Marking Scheme — Chemistry

General Instructions

1. The Marking Scheme provides general guidelines to reduce subjectivity in the marking. The answers given in the Marking Scheme arc suggested answers. The content is thus indicative. If a student has given any other answer which is different from the one given in the Marking Scheme, but conveys the same meaning, such answers should be given full weightage.
2. The Marking Scheme carries only suggested value point for the answers. These are only guidelines and do not constitute the complete answers. The students can have their own expression and if the expression is correct the marks will be awarded accordingly.
3. The Head-Examiners have to go through the first five answer-scripts evaluated by each evaluator to ensure that the evaluation has been carried out as per the instruction given in the marking scheme. The remaining answer scripts meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
4. 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.
5. If a question has parts, please award marks in the right hand side for each part. Marks awarded for different parts of the question should then be totalled up and written in the left hand margin and circled.
6. If a question does not have any parts, marks be awarded in the left-hand margin.
7. If a candidate has attempted an extra question, marks obtained in the question attempted first should be retained and the other answer should be scored out.
8. No Marks to be deducted for the cumulative effect of an error. It should be penalized only once.
9. A full scale of marks 0-70 has to be used. Please do not hesitate to award full marks if the answer deserves it.

10. Separate marking schemes for all the three sets have been provided.

11. As per orders of the Hon'ble Supreme Court. The candidates would now be permitted to obtain photocopy of the Answer book on request on payment of the prescribed fee. All examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answeras given in the Marking Scheme.

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

13. Every Examiner should stay upto sufficiently reasonable time normally 5-6 hours every day and evaluate 20-25 answer books and should devote minimum 15-20 minutes to evaluate each answer book.

14. Every Examiner should acquaint himself /herself with the marking schemes of all the sets.

QUESTION PAPER CODE 56/1/1

EXPECTED ANSWERS/VALUE POINTS

1. 3 — 1

2. 2, 5 - dinitrophenol — 1

3. CH_3-CH_2-Br — ½+½

   Because it is a primary halide / (1^0) halide

4. $BaCl_2$ because it has greater charge / +2 charge — ½+½

5. X_2Y_3 — 1

6. Elements which have partially filled d-orbital in its ground states or any one of its oxidation states. — 1

   1) Variable oxidation states. — ½+½

2) Form coloured ion

Or any other two correct charactenstics

7. 1) Diamminedichloridoethylenediaminechromium(III) chloride 1+1

2) $[Co(NH_3)_5(ONO)]^{2+}$

8. (i) $LiAlH_4$ / $NaBH_4$ /H_2, Pt 1

(ii) $KMnO_4$, KOH 1

9. When vapour pressure of solution is higher than that predicted by Raoult's law / the intermolecular attractive forces between the solute-solvent/(A-B) molecules are weaker than those between the solute-solute and solvent-solvent molecules/ A-A or B-B molecules. 1 ½

Eg. ethanol-acetone/cthanol-cyclohexane/CS_2-acetone or any other correct example $\Delta_{mix}H$ is positive ½

OR

(a) Azeotropcs are binary mixtures having the same composition in the liquid and vapour phase and boil at a constant temperature. 1

(b) Minimum boiling azeotrope ½

eg - ethanol + water or any other example ½

10. (i) $Ag^+(aq) + e \rightarrow Ag(s)$ ½

Reaction with higher E^o value / ΔG^o negative ½

(ii) Molar conductivity of a solution at infinite dilution or when concentration approaches zero ½

Number of ions per unit volume decreases ½

11. $\Delta T_f = i K_f m$ ½

$$\Delta T_f = i K_f \frac{w_b \times 1000}{M_b \times w_a}$$

$$1.62\ K = i \times 4.9K\ kg\ mol^{-1} \times \frac{3.9\ g}{122\ gmol^{-1}} \times \frac{1000}{49\ g}$$ 1

$i = 0.506$ ½

Or by any other correct method

As i<l , therefore solute gets **associated**. 1

12 (i) Zinc being low boiling will distil first leaving behind impurities/ or on electrolysis the pure metal gets deposited on cathode from anode. 1

(ii) Silica acts as flux to remove iron oxide which is an impurity as slag or

$FeO + SiO_2 \rightarrow FeSiO_3$ 1

(iii) Wrought iron 1

13. $d = \frac{z \times M}{a^3\ N_A}$ ½

$$z = \frac{d\ a^3\ N_A}{M}$$

$$z = \frac{2.7\ g\ cm^{-3} \times 6.022 \times mol^{-1} \times (4.05 \times 10^{-8}\ cm)^3}{M}$$ 1

