weight (A)**

Element	H	He	Li	Be	B	C	N	O	F
Z	1	2	3	4	5	6	7	8	9
A	1.0	4.0	6.9	9.01	10.8	12.0	14.0	16.0	19.0
Element	Ne	Na	Mg	Al	P	S	Cl	Ar	K
Z	10	11	12	13	15	16	17	18	19
A	20.2	23.0	24.3	26.98	31.0	32.1	35.5	39.95	39.0
Element	Ca	Mn	Cr	Cu	Zn	Br	Ag	I	pb
Z	20	25	24	29	30	35	47	80	82
A	40.08	54.9	52	63.55	65.38	80	108	200.6	207

1. Which one of the following mathematical expressions is derived from the combination of Boyle's law, Charles' law, and Avogadro's law?
   A. $V\alpha \frac{nT}{P}$ B. $V \alpha \frac{P}{nT}$ C. $V\alpha \frac{T}{nP}$ D. $V\alpha \frac{nP}{T}$
2. The correct increasing order of rate of diffusion of gases:- PH_3, O_2, CH_4, NH_3, HCl would be:
   A. $O_2 <$ HCl < PH_3 < NH_3 < CH_4 C. CH_4 < NH_3 < PH_3 < O_2 < CH_4
   B. HCl < PH_3 < O_2 < NH_3 < CH_4 D. PH_3 < CH_4 < NH_3 < HCl < O_2
3. Which of the following is NOT the concern of chemical kinetics?
   A. Study of "how fast?" a chemical reaction goes to completion.
   B. Study of the individual steps in a chemical reaction.
   C. Study of "how far?" a chemical reaction goes to completion.
   D. Study of its spontaneity of reaction.
4. According to the kinetic theory of matter, why do solids have a definite shape and volume?
   A. Particles are in constant random motion.
   B. Particles have high kinetic energy
   C. Particles are closely packed with strong intermolecular forces.
   D. Particles are far apart.
5. Which of the following CORRECT about the boiling point of liquid?
   A. It is the temperature at which all the physical states co-exist.
   B. It is the temperature at which the vapor pressure becomes equal to the external pressure.
   C. It is the temperatures at which molecules present in the vapor phase go back to the liquid state.
   D. It is the temperature at which the kinetic energy of molecules is much less than the intermolecular force.
6. A 900 mL sample of N_2 gas at 760 mmHg is compressed at constant temperature to 2.5 atm. What is final gas volume?
   A. 360 mL B. 273 mL C. 296 mL D. 2.1 mL

7. Which of the following gas laws states that the volume of a fixed amount of a gas is directly proportional to absolute temperature at constant pressure?
   A. Charles law B. Boyles law C. Avogadro's law D. combined gas law
8. The temperature of 2.5 L of a gas initially at STP is raised to 250 °C at constant volume; calculate the final pressure of the gas in atmosphere.
   A. 3.1 atm B. 1.92 atm C. 2.5 atm D. 4 atm
9. Which of the following is TRUE about energy change in solid?
   A. Melting is exothermic process while freezing is endothermic.
   B. The amount enthalpy change of sublimation and enthalpy change of deposition are equal in magnitude and same in sign.
   C. Sublimation is endothermic process while deposition is exothermic process.
   D. The enthalpy change of sublimation is the sum of enthalpy change of fusion and enthalpy change of deposition.
10. A 280 mL sample of neon exerts a pressure of 660 torr at 26 °C. At what temperature in ^{0}C would it exert a pressure of 940 torr in a volume of 440 mL?
   A. 689 B. 199 C. 469 D. 396
11. What is the definition of the rate of a chemical reaction?
   A. The change of time per unit concentration of product.
   B. The change of time per unit concentration of reactant.
   C. The change in concentration of reactants or products per unit time
   D. The total time taken for a reaction to complete
12. Which of the following expressions is CORRECT for the rate of reaction given below? $5Br^-(aq) + BrO_3^-(aq) + 6H^+(aq) \longrightarrow 3Br_2(aq) + 3H_2O(l)$

