

G.C.E. (A/L) Examination
2005 April
Chemistry I / Two hours

Important

- This paper consists of 08 pages (Periodic Table is also provided)
- Answer all the questions
- Use of calculators is **not** allowed.
- Write your Index Number in the space provided in the answer sheet and then indicate your Index Number by shading the appropriate numbers in the grid immediately below it.
- In each of the questions 1 to 60, pick one of the alternatives: (1), (2), (3), (4), (5) which is correct or most appropriate and shade its number on the answer sheet in accordance with the instructions given therein.

Universal gas constant, $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$
 Avogadro Constant $N_A = 6.022 \times 10^{23} \text{ mol}^{-1}$

- The third ionisation enthalpy is highest for,
 (1) Al (2) Si (3) S (4) Mg (5) Ar
- The oxidation number of the carbonyl carbon in acetaldehyde,
 $\text{[CH}_3\text{-}\overset{\text{O}}{\underset{\text{||}}{\text{C}}}\text{-H]}$ is
 (1) +2 (2) 0 (3) +1 (4) -1 (5) ?
- Which arrangement of compounds given below, gives the correct increasing order of acid strength?
 (1) $\text{H}_2\text{O} < \text{CH}_3\text{OH} < \text{CH}_3\text{COOH} < \text{C}_6\text{H}_5\text{OH}$
 (2) $\text{CH}_3\text{OH} < \text{H}_2\text{O} < \text{CH}_3\text{COOH} < \text{C}_6\text{H}_5\text{OH}$
 (3) $\text{H}_2\text{O} < \text{CH}_3\text{OH} < \text{C}_6\text{H}_5\text{OH} < \text{CH}_3\text{COOH}$
 (4) $\text{CH}_3\text{OH} < \text{H}_2\text{O} < \text{C}_6\text{H}_5\text{OH} < \text{CH}_3\text{COOH}$
 (5) $\text{H}_2\text{O} < \text{C}_6\text{H}_5\text{OH} < \text{CH}_3\text{OH} < \text{CH}_3\text{COOH}$
- Which of the following does **not** occur when the atomic number of the elements increases in group V of the periodic table?
 (1) Increase in metallic character
 (2) Oxides becoming more acidic
 (3) Hydrides becoming less basic
 (4) Hydrides becoming more reducing
 (5) Oxyacids becoming less acidic
- Which arrangement of compounds given below gives the correct increasing order of base strength?
 (1) $\text{C}_6\text{H}_5\text{-NH}_2 < \text{CH}_3\text{CONH}_2 < \text{CH}_3\text{NH}_2 < \text{NH}_3$
 (2) $\text{CH}_3\text{CONH}_2 < \text{C}_6\text{H}_5\text{-NH}_2 < \text{NH}_3 < \text{CH}_3\text{NH}_2$
 (3) $\text{NH}_3 < \text{CH}_3\text{CONH}_2 < \text{CH}_3\text{NH}_2 < \text{C}_6\text{H}_5\text{-NH}_2$
 (4) $\text{CH}_3\text{NH}_2 < \text{NH}_3 < \text{CH}_3\text{CONH}_2 < \text{C}_6\text{H}_5\text{-NH}_2$
 (5) $\text{CH}_3\text{CONH}_2 < \text{CH}_3\text{NH}_2 < \text{C}_6\text{H}_5\text{-NH}_2 < \text{NH}_3$
- Which one of the following statements regarding ideal solutions of two volatile liquids is incorrect?
 (1) The standard boiling point of an ideal solution of a given composition is a constant.
 (2) When an ideal solution is distilled, its boiling point changes with time.
 (3) Ideal solutions can occur only over a limited range of compositions.