$= 3.999 \approx 4$ ½

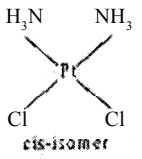
Face centered cubic cell / fcc 1

14. (i) 5f orbital electrons have poor shielding effect than 4f . 1

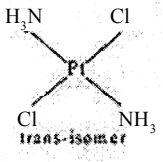
(ii) due to d-d transition / or the energy of excitation of an electron from lower d-orbital to' higher d-orbital lies in the visible region /presence of unpaired electrons in the d-orbital. 1

(iii) $2\ MnO_4^- + 6\ H^+ + 5\ NO_2^- \rightarrow 2\ Mn^{2+} + 3\ H_2O + 5\ NO_3^-$ 1

15. (i)



cis-isomer



trans-isomer

1

(ii) $t2g^3\ e\ g^1$ 1

(iii) sp^3, diamagnetic ½+½

16. The cell reaction : $Fe(s) + 2H^+(aq) \rightarrow Fe^{2+}(aq) + H_2(g)$

$E^o_{cell} = E^o_c - E^o_a$

$= [0-(-0.44)]\ V = 0.44V$

$$E_{cell} = E^o_{cell} - \frac{0.059}{2} \log \frac{[Fe^{2+}]}{[H^+]^2}$$ 1

$$E_{cell} = 0.44\ V - \frac{0.059}{2} \log \frac{(0.001)}{(0.01)^2}$$ 1

$$= 0.44\ V - \frac{0.059}{2} \log (10)$$

$= 0.44\ V - 0.0295\ V$

$= \approx$ **0.410 V** 1

17. (i) mutual coagulation 1

(ii) strong interaction between dispersed phase and dispersion medium or solvated layer 1

(iii) CO acts as a poison for catalyst 1

18. (i) Hexamethylene diamine $NH_2(CH_2)_6NH_2$ and ½

adipic acid $HOOC-(CH_2)_4-COOH$ ½

(ii) 3 hydroxybutanoic acid $CH_3CH(OH)CH_2COOH$ and ½

3 hydroxypentanoic acid $CH_3CH_2CH(OH)CH_2COOH$ ½

(iii) Chloroprene $H_4C=C(Cl)CH=CH_2$ ½

IUPAC names are accepted ½

Note: ½ mark for name /s and ½ mark for structure / s

19. (i) $CH_3CH_2CH_3$ 1

(ii) $C_6H_5COONa + CHI_3$ ½, ½

(iii) CH_4 1

20. (i) $C_6H_5OH + NaOH \rightarrow C_6H_5ONa \xrightarrow{CH_3X} C_6H_5OCH_3$

Or

$C_6H_5OH + Na \rightarrow C_6H_5ONa \xrightarrow{CH_3X} C_6H_5OCH_3$ 1

(ii) $CH_3CH(OH)CH_3 \xrightarrow{CrO_3 \text{ or } Cu/573K} CH_3COCH_3 \xrightarrow[(ii)H_2O]{(i)CH_3MgX} (CH_3)_2C(OH)CH_3$

1

(iii) $C_6H_5NH_2 \xrightarrow[273K]{NaNO_2 + HCl} C_6H_5N_2Cl \xrightarrow{H_2O \text{ warm}} C_6H_5OH$

1

OR

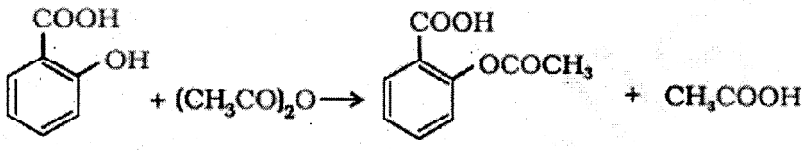
a) ½

(i) $CH_3-CH_2-\ddot{O}-H + H^+ \longrightarrow CH_3-CH_2-\overset{+}{\ddot{O}}(H)-H$ ½

(ii) $CH_3-CH_2-\ddot{O}(H)- + CH_3-CH_2-\overset{+}{O}(H)-H \rightarrow CH_3CH_2-O-CH_2CH_3 + H_2O$ 1

(iii) $CH_3CH_2-\overset{+}{O}(H)-CH_2CH_3 \longrightarrow CH_3CH_2-O-CH_2CH_3 + H^+$

b)



1

(Acetyl chloride instead of acetic anhydride may be used)

21. (i) Maltose 1

(ii) fibrous proteins: parallel polypeptide chain, insoluble in water, Globular proteins: spherical shape, soluble in water, (or any I suitable difference) 1