   A. $\frac{\Delta[Br^-]}{\Delta t} = \frac{5}{6}\frac{\Delta[H^+]}{\Delta t}$ C. $\frac{\Delta[Br^-]}{\Delta t} = \frac{6}{5}\frac{\Delta[H^+]}{\Delta t}$

   B. $\frac{\Delta[Br^-]}{\Delta t} = 5\frac{\Delta[H^+]}{\Delta t}$ D. $\frac{\Delta[Br-]}{\Delta t} = 6\frac{\Delta[H^+]}{\Delta t}$

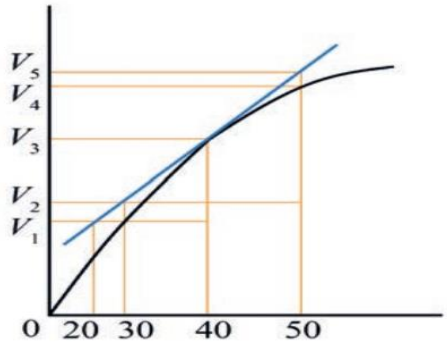
13. The graph below shows the volume of hydrogen gas released over time for the reaction between zinc and dilutes HCl. Which of the following options does NOT show instantaneous rate of reaction at 40th second?

A . $\frac{V_5 - V_2}{50-30}$

B. $\frac{V_4 - V_2}{50-30}$

C. $\frac{V_3 - V_2}{50-30}$

D. $\frac{V_3 - V_1}{40-20}$



14. Consider the following combustion reaction of ethane (C_2H_6) in the presence of oxygen to produce carbon dioxide and water: $2C_2H_6\,(g) + 7O_2\,(g) \rightarrow 4CO_2\,(g) + 6H_2O\,(l)$. In this reaction;
    A. CO_2 is formed twice as fast as ethane is consumed
    B. The rate of formation on of CO_2 equals the rate formation of water.
    C. The rate consumption of ethane is 7 times faster than the rate of consumption of oxygen.
    D. Water is formed at rate equal to 2/3 the rate of formation of CO_2
15. The instantaneous rate of disappearance of the MnO_4^- ion in the reaction below is 4.56×10^{-3} M s^{-1}.
    $2MnO_4^-(aq) + 10I^-(aq) + 16H^+(aq) \rightarrow 2Mn^{2+}(aq) + 5I_2(s) + 8H_2O(g)$.
    The rate of appearance of I_2 would be equal to:-
    A. 1.14×10^{-4} mol/L.s B. 5.7×10^{-3} M.s^{-1} C. 4.56×10^{-4} M s^{-1} D. 1.14×10^{-2} M.s^{-1}
16. Which of the following NOT precondition required for a reaction to occur between reactants?
    A. The particles of the reacting substances must collide.
    B. The particles of the reacting species must have proper orientation.
    C. The particles of the reactants must collide with energy greater than or equal to the energy of activation.
    D. The reacting particles must have the same size.
17. Thiosulfate ion is oxidized by iodine according to the following reaction :
    $2S_2O_3^{2-}(aq) + I_2\,(aq) \rightarrow S_4O_6^{2-}(aq) + 2I^-\,(aq)$
    In a certain experiment, if 0.006 mol of $S_2O_3^{2-}$ is consumed in 1 L of solution per second. At what rate $S_4O_6^{2-}$ and I^- are produced in this solution?
    A. 0.012 mol $L^{-1}s^{-1}$ ($S_4O_6^{2-}$) and 0.006 mol$L^{-1}s^{-1}$ (I^-)
    B. 0.006 mol $L^{-1}s^{-1}$ ($S_4O_6^{2-}$) and 0.006 mol$L^{-1}s^{-1}$ (I^-)
    C. 0.003 mol $L^{-1}s^{-1}$ ($S_4O_6^{2-}$) and 0.006 mol$L^{-1}s^{-1}$ (I^-)
    D. 0.0012 mol $L^{-1}s^{-1}$ ($S_4O_6^{2-}$) and 0.012 mol$L^{-1}s^{-1}$ (I^-)
18. Given that: $Kc = [HCl]^4[O_2]/[Cl_2]^2$. Which of the following reaction is the appropriate equilibrium reaction equation that exhibits such Kc expression?
    A. $4HCl\,(aq) \rightleftharpoons 4H^+\,(aq) + 4Cl^-\,(aq)$
    B. $HCl\,(aq) + H_2O\,(\iota) \rightleftharpoons H_3O^+\,(aq) + Cl^-\,(aq)$
    C. $2Cl_2\,(g) + 2\,H_2O\,(l) \rightleftharpoons 4HCl\,(aq) + O_2\,(g)$
    D. $4HCl\,(aq) + O_2\,(g) \rightleftharpoons 2Cl_2\,(g) + 2\,H_2O\,(l)$
19. Which of the following is CORRECT about the factors influencing rate of reaction?
    A. As surface area of solid reactants increases, the rate of the reaction decreases.
    B. As concentration of a reactant increases, the rate of the reaction increases.
    C. As temperature increases, the rate of endothermic reaction decreases.
    D. A catalyst always speeds up the rate of a reaction.
20. Which factor is most effective in increasing the rate of a heterogeneous reaction?
    A. Increasing surface area
    B. Increasing temperature
    C. Increasing pressure
    D. Adding a catalyst