- All ideal solutions obey Raoult's law.
- The boiling point of an ideal solution lies between the boiling points of the two pure components

- With which of the following compounds does H_2O_2 react as a reducing agent?
 (1) H_2S (2) KI (3) FeSO_4 (4) SO_2 (5) Ag_2O
- Which one of the following compounds has the largest dipole moment?
 (1) *cis* $\text{ClCH}=\text{CHCl}$ (2) CO_2 (3) $\text{Cl}_2\text{C}=\text{CCl}_2$
 (4) CCl_4 (5) *trans* $\text{ClCH}=\text{CHCl}$
- The coloured salt that gives a colourless solution in hot water is
 (1) KMnO_4 (2) FeCl_3 (3) KI
 (4) PbI_2 (5) CuSO_4
- One of two identical glass bulbs is filled with X moles of an ideal gas and the other with X moles of a real gas. Which of the following statements about the two gases is **least likely** to be correct?
 (1) The volumes of the two gases are equal at any temperature where no liquefaction occurs.
 (2) the pressure of the ideal gas is never smaller than that of the real gas at the same temperature.
 (3) The pressures of the two gases may become equal at some temperatures.
 (4) The compressibilities of the two gases may become equal at some temperatures.
 (5) The mean square speeds, of the two gases are equal at any temperature.
- Consider the following carbocations:

$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH} \\ / \quad \backslash \\ \text{CH}_3 \quad \text{CH}^+ \\ | \\ \text{CH}_3 \end{array}$
 (I)

$\begin{array}{c} \text{CH}_3 \\ | \\ \text{C}^+ \\ / \quad \backslash \\ \text{CH}_3 \quad \text{CH} \\ | \\ \text{CH}_2 \end{array}$
 (II)

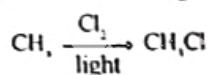
$\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH} \\ / \quad \backslash \\ \text{CH}_3 \quad \text{CH}_2 \\ | \\ \text{CH}_3 \end{array}$
 (III)

$\begin{array}{c} \text{CH}_3 \\ | \\ \text{C}^+ \\ / \quad \backslash \\ \text{CH}_3 \quad \text{CH} \\ | \\ \text{CH}_3 \end{array}$
 (IV)

Which of the following gives the correct increasing order of stability of the above carbocations?
 (1) $\text{III} < \text{I} < \text{II} < \text{IV}$ (2) $\text{III} < \text{I} < \text{IV} < \text{II}$
 (3) $\text{IV} < \text{II} < \text{I} < \text{III}$ (4) $\text{I} < \text{II} < \text{III} < \text{IV}$
 (5) $\text{II} < \text{IV} < \text{I} < \text{III}$
- Which one of the following statements is **incorrect**?
 (1) The elements at the top of the electro-chemical series are the most reducing.
 (2) Zn will replace Fe from a solution of FeSO_4 .
 (3) Cl_2 will liberate I_2 from a solution of KIO_3 .
 (4) Elements above H in the electrochemical series will liberate $\text{H}_2(\text{g})$ from acids.
 (5) The oxidation state of an element in a compound can be zero
- The correct order of the standard enthalpies of formation, ΔH_f° , of the atoms of oxygen, nitrogen, chlorine and neon is
 (1) $\text{Cl} < \text{Ne} < \text{N} < \text{O}$ (2) $\text{Cl} < \text{N} < \text{O} < \text{Ne}$
 (3) $\text{O} < \text{Ne} < \text{Cl} < \text{N}$ (4) $\text{O} < \text{N} < \text{Ne} < \text{Cl}$
 (5) $\text{Ne} < \text{Cl} < \text{O} < \text{N}$
- Which one of the following statements is **not true** regarding CrO_4^{2-} and $\text{Cr}_2\text{O}_7^{2-}$ ions?
 (1) Both contain Cr in its highest oxidation state
 (2) Both oxidise I^- to I_2
 (3) They are in equilibrium with each other in aqueous solution

- (4) Both give precipitates with NH_4OH .
 (5) Both are reduced to Cr^{3+} by SO_2 .