(iii) Vitamin D 1

22 (i) Larger surface area, higher van der Waals' forces ,higher the boiling point 1

(ii) Rotation due to one enantiomer is cancelled by another enantiomer 1

(iii) - NO_2 acts as Electron withdrawing group or –I effect 1

23. (i) Concern for students health, Application of knowledge of chemistry to daily life, empathy, caririg or any other ½, ½

(ii) Through posters, nukkad natak in community, social media, play in assembly or any other 1

(iii) Tranquilizers are drugs used for treatment of stress or mild and severe mental disorders .. Eg: equanil (or any other suitable example) ½, ½

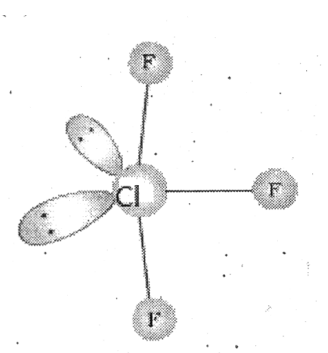
(iv) Aspartame is unstable at cooking temperature. 1

24. (a) (i) Due to decrease in bond dissociation enthalpy from HF to HI , there is an increase in acidic character observed. 1

(ii) Oxygen exists as diatomic O_2 molecule while sulphur as polyatomic S_8 1

(iii) Due to non availability of d orbitals 1

(b)



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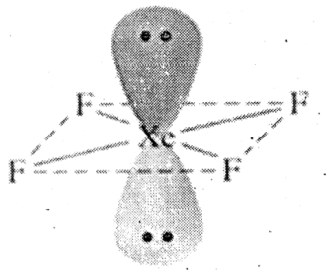


1

OR

(i) White Phosphorus because it is less stable due to angular strain ½+½

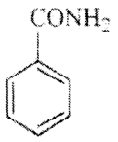
(ii) Nitrogen oxides emitted by supersonic jet planes are responsible for depletion of ozone layer. 1

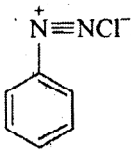
Or $NO+O_3 \rightarrow NO_2 + O_2$

(iii) due to small size of F, large inter electronic repulsion / electron- electron repulsion among the lone pairs of fluorine 1

(iv) Helium 1

(v) $XeF_2 + PF_5 \rightarrow [XeF]^+ [PF_6]^-$ 1

25. A = 

B = 

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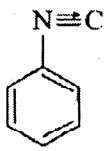
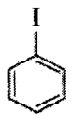
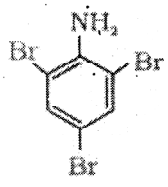
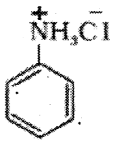
D = 

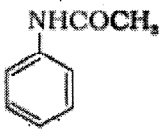
E = 

1×5 = 5

OR

a. i) 

ii) 

iii) 

1

1

b. $(CH_3)_3N < C_2H_5NH_2 < C_2H_5OH$ 1

c. By Hinsberg test secondary amines $(CH_3)_2NH$ shows ppt formation which is insoluble in KOH tertiary amines $(CH_3)_3N$ do not react with benzene sulphonyl choride 1

26. $k = \frac{2.303}{t} \log \frac{[A_0]}{[A]}$ 1

$k = \frac{2.303}{30} \log \frac{0.60}{0.30}$

$k = \frac{2.303}{30} \times 0.301 = 0.023\ s^{-1}$ ½

$k = \frac{2.303}{60} \log \frac{0.60}{0.15}$ ½

$k = \frac{2.303}{60} \times 0.6021 = 0.023\ s^{-1}$ 1

As k is constant in both the readings, hence it is a pseudo first order reaction. ½

ii) Rate $= -\Delta[R]/\Delta t$ ½

$= \frac{-[0.15 - 0.30]}{60 - 30}$

$= 0.005\ mol\ L^{-1}\ s^{-1}$ 1

OR

a) (i) Rate will increase 4 times of the actual. rate of reaction. 1+1

(ii) Second order. reaction

b) $t_{1/2} = \frac{0.693}{k}$

$30\ min = \frac{0.693}{k}$ ½

$k = 0{:}0231 min^{-1}$ ½

$$k = \frac{2.303}{t} \log \frac{[A_0]}{[A]}$$

$$t = \frac{2.303}{0.0231} \log \frac{100}{10}$$ ½

$$t = \frac{2.303}{0.0231} \text{ min}$$ ½

$t = 99.7\text{min}$ 1