21. What is the definition of chemical equilibrium?

A. A state where the reactants completely transferred to products.

B. A state where the concentrations of reactants and products remain constant.

C. A state where only product is formed.

D. A state where the reaction rate is zero.

22. Which of the following is a characteristic of chemical equilibrium?

A. The reaction proceeds only in the forward direction.

B. The equilibrium can only be achieved in an open system.

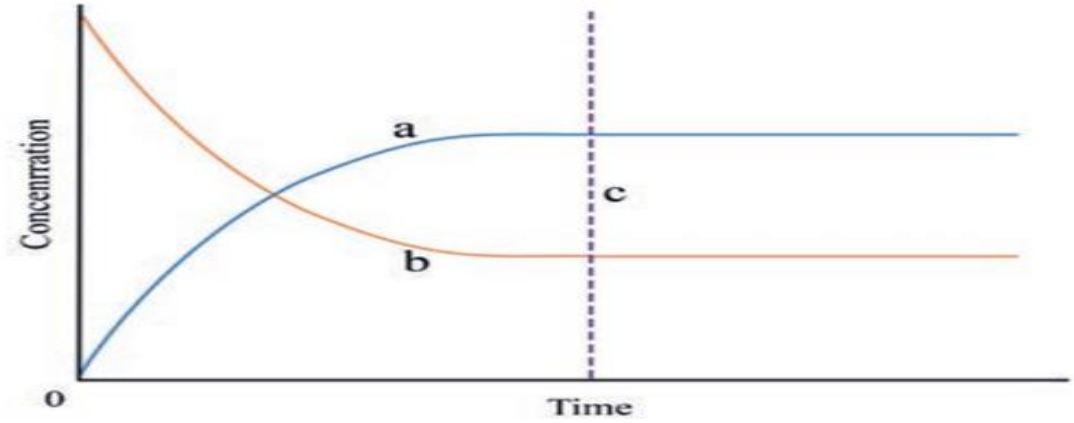
C. The macroscopic properties like concentration and pressure remain constant.

D. The equilibrium constant changes with pressure.

23. What happens to the equilibrium constant when the temperature increases for an endothermic reaction?

A. Increases B. Decreases C. Remains constant D. Becomes zero

24. Based on the graph given below and the behavior of the reaction, which of the following statements best describes the reaction dynamics at point **c**?



A. At point c, the reaction has reached equilibrium, and the concentrations of reactants and products are equal.

B. At point c, the reaction is still proceeding in the forward direction, with the rate of product formation exceeding the rate of reactant consumption.

C. At point c, the reaction is approach to equilibrium with the rates of the forward and reverse reactions are equal.

D. At point c, the reaction has stopped, and no further changes in concentration will occur to either reactants or products.

