Strictly Confidential: (For Internal and Restricted use only)
Secondary School Examination September-2020
Marking Scheme – CHEMISTRY (043)
(PAPER CODE –56(B)/C)

General Instructions: -

1. You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2. **"Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its' leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in News Paper/Website etc may invite action under IPC."**
3. Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. **However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and marks be awarded to them. In class-X, while evaluating two competency based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, marks should be awarded.**
4. The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
5. Evaluators will mark(√) wherever answer is correct. For wrong answer 'X"be marked. Evaluators will not put right kind of mark while evaluating which gives an impression that answer is correct and no marks are awarded. **This is most common mistake which evaluators are committing.**
6. If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
7. If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
8. If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out.
9. No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
10. A full scale of marks 70 has to be used. Please do not hesitate to award full marks if the answer deserves it.
11. Every examiner has to necessarily do evaluation work for full working hours i.e. 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines).
12. Ensure that you do not make the following common types of errors committed by the Examiner in the past:-
    - Leaving answer or part thereof unassessed in an answer book.
    - Giving more marks for an answer than assigned to it.
    - Wrong totaling of marks awarded on a reply.
    - Wrong transfer of marks from the inside pages of the answer book to the title page.
    - Wrong question wise totaling on the title page.
    - Wrong totaling of marks of the two columns on the title page.
    - Wrong grand total.

*These answers are meant to be used by evaluators

- Marks in words and figures not tallying.
- Wrong transfer of marks from the answer book to online award list.
- Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.)
- Half or a part of answer marked correct and the rest as wrong, but no marks awarded.

13. While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.

14. Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.

15. The Examiners should acquaint themselves with the guidelines given in the Guidelines for spot Evaluation before starting the actual evaluation.

16. Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.

17. The Board permits candidates to obtain photocopy of the Answer Book on request in an RTI application and also separately as a part of the re-evaluation process on payment of the processing charges.

Marking scheme – 2020

CHEMISTRY (043) / CLASS XII

56(B)/C

Q.No	Expected Answer / Value Points	Marks
	SECTION A	
1	1M NaCl	1
2	Natural membrane –pig bladder / calf bladder or any other suitable example, Synthetic membrane – parchment paper/ cellophane paper or any other suitable example.	½ ½
3	π (osmotic pressure) is directly proportional to concentration (Molarity) so person will have less blood pressure or less chances of heart attack./ Less quantity of salt will help to maintain low blood pressure./ To prevent edema or puffiness or heart attack./ Less salt intake will help to reduce water retention in blood.	1
4	With help of reverse osmosis or desalination. / By applying external pressure more than osmotic pressure.	1
5	RBC will shrink / RBC will have exosmosis / RBC will lose water/ In hypertonic solution RBC will lose water.	1
6	$Xe^{+}[PtF_6]^{-}$ (Formula only)	1
7	At anode: $Ag_{(s)} \longrightarrow Ag^{+}_{(aq)} + e^{-}$ At Cathode: $Ag^{+}_{(aq)} + e^{-} \longrightarrow Ag_{(s)}$. / Silver is deposited at cathode and silver ions are formed at anode.	½ ½
8	d^2sp^3	1