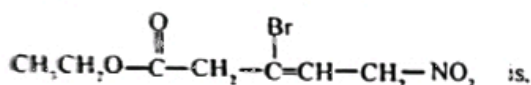
15. Which step given below makes the largest contribution to the yield of CH_3Cl in the following reaction?



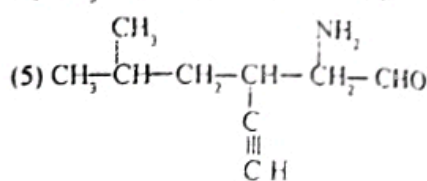
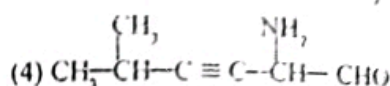
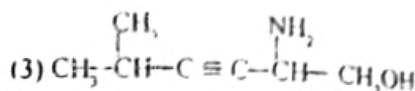
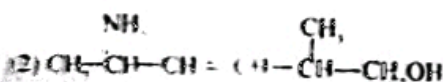
- (1) $\text{CH}_4 + \text{Cl}^\bullet \rightarrow \text{CH}_3\text{Cl}$ (2) $\text{CH}_4 + \text{Cl}_2 \rightarrow \text{CH}_3\text{Cl} + \text{Cl}^\bullet$
 (3) $\text{CH}_3^\bullet + \text{Cl}^\bullet \rightarrow \text{CH}_3\text{Cl}$ (4) $\text{CH}_3^\bullet + \text{Cl}_2 \rightarrow \text{CH}_3\text{Cl} + \text{Cl}^\bullet$
 (5) $\text{Cl}^\bullet + \text{CH}_3\text{Cl} \rightarrow \text{CH}_3\text{Cl} + \text{H}^\bullet$
16. Which one of the following statements is **not true** regarding the elements in the periodic table?
- (1) All elements with one valence electron are metals.
 (2) There are metals as well as non-metals in group IV.
 (3) Most elements in group III are metals.
 (4) All 3d-transition elements are metals.
 (5) Group VII contains elements that exist as gas, liquid or solid at room temperature.

17. P, Q, R, and S are respectively, pure water, an aqueous solution of sugar, a mixture of ether and water and a mixture of coconut oil and water. The correct order of the boiling points of P, Q, R and S is
- (1) $P < Q < R < S$ (2) $R < S < Q < P$
 (3) $R < S < P < Q$ (4) $Q < P < R < S$
 (5) $P < S < Q < R$

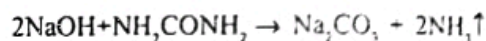
18. The IUPAC name of the compound,



- (1) 3-Bromo-1-ethoxy-5-nitropent-3-enone
 (2) 3-Bromo-5-ethoxy-1-nitropent-2-enone
 (3) 2-Bromo-1-carboethoxy-4-nitrobut-2-ene
 (4) Ethyl 3-bromo-5-nitropent-3-enoate
 (5) Ethyl 3-bromo-1-nitropent-2-enoate
19. In group III of qualitative analysis, the filtrate from group II is,
- (1) treated with NH_4Cl and NH_4OH .
 (2) boiled with HNO_3 and then treated with NH_4Cl and NH_4OH .
 (3) boiled and then treated with NH_4Cl and NH_4OH .
 (4) boiled and then heated with HNO_3 and treated with NH_4Cl and NH_4OH .
 (5) boiled with HNO_3 , NH_4Cl and NH_4OH .
20. The valency and oxidation number of the central atom in $\text{S}_2\text{O}_3^{2-}$ ion are respectively
- (1) 2 and +4 (2) 4 and +6
 (3) 6 and +4 (4) 6 and +2
 (5) 4 and +4
21. The shape of the BrF_3 molecule is
- (1) trigonal bipyramidal (2) octahedral
 (3) square pyramidal (4) tetrahedral
 (5) none of these
22. Choose the structure which corresponds to the IUPAC name 2-Amino-5-methylhex-3-ynal



23. NaOH reacts with urea as follows



0.6 g of urea (relative molecular mass of urea = 60.0) reacts completely with 25.0 cm³ of 1.0 mol dm⁻³ NaOH. All NH_3 was expelled by boiling. The volume of 0.5 mol dm⁻³ HCl necessary to neutralise the resulting solution is

- (1) 10.0 cm³ (2) 12.5 cm³ (3) 20.0 cm³
 (4) 25.0 cm³ (5) 50.00 cm³
24. For the species NO_2 , NO_2^- and NO_2^+ the correct order of the bond angles is,
- (1) $\text{NO}_2 > \text{NO}_2^- > \text{NO}_2^+$ (2) $\text{NO}_2^- > \text{NO}_2 > \text{NO}_2^+$
 (3) $\text{NO}_2^- > \text{NO}_2 = \text{NO}_2^+$ (4) $\text{NO}_2^- > \text{NO}_2^+ > \text{NO}_2$
 (5) $\text{NO}_2^+ > \text{NO}_2^- > \text{NO}_2$
25. The structural formula of ammonium aquapentafluoroferrate(III)
- (1) $(\text{NH}_4)^+ [\text{Fe}(\text{H}_2\text{O})\text{F}_5]^-$ (2) $(\text{NH}_4)^+ [\text{Fe}(\text{H}_2\text{O})_5\text{F}]^-$
 (3) $(\text{NH}_4)_2 [\text{Fe}(\text{H}_2\text{O})_5\text{F}_2]^-$ (4) $(\text{NH}_4)_2 [\text{Fe}(\text{H}_2\text{O})_5\text{F}]^-$
 (5) $[\text{Fe}(\text{NH}_3)(\text{H}_2\text{O})\text{F}_5]$

26. A closed vessel contains water in contact with CO_2 gas at 3 atm pressure. A number of equilibria exist in this system. If CO_2 and H_2O behave ideally in the gas phase, the number of equilibria the system is
- (1) 3 (2) 4 (3) 5 (4) 6 (5) 7

27. Which of the following will show the largest change in pH when 1.0 cm³ of 1.0 mol dm⁻³ NaOH solution is added to each of the
- (1) 20.0 cm³ of 1.0 mol dm⁻³ CH_3COOH
 (2) 20.0 cm³ of 1.0 mol dm⁻³ NaOH
 (3) A mixture of 10.0 cm³ of 1.0 mol dm⁻³ CH_3COOH and 10.0 cm³ of 1.0 mol dm⁻³ CH_3COONa
 (4) 20.0 cm³ of 1.0 mol dm⁻³ H_2SO_4
 (5) 20.0 cm³ of distilled water.

28. Which one of the following cations
- (i) gives a precipitate with NaOH, which is insoluble in excess NaOH?
 (ii) gives a precipitate with NH_4OH , which is soluble in excess NH_4OH ?
- (1) Al^{3+} (2) Cr^{3+} (3) Zn^{2+} (4) Fe^{2+} (5) Cu^{2+}

29. A test tube contains 1-hexyne and another 2-hexyne. Which of the following would you add to each of the two test tubes to distinguish between 1-hexyne and 2-hexyne?
- (1) dilute H_2SO_4 and HgSO_4
 (2) $\text{Br}_2 / \text{CCl}_4$
 (3) alkaline KMnO_4
 (4) ammoniacal AgNO_3
 (5) aqueous Na_2CO_3

30. Of those given below, the possible combination of bonds that can be formed between any two atoms is
- (1) two σ bonds and one π bond
 (2) three σ bonds
 (3) one σ bond and one π bond
 (4) three π bonds
 (5) two π bonds

- 31 Which of the following columns 1-5, contains the correct observations for both tests A and B, performed on aqueous solutions of the respective salts?

	(1) AgNO ₃	(2) Ba(NO ₃) ₂	(3) CdSO ₄	(4) MgSO ₄	(5) FeCl ₃
(A) Addition of dil HCl	white ppt	no ppt	no ppt	white ppt	no ppt
(B) Passing H ₂ S through the solution from test A	white ppt	white ppt	black ppt	no ppt	no ppt

- 32 Consider the solutions given below

- (a) 0.1 mol dm⁻³ aqueous NH₄Cl
(b) 0.1 mol dm⁻³ aqueous NH₄OH
(c) Mixture of 50.0 cm³ of 0.2 mol dm⁻³ aqueous NH₄Cl and 50.0 cm³ of 0.2 mol dm⁻³ aqueous NH₄OH
(d) Mixture of 25.0 cm³ of 0.2 mol dm⁻³ aqueous NH₄OH and 25.0 cm³ of 0.2 mol dm⁻³ aqueous acetic acid

The pH values of the solutions follow the order,

- (1) d < c < b < a (2) a < b < c < d
(3) a < d < c < b (4) b < c < d < a (5) b < c < a < d
- 33 1.0 dm³ of 0.2 mol dm⁻³ H₂SO₄ and 1.0 dm³ of 0.2 mol dm⁻³ HCl were mixed to obtain 2.0 dm³ of solution. The H⁺ ion concentration of the resulting solution, if H₂SO₄ is fully dissociated under these conditions, is
- (1) 0.1 mol dm⁻³ (2) 0.15 mol dm⁻³ (3) 0.2 mol dm⁻³
(4) 0.3 mol dm⁻³ (5) 0.4 mol dm⁻³

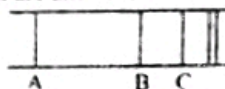
- 34 Which one of the following is an oxidation - reduction reaction?

- (1) $2\text{CrO}_4^{2-} + 2\text{H}^+ \rightarrow \text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{O}$
(2) $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
(3) $\text{N}_2\text{O}_4 \rightarrow 2\text{NO}_2$
(4) $\text{Ca}(\text{COO})_2 \rightarrow \text{CaCO}_3 + \text{CO}$
(5) $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3$

- 35 Which one of the following tests can be used to distinguish between acetamide (CH₃CONH₂) and ethylamine (CH₃CH₂NH₂)?

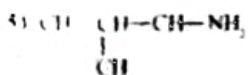
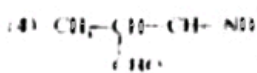
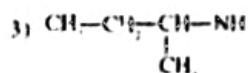
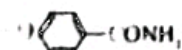
- (1) addition of Br₂ water
(2) heating with aqueous NaOH
(3) addition of Brady's reagent
(4) heating with dil HCl
(5) treating with acidic KMnO₄

- 36 The emission lines of the Balmer series of the atomic spectrum of hydrogen are shown below

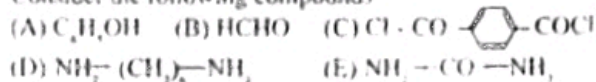


The colours of the lines A, B and C are respectively

- (1) red, green, blue (2) blue, green, red
(3) green, red, blue (4) blue, red, green
(5) red, blue, green
- 37 Which of the following is **not** used as a bleaching agent?
- (1) NaOCl (2) KMnO₄ (3) moist SO₂
(4) Ca(OCl)₂ (5) H₂O₂
- 38 An organic compound X reacts with nitrous acid to give Y. Compound Y reacts with acidified KMnO₄ to give Z. Compound Z reacts with acidified, alcoholic, 2,4-dinitrophenylhydrazine to give an orange precipitate. The compound X is



- 39 Consider the following compounds

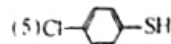
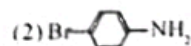
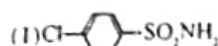


Which pair of these compounds given below will produce a thermoplastic polymer?

- (1) A and B (2) B and C (3) C and D
(4) D and E (5) E and A
- 40 An organic compound X was fused with sodium. The aqueous extract of the fusion mixture was subjected to the following tests

Test	Observation
(i) Boiled with excess dil HNO ₃ and added aqueous AgNO ₃	A precipitate insoluble in excess NH ₄ OH
(ii) Added a solution of sodium nitroprusside	A purple colouration
(iii) Added aqueous FeSO ₄	A black precipitate

The compound X is,



- Instructions for questions No. 41 to 50 :

For each of the questions 41 to 50, four responses (a), (b), (c) and (d) are given; one or more is/ are correct. Select the correct response/responses. In accordance with the instructions given on your answer sheet, mark

- (1) if only (a) and (b) are correct
(2) if only (b) and (c) are correct
(3) if only (c) and (d) are correct
(4) if only (d) and (a) are correct
(5) if any other number or combination of responses is correct

Summary of above Instructions				
(1)	(2)	(3)	(4)	(5)
Only (a) and (b) are correct	Only (b) and (c) are correct	Only (c) and (d) are correct	Only (d) and (a) are correct	Any other number or combination of responses is correct

- 41 Which of the following statement/s is/are true?

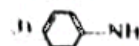
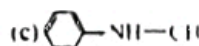
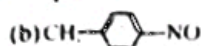
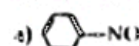
- (a) Electrons have particle as well as wave properties.
(b) A proton is heavier than a neutron
(c) All atoms have electrons, protons and neutrons
(d) All ions have at least one proton

- 42 The kinetic molecular theory equation for an ideal gas is,

$pV = \frac{1}{3} mNC^2$ Which of the following statement/s is/are true for an ideal gas?

- (a) $\overline{C^2}$ is independent of temperature
(b) $\overline{C^2}$ is a constant at constant temperature
(c) pV is a constant at constant temperature
(d) pV is independent of the number of moles

- 43 Compound X was treated with the reducing agent Sn and conc HCl. The reaction mixture was basified with aqueous NaOH. The organic product resulting from basification was isolated and treated with nitrous acid, followed by 2-naphthol to give a reddish-orange dye. Which of the following structures for X is/ are consistent with the above reaction sequence?



44. Which of the following can be taken as evidence for the non-ideal nature of real gases?
- Different real gases have different boiling points.
 - Certain real gases are coloured while others are not.
 - Under identical conditions different real gases have different densities.
 - Certain real gases react chemically with each other.

45. Which of the following solutions **cannot** be used to distinguish between SO_2 and CO_2 ?

- $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}^+$
- KMnO_4
- Litmus solution
- FeCl_3/H^+

46. The rate of a chemical reaction increases when the concentrations of the reactants are increased at constant temperature, because:

- The number collisions between molecules increases.
- The fraction of molecules with energy in excess of the activation energy/increases.
- The energy of the collisions increases.
- The fraction of collisions with the correct geometry increases.

47. The standard electrode potentials of two metal/metal ion electrodes, P/P^+ and Q/Q^{2+} are 0.80 and -0.44 V respectively. Which of the following reaction/s is/are consistent with the above potentials?

- $2\text{P}(\text{s}) + \text{Q}^{2+}(\text{aq}) \rightarrow 2\text{P}^+(\text{aq}) + \text{Q}(\text{s})$
- $\text{Q}(\text{s}) + 2\text{H}^+(\text{aq}) \rightarrow \text{H}_2(\text{g}) + \text{Q}^{2+}(\text{aq})$
- $\text{H}_2(\text{g}) + \text{P}_2\text{O}_5(\text{s}) \rightarrow 2\text{P}(\text{s}) + \text{H}_2\text{O}(\text{l})$
- $\text{H}_2\text{O}(\text{l}) + \text{P}(\text{s}) \rightarrow \text{H}_2(\text{g}) + \text{POH}(\text{aq})$

48. Water from a tube well is clear as it is pumped out, but turns cloudy and brown on exposure to air for some time, due to the formation of $\text{Fe}(\text{OH})_3$. Which of the following statements are most likely to be true in this situation?