25. Which trend is correct for industrial manufacturing of sulphuric acid by contact process?
   A. Combustion of S to form SO_2 → Formation of SO_3 → Hydration of oleum to produce H_2SO_4 → SO_3 absorbed in to H_2SO_4 aerosols.
   B. Combustion of S to form SO_2 → Hydration of oleum to produce H_2SO_4 → SO_3 absorbed in to H_2SO_4 aerosols → Formation of SO_3
   C. Combustion of S to form SO_2 → Formation of SO_3 → SO_3 absorbed in to H_2SO_4 aerosols → Hydration of oleum to produce H_2SO_4
   D. Hydration of oleum to produce H_2SO_4 → SO_3 absorbed in to H_2SO_4 aerosols → Formation of SO_3→ Combustion of S to form SO_2.

26. Given the reaction; $3C(g) \rightleftharpoons 2B(g) + \frac{1}{2}A(g)$. What is the relationship between Kc and Kp?

   A. $Kp = Kc\,(RT)^2$ B. $Kp = Kc\,(RT)^5$ C. $Kp = Kc\,(RT)^{-2}$ D. $Kp = {Kc}/{\sqrt{RT}}$

27. For the equilibrium: $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$, if the volume of the container is decreased, what will happen to the equilibrium position?

   A. Shift to the left B. Shift to the right C. No shift D. Reaction stops

28. At very high temperature , $Kc=1.0x10^{-13}$ for the reaction :-

   $2HF(g) \rightleftharpoons H_2(g) + F_2(g)$

   At certain time the concentration of HF, F_2, and H_2 , 0.4M, 0.004M and 0.01M respectively .Which one of the following is FALSE about the above reaction ?
   A. The reaction mixture is not at equilibrium.
   B. The product should combine to form more reactant to reach equilibrium.
   C. The reaction should proceed to the right (forward direction)
   D. The reaction should proceed to the left (reverse direction)

29. The reaction $SO_2(g) + \frac{1}{2}O_2(g) \rightleftharpoons SO_3(g)$ has Kp (normal) = $2.0x10^4$ at 400K. Which of the following expression is WRONG at this temperature?

   A. $2SO3(g) \rightleftharpoons 2SO2(g) + O2(g)$; $Kp\,(1) = 2.5x10^{-9}$
   B. $\frac{1}{2}SO_2(g) + \frac{1}{4}O_2(g) \rightleftharpoons \frac{1}{2}SO_3(g)$; $Kp\,(2) = 1.0x10^4$
   C. $SO_3(g) \rightleftharpoons SO_2(g) + \frac{1}{2}O_2(g)$; $Kp\,(3) = 5.0x10^{-5}$
   D. $2SO_2(g) + O_2(g) \rightleftharpoons 2SO_3(g)$; $Kp\,(4) = 4.0x10^8$

30. Which of the following is NOT correct about comparison between irreversible and reversible chemical reaction?

	Irreversible chemical reaction	Reversible chemical reaction
A.	Products do not convert back to reactants	Products are convert back to reactants
B.	The reaction stops as soon as reactant has been completed	The reaction not goes to completion
C.	It can be carried out in a closed vessel	It can be carried out in an open vessel
D.	It takes place in one direction.	It takes place in both directions.

31. At 700 K the equilibrium constant for the reaction:-
$Br_2(g) + Cl_2(g) \rightleftharpoons 2BrCl(g)$ is 1×10^4 . 160 g Br_2 and 71g Cl_2 are sealed in a $10dm^3$ container. What is the concentration of BrCl at equilibrium?
A. 10 mol/dm^3 B. 100 mol/dm^3 C. 1 mol/dm^3 D. 1000 mol/dm^3