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9	Due to dissociation of hydrogen bonding OR disulphide linkages OR electrostatic forces of interactions OR van der Waal forces. / native proteins change to primary structure. / Complex or higher structure or secondary and tertiary structure (2^{o} or 3^{o} structures) of proteins change or disrupt to primary (1^{o}) structure.	1
10	-NO_2 group is an electron withdrawing group OR –I effect of NO_2 group./ NO_2 group helps in increasing the positive polarity (or decreases the electron density) on C containing halogen or benzene ring.	1
11	(a)	1
12	(c)	1
13	(d)	1
14	(d)	1
15	(d)	1
16	(i)	1
17	(iii)	1
18	(i)	1
19	(i)	1
20	(iv)	1
	SECTION B	
21	a) At high altitudes atmospheric pressure decreases, boiling point decreases so cooking time increases. / Due to decrease in atmospheric pressure water boils at a lower temperature and more heat is required. b) At a high temperature rate constant or collision frequency or kinetic energy of the particles increases. / Activation energy decreases. **OR** a) Rate becomes four times b) Rate = $K[A]^2$ / 2^{nd} order reaction / pseudo second order reaction.	1 1 1 1
22	a) To form volatile complex. / It acts as an available reagent. / Iodine is heated with Zr to give a volatile compound which is decomposed to give pure Zr. / Reaction : $Zr_{(impure)} + 2I_{2(g)} \xrightarrow{\Delta} ZrI_{4(g)} \xrightarrow{\Delta} Zr_{(pure)} + 2I_{2(g)}$. b) Lowers the melting point / increases the electrical conductivity / acts as a solvent. **OR** a) Basic Flux: CaO /$CaCO_3$ / MgO / $MgCO_3$ or any other suitable example Acidic flux: SiO_2 / P_4O_{10} / $Na_2B_4O_7$ or any other suitable example b) ZnS or Zinc blende or Sphalerite and $CuFeS_2$ or Copper pyrite or Cu_2S or Copper glance	1 1 ½ ½ ½+½
23	Due to completely filled d-orbitals or d^{10} configuration or due to the absence of any unpaired electrons in their d-subshell, they have weak inter-metallic bonding or weak inter-atomic interactions or no metal-metal bonding. **(Any two relevant reasons)**	1+1
24.	(a) due to presence of lone pair electron / NH_3 can acts a lewis base or ligand / NH_3 can form a coordinate bond / NH_3 can donate an electron pair. (b) due to sp^3 and dsp^2 hybridisation / due to difference in the hybridisation of Ni.	1 ½+½/1
25.	a) A = $CH_3CH_2CH_2Br$ or 1-Bromopropane, B = $CH_3CH_2CH_2I$ or 1-Iodopropane b) A = $CH_3CH{=}CHCH_3$ or But-2-ene, B = $CH_3CH(Br)CH(Br)CH_3$ or 2,3-Dibromobutane	½+½ ½+½
26.	A = CH_3COCH_3, B= CH_3CH_2CHO	1+1
27.	a) Homopolymers contain same or identical monomers while Copolymers contain different monomers. b) Due to extensive or high cross linking / extensive or heavy branching / due to formation of an infusible mass.	½+½ 1

