CLASS : 12th (Sr. Secondary) **2079/2029**

Series : SS-M/2017

SET : A, B, C, & D

Total No. of Printed Pages : **24**

MARKING INSTRUCTIONS AND MODEL ANSWERS
CHEMISTRY
ACADEMIC/OPEN

(Only for Fresh Candidates)

उप-परीक्षक मूल्यांकन निर्देशों का ध्यानपूर्वक अवलोकन करके उत्तर-पुस्तिकाओं का मूल्यांकन करें। यदि परीक्षार्थी ने प्रश्न पूर्ण व सही हल किया है तो उसके पूर्ण अंक दें।

General Instructions :

(i) *Examiners are advised to go through the general as well as specific instructions before taking up evaluation of the answer-books.*

(ii) *Instructions given in the marking scheme are to be followed strictly so that there may be uniformity in evaluation.*

(iii) *Mistakes