- $\text{Fe}(\text{OH})_3$ dissolves in water under pressure but is deposited when the pressure is atmospheric.
- Iron is present mainly as Fe^{2+} in the ground water feeding the well.
- Conditions underground are reducing.
- The solubility of $\text{Fe}(\text{OH})_3$ is much less than that of $\text{Fe}(\text{OH})_2$.

49. Which of the following may be considered as a standard hydrogen electrode/ standard hydrogen electrodes at 25°C ?

- $\text{HCl}(\text{aq}) (1.0 \text{ mol dm}^{-3}) / \text{H}_2(\text{g}) (1 \text{ atm})$
- $\text{CH}_3\text{COOH}(\text{aq}) (1.0 \text{ mol dm}^{-3}) / \text{H}_2(\text{g}) (1 \text{ atm})$
- $\text{H}_2\text{SO}_4(\text{aq}) (1.0 \text{ mol dm}^{-3}) / \text{H}_2(\text{g}) (1 \text{ atm})$
- $\text{HNO}_3(\text{aq}) (1.0 \text{ mol dm}^{-3}) / \text{H}_2(\text{g}) (1 \text{ atm})$

50. S is a solution of Na_2CO_3 and NaHCO_3 in water. By which method/ methods given below can the concentrations of Na_2CO_3 and NaHCO_3 in S be determined by titrating 25.0 cm^3 of S with standard HCl ?

- Using phenolphthalein as indicator.
- First using methyl orange as indicator and further titrating the same solution using phenolphthalein as indicator.
- First using phenolphthalein as indicator and further titrating the same solution using methyl orange as indicator.
- Titrate using phenolphthalein as indicator and thereafter titrate a separate 25.0 cm^3 of S using methyl orange as indicator.

Instructions for questions No. 51 to 60

In questions No. 51 to 60, two statements are given in response of each question. From the Table given below, select the response out of the responses (1), (2), (3), (4) and (5) that **best** fits the two statements given for each of the questions and mark appropriately on your answer sheet.

Response	First Statement	Second Statement
(1)	True	True, and correctly explains the first statement
(2)	True	True, but does not explain the first statement correctly
(3)	True	False
(4)	False	True
(5)	False	False

	First Statement	Second Statement
51.	Ethylamine does not give a stable diazonium salt with HNO_2 .	HNO_2 reacts with aromatic amines only.
52.	Under a given set of conditions, a catalyst increases the amount of product obtained in unit time.	A catalyst alters the enthalpy change of a reaction.
53.	CH_4 and CO_2 are green-house gases.	Green-house gases are those that consist of carbon-containing, small molecules.
54.	Two different reactions taking place at the same rate, at the same temperature should have the same activation energy.	The rate of a reaction is directly proportional to the activation energy.
55.	The organic product obtained from the reaction of optically active 2-butanol with acidic KMnO_4 is not optically active.	The organic product is a racemic mixture.
56.	Cl_2 gas dissolved in water can be expelled by boiling.	Dissolution of chlorine in water is exothermic and reversible.
57.	$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ becomes colourless on heating.	Cu^{2+} ion is reduced to Cu^+ ion on dehydration.
58.	ICl_4^- ion is tetrahedral.	There are four repulsion units around the iodine atom in ICl_4^- .
59.	The properties of one N-H bond in the NH_4^+ ion are different from those of the other three N-H bonds.	One N-H bond in the NH_4^+ ion can be identified as a co-ordinate bond.
60.	In the fermentation of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) by yeast, some carbon atoms of the glucose molecule are oxidised while others are reduced.	The chemical products of fermentation of glucose are CO_2 and $\text{CH}_3\text{CH}_2\text{OH}$.