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	SECTION C	
28	$\Delta T_f = iK_f m = i\ K_f \frac{Wb\ x\ 1000}{Mb\ x\ Wa}$ $1.62 = i \text{ x } 4.9 \text{ x } \frac{3.9\ x\ 1000}{122\ x\ 49}$ $i = 0.506$ as i<1, so solute particles are associated **(Or by any other correct method)** **OR** (i) Let, the molar mass of the solute be M g mol^{-1} .Now, the no. of moles of solvent (H_2O), $n_1 = \frac{90\ \text{g}}{18\ \text{g mol}^{-1}} = 5\,\text{mol}$ and, the no. of moles of solute, $n_2 = \frac{30\ \text{g}}{\text{M mol}^{-1}} = \frac{30}{\text{M}}\,\text{mol}$ & $p_1 = 2.8\,\text{kPa}$. Applying the relation: $n_1 = \frac{90 + 18\,\text{g}}{18} = 6\,\text{mol}$ Again applying the relationship, we get $p_1 = 2.9\,\text{kPa}$ $\frac{p_1^0 - p_1}{p_1^0} = \frac{n_2}{n_1 + n_2}$ $\Rightarrow \frac{p_1^0 - 2.8}{p_1^0} = \frac{\frac{30}{\text{M}}}{5 + \frac{30}{\text{M}}}$ $\Rightarrow 1 - \frac{2.8}{p_1^0} = \frac{\frac{30}{\text{M}}}{\frac{5\text{M} + 30}{\text{M}}}$ $\Rightarrow 1 - \frac{2.8}{p_1^0} = \frac{30}{5\text{M} + 30}$ $\Rightarrow \frac{2.8}{p_1^0} = 1 - \frac{30}{5\text{M} + 30}$ $\Rightarrow \frac{2.8}{p_1^0} = \frac{5\text{M} + 30 - 30}{5\text{M} + 30}$ $\Rightarrow \frac{2.8}{p_1^0} = \frac{5\text{M}}{5\text{M} + 30}$ $\Rightarrow \frac{p_1^0}{2.8} = \frac{5\text{M} + 30}{5\text{M}}$ (i) $\frac{p_1^0 - p_1}{p_1^0} = \frac{n_2}{n_1 + n_2}$ $\Rightarrow \frac{p_1^0 - 2.9}{p_1^0} = \frac{\frac{30}{\text{M}}}{6 + \frac{30}{\text{M}}}$ $\Rightarrow 1 - \frac{2.9}{p_1^0} = \frac{\frac{30}{\text{M}}}{\frac{6\text{M} + 30}{\text{M}}}$ $\Rightarrow 1 - \frac{2.9}{p_1^0} = \frac{30}{6\text{M} + 30}$ $\Rightarrow \frac{2.9}{p_1^0} = 1 - \frac{30}{6\text{M} + 30}$ $\Rightarrow \frac{2.9}{p_1^0} = \frac{6\text{M} + 30 - 30}{6\text{M} + 30}$ $\Rightarrow \frac{2.9}{p_1^0} = \frac{6\text{M}}{6\text{M} + 30}$ $\Rightarrow \frac{p_1^0}{2.9} = \frac{6\text{M} + 30}{6\text{M}}$ (ii) Dividing equation (i) by (ii), we have: $\frac{2.9}{2.8} = \frac{\frac{5\text{M} + 30}{5\text{M}}}{\frac{6\text{M} + 30}{6\text{M}}}$ $\Rightarrow \frac{2.9}{2.8} \times \frac{6\text{M} + 30}{6} = \frac{5\text{M} + 30}{5}$ $\Rightarrow 2.9 \times 5 \times (6\text{M} + 30) = 2.8 \times 6 \times (5\text{M} + 30)$ $\Rightarrow 87\,\text{M} + 435 = 84\,\text{M} + 504$ $\Rightarrow 3\,\text{M} = 69$ $\Rightarrow \text{M} = 23\,\text{u}$ **(Or any other relevant method).**	½ 1 1 ½ ½ ½ ½ ½ ½ ½ ½
29	$t = \frac{2.303}{k} log \frac{[Ro]}{[R]}$ $t_{3/4} = \frac{2.303}{k} log \frac{[Ro]}{[Ro]/4} = \frac{2.303}{k} log4 = \frac{2.303}{k}\ x\ 2log2$ -i $t_{1/2} = \frac{2.303}{k} log \frac{[Ro]}{[Ro]/2} = \frac{2.303}{k} log2$ -ii dividing the equation 'i' by equation 'ii' $\frac{t_{3/4}}{t_{1/2}} = 2$ $t_{3/4} = 2 \text{ x } t_{1/2}$	½ 1 ½ 1