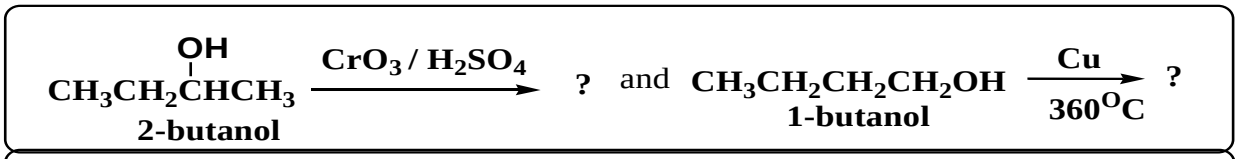
32. According to Le- Chatelier's principle, which conclusion is NOT correctly described?
A. Increases in concentration of substance favors the direction of reaction in which it is used.
B. High pressure favors the gaseous reaction in which there is a decrease in volume
C. Lower pressure favors the gaseous reaction in which there is a decrease in number of mole.
D. A raising temperature favors the endothermic direction of the reaction

33. For the synthesis of ammonia: $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) + Heat$.
How would you adjust the conditions to maximize the yield of NH_3?
A. Increase temperature and decrease pressure
B. Decrease temperature and increase pressure
C. Increase both temperature and pressure
D. Decrease both temperature and pressure

34. Fats are formed by the condensation reaction between glycerol molecules and fatty acid molecules. In this reaction the mole ratio of glycerol molecules to fatty acid molecules is
A. 1 : 3 B. 1:2 C. 1:1 D. 3:1

35. Assess the impact of adding an inert gas at constant volume to an equilibrium system.
A. No effect on equilibrium
B. Shifts equilibrium to the right
C. Shifts equilibrium to the left
D. Changes the equilibrium constant

36. Given organic reaction:



What are the major product the two reactions respectively ?
A. 1-pentanal and 2-pentanone
B. 2-butanol and 1-butanone
C. 2-butanoic acid and 1-butanoate
D. 2-butanone and 1-butanal

37. Why do alcohols have higher boiling points than ethers of similar molecular mass?
A. Alcohols form stronger covalent bonds.
B. Ethers have higher electronegativity.
C. Alcohols exhibit hydrogen bonding.
D. Alcohols have lower molecular masses.

38. In which of the following chemical reaction of alcohols -C-O-bond would be cleaved?
A. Reaction of alcohols with Active metals to form metal alkoxides and hydrogen gas.
B. Oxidation of primary alcohols to form carboxylic acid
C. Reaction of alcohols with carboxylic acid to form ester
D. Dehydration of alcohols in the presence of acid catalyst to form alkene.

39. Given the following set of compounds: Alcohols and Carboxylic acids. Which of the following is the correct increasing order of their boiling points?

➢ $CH_3CH_2CH_2\,CH_2OH$, $CH_3CH(CH_3)CH_2OH$, $CH_3(CH_2)_5COOH$, $CH_3C(CH_3)_2COOH$

A. $CH_3C(CH_3)_2COOH < CH_3CH_2CH_2\,CH_2OH < CH_3(CH_2)_5COOH < CH_3CH(CH_3)CH_2OH$

B. $CH_3(CH_2)_5COOH < CH_3CH(CH_3)CH_2OH < CH_3C(CH_3)_2COOH < CH_3CH_2CH_2CH_2OH$

C. $CH_3CH(CH_3)CH_2OH < CH_3CH_2CH_2CH_2OH < CH_3(CH_2)_5COOH\ CH_3C(CH_3)_2COOH$

D. $CH_3CH(CH_3)CH_2OH < CH_3CH_2CH_2CH_2OH < CH_3C(CH_3)_2COOH < CH_3(CH_2)_5COOH$

40. Which of the following statement is NOT correct about carbonyl group of aldehyde and ketone?

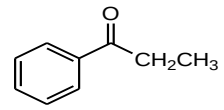
A. The bond is polar, with a slight negative charge on the oxygen atom

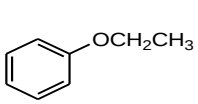
B. The carbonyl group is readily form hydrogen bonds with each other.

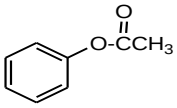
C. The bond angle about the central atom is 120^o

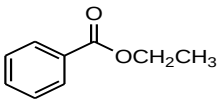
D. In condensed form, the carbonyl group of aldehyde can be written as CHO.

41. What is the correct product of the chemical reaction between benzoic acid & ethanol?

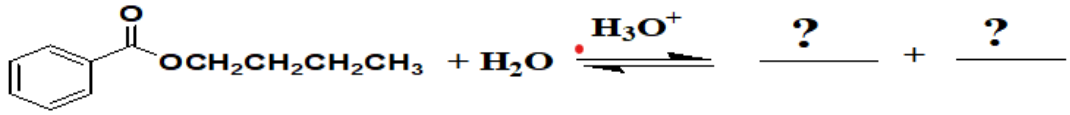
A. 

B. 

C. 

D. 

42. Given the reaction below:



What is the correct product of the above reaction?

A. Butylbenzoate & Benzoic acid
B. Butanoic acid & Benzene
C. Pentanoic acid & Benzene
D. Butanol & Benzoic acid

43. Which of the following IUPAC names is correctly matched with its condensed structure?

A. $CH_3CH_2CH_2COOH$ ……..1- Butanol

B. $CH_3CH_2CH_2OCH_2CH_2CH_2CH_3$ …… 2-propoxybutane

C. $CH_3CH_2CH_2COOCH_2CH_3$ ……. Butylethanoate

D. $CH_3CH_2CH_2CH_2CH_2OCH_2CH_3$……..1-ethoxypentane

44. Design the reaction scheme to convert 1-propanol to propyl propanoate in two steps in the presence of $KMnO_4/H_3O^+$ and in acid medium respectively.

A. Oxidizing to propanal, then esterification with propanoic acid.

B. Oxidizing to propanoic acid , then esterification with 1-propanol.

C. Reducing to propane, then esterification with propanoic acid.

D. Dehydration to propene, then reaction with propanoic acid.

45. Which of the following pair of condensed structures are isomers with each other having molcular formula, C_3H_8O?

A. CH_3CH_2-O-CH_3 and $CH_3CH_2CH_2OH$
B. CH_3-O-$CH_2\,CH_3$ and $CH_3CH_2CH_2CHO$
C. CH_3CH_2CHO and $CH_3CH_2CH_2OH$
D. CH_3CH_2COOH and $CH_3CH_2OCH_3$

46. Assess why vegetable oils are liquids at room temperature while animal fats are solids.
    A. Oils have shorter hydrocarbon chains. C. Oils have more unsaturated fatty acids.
    B. Fats have weaker intermolecular forces. D. Oils have higher molecular masses.
47. Which of the following experimental design ensures the successful oxidation of an alcohol to produce a ketone as the primary product, while confirming the product's identity?
    A. Select methanol, oxidizes it with potassium permanganate ($KMnO_4$) under basic condition.
    B. Select ethanol, oxidize it with pyridinium chlorochromate (PCC) in dichloromethane.
    C. Select 2-propanol; oxidize it with chromic acid (H_2CrO_4) in aqueous solution.
    D. Select 1-propanol; oxidize it with sodium hypochlorite (NaOCl) in acidic conditions
48. When ethanoic acid reacts with sodium hydroxide, what salt is produced?
    A. Ethyl ethanoate B. Ethanal C. Ethanol D. Sodium ethanoate
49. Why do carboxylic acids have higher boiling points than aldehydes of similar molecular weight?
    A. Carboxylic acids are non-polar, while aldehydes are polar
    B. Carboxylic acids form stronger hydrogen bonds than aldehydes
    C. Aldehydes have higher molecular weights
    D. Carboxylic acids have weaker intermolecular forces
50. A student observes that butter develops an unpleasant odour after being stored for a month. What is the primary cause of this observation, and how can it be prevented?
    A. Due to hydrolysis and oxidation; store in a sealed container at low temperature.
    B. Due to Esterification; store in an open container.
    C. Due to Hydrogenation; store at high temperature.
    D. Due to Fermentation; store in water.