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29	**OR** $\log\frac{K2}{K1} = \frac{Ea}{2.303R} x \left[\frac{T2-T1}{T1T2}\right]$ $\log\frac{24\ x\ 10^{-2}}{4\ x\ 10^{-2}} = \frac{Ea}{2.303\ x\ 8.314} x \left[\frac{50}{300\ x350}\right]$ $\log 6 = \frac{Ea}{19.147}\ x\ 0.000476$ $0.7782 = \frac{Ea}{19.147}\ x\ 0.000476$ $E_a = \frac{0.7782\ x\ 19.147}{0.000476} = 3.13\ x\ 10^4\ Jmol^{-1} = 31.3\ kJ/mol$ **(or by any other correct method)** **(deduct ½ mark for incorrect or no unit)**	½ 1 ½ 1
30	Lyophobic sol / Lyophilic sol Interaction between dispersed phase and dispersion medium are weak / Interaction between dispersed phase and dispersion medium are strong Irreversible / reversible Can be easily coagulated / Can't be easily coagulated **(or any other three correct points)**	1 1 1
31	a) Due to presence of unpaired electron / due to partially filled d-orbitals / due to d-d transition / due to excitation of unpaired electrons in the visible region. b) Due to variable oxidation state/ they provide large surface area / they form intermediate complexes/ they decrease down the activation energy. c) Due to more number of unpaired electrons in d-orbitals / due to frequent or strong inter-metallic bonding /due to partially filled d-orbitals./ due to participation of ns and (n-1)d orbitals electrons in inter-atomic bonding.	1 1 1
32	a) Iodoform test-given positive (formation of yellow ppt.) by propanone / Tollen's Test or Silver Mirror Test or Fehling's test-given positive (formation of silver mirror or red brown ppt.) by propanal./ Chemical reaction for any of the above tests. b) $NaHCO_3$ Test – given positive (brisk effervescence due to evolution of CO_2 gas) by benzoic acid. / Neutral $FeCl_3$ test- given positive (violet colouration) by phenol. / Br_2 water test – given positive (white ppt.) by phenol./ Chemical reaction for any of the above tests. c) Iodoform test-given positive (formation of yellow ppt.) by acetaldehyde / Fehling's test-given positive (formation of red brown ppt.) by acetaldehyde./ Chemical reaction for any of the above tests. **(or by any other correct method)**	1 1 1
33	a) $A = C_6H_5CH_2NO_2$, $B = C_6H_5CH_2NH_2$, $C = C_6H_5CH_2NC$ b) $A = CH_3OH$, $B = CH_3Cl$, $C = = CH_3CN$ **(or correct IUPAC names of the A,B and C in both of the above questions)**	½ x3 ½ x3
34	a) Chemical substances produced by microorganisms (bacteria, fungi and molds) or partially synthesized that inhibit the growth or even destroy microorganisms e.g. chloramphenicol, penicillin, tetracycline. a) Antiseptics the chemicals which (are applied to living tissues) either kill or prevent the growth of microorganisms e.g. dettol, soframycin, bithionol. b) Food preservatives prevent spoilage of food due to microbial growth. The most commonly used preservatives include table salt, sugar, vegetable oils and sodium benzoate, C_6H_5COONa. **(Or any other suitable definition and example in each of the above)**	½+½ ½+½ ½+½

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	SECTION D	
35	a) The cell constant is given by the equation: Cell constant = G^* = conductivity × resistance = 1.29 S/m × 100 Ω = 129 m^{-1} = 1.29 cm^{-1} Conductivity of 0.02 mol L^{-1} KCl solution = cell constant / resistance $= \frac{G^*}{R} = \frac{129\ m^{-1}}{520\ \Omega} = 0.248\ S\ m^{-1}$ Concentration $= 0.02\ mol\ L^{-1}$ $= 1000 \times 0.02\ mol\ m^{-3} = 20\ mol\ m^{-3}$ Molar conductivity $= \Lambda_m = \frac{\kappa}{c}$ $= \frac{248 \times 10^{-3}\ S\ m^{-1}}{20\ mol\ m^{-3}} = 124 \times 10^{-4}\ S\ m^2 mol^{-1}$ Alternatively, $\kappa = \frac{1.29\ cm^{-1}}{520\ \Omega} = 0.248 \times 10^{-2}\ S\ cm^{-1}$ and $\Lambda_m = \kappa \times 1000\ cm^3\ L^{-1}\ molarity^{-1}$ $= \frac{0.248 \times 10^{-2}\ S\ cm^{-1} \times 1000\ cm^3\ L^{-1}}{0.02\ mol\ L^{-1}}$ $= 124\ S\ cm^2\ mol^{-1}$	1 1
	b) (i) Fuel Cell: Galvanic cells (or electrochemical cells) in which the energy of combustion of the fuels like hydrogen, methanol, methane, etc. is directly converted into electrical energy. / Cells in which electrical energy or electricity is produced with help of the combustion or oxidation of some fuel.	1
	(ii) Limiting molar conductivity: When the concentration of the solution approaches zero, the molar conductivity is known as limiting molar conductivity / molar conductivity at infinite dilution/ maximum limit or maximum value of the molar conductivity of an electrolyte.	1
	OR	
35	(a) $E_{cell} = E^\circ_{cell} - \frac{0.0591}{n} log \frac{[Mg^{2+}]}{[Sn^{2+}]}$	½
	$= 2.204 - \frac{0.0591}{2} log \frac{[0.01]}{[0.1]}$	½
	$= 2.204 - \frac{0.0591}{2} log 10^{-1}$	½
	$= 2.204 - 0.02955\ x\ (-1)$	½
	$= 2.204 + 0.02955$	½
	$= 2.234\ V$	½
	b) i) Saline water helps in ionisation of water / saline water is an electrolytes / saline water helps iron to lose electrons / saline water increases the number of ions which favours rusting.	1
	ii) At infinite dilution (i.e., concentration $c \rightarrow$ zero) electrolyte dissociates completely (α =1), but at such low concentration the conductivity (or resistance) of the solution is so low that it cannot be measured accurately. / For weak electrolytes graph of Λ_c vs $\sqrt{C}$ is not linear and can't be extrapolated.	1
36	a) due to lower bond dissociation enthalpy of Te-H than H-S/ due to large size of Te / longer bond length of Te-H than H-S. b) due to smaller size of F / due to high inter electronic repulsions / due to high lone pair-lone pair electronic repulsions. c) Due to highest electronegativity / due to absence of vacant d-orbitals. d) due to small size of He and Ne / due to very high Ionisation enthalpy of He and Ne. e) causes acid rain / causes breathing problems / SO_2 is corrosive / causes stunted	1 1 1 1 1

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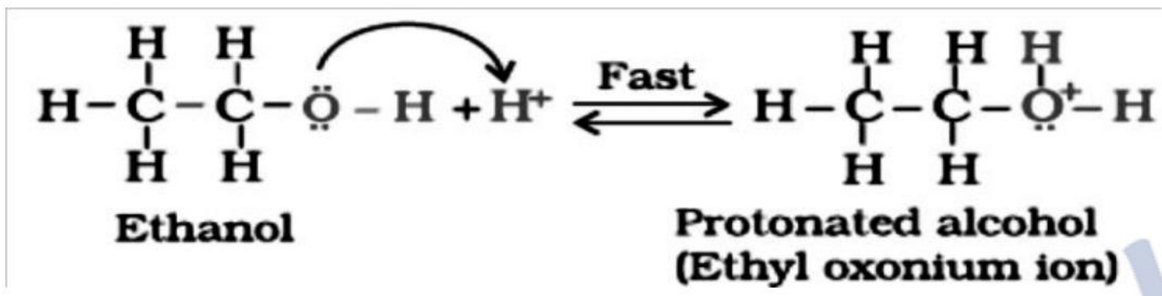
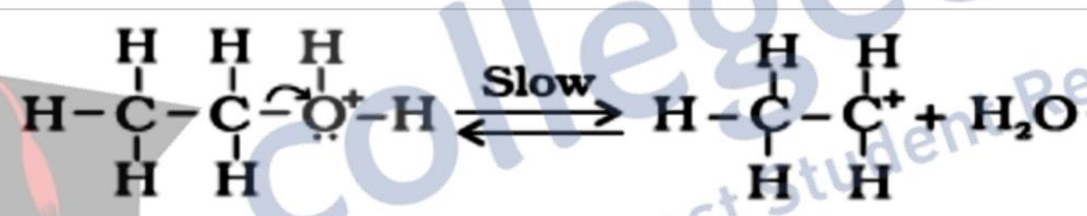
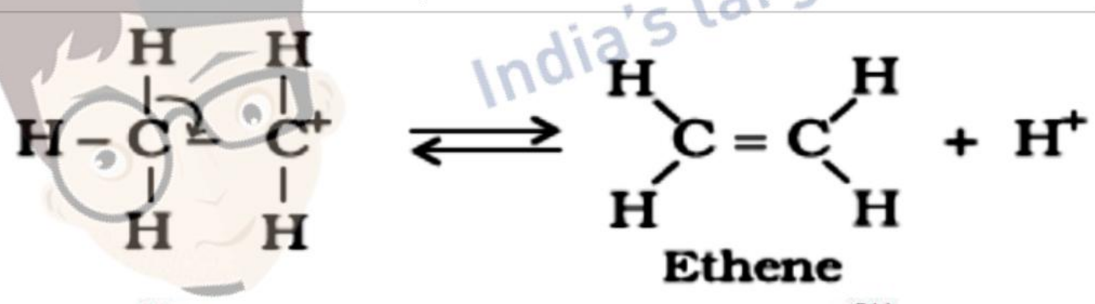
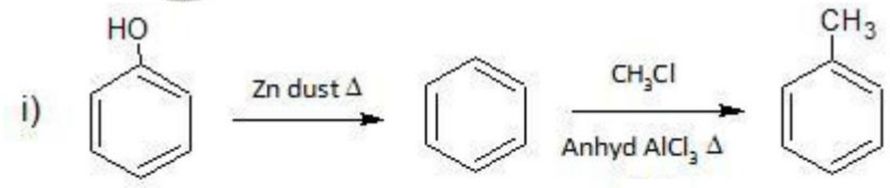
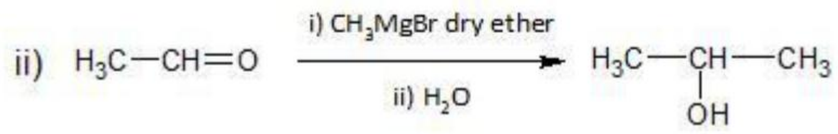
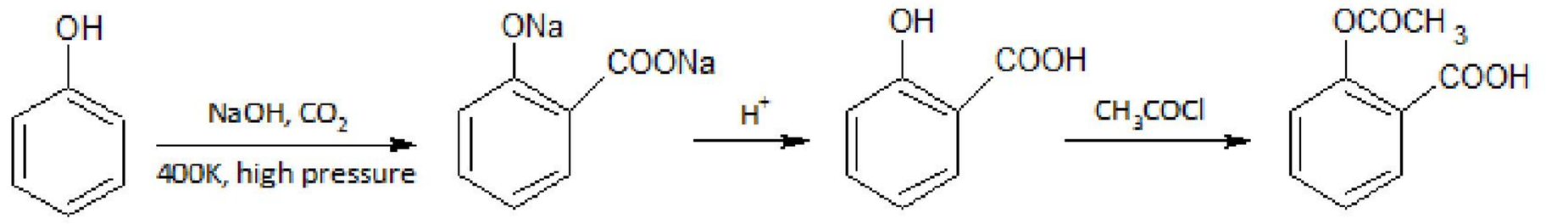
36	growth in plants. **(or any other correct answer)** **OR** a) i) $2XeF_{2\,(s)} + 2H_2O_{(l)} \longrightarrow 2Xe_{\,(g)} + 4\,HF_{(aq)} + O_{2(g)}$ (ignore balancing) ii) $XeF_{4(s)} + O_2F_{2(g)} \longrightarrow XeF_{6(s)} + O_{2(g)}$ b) i) This is due to absorption of radiations in visible region which results in the excitation of outer electrons to higher energy level. ii) Chlorine gets reduced as well as oxidised in the same reaction. / chlorine changes its oxidation state from 0 to -1 as well as to +1 or +5. / chlorine changes its oxidation state from 0 to a lower as well as a higher oxidation state. iii) highly exothermic reaction / acid may spill out / mixture may splash out, cause burns **(or any other suitable reason)**	1 1 1 1 1
37	a) ***Step 1:*** Formation of protonated alcohol.  ***Step 2:*** Formation of carbocation: It is the slowest step and hence, the rate determining step of the reaction  ***Step 3:*** Formation of ethene by elimination of a proton.  b)   **OR**	1 1 1 1 1
37.	 A = Phenol B = Sodium salicylate C = Salicylic acid D = Acetyl Salicylate (Aspirin) (1/2 mark for identification of A,B,C and D and 1 mark each for reaction	½ x 4 1x3=3

*These answers are meant to be used by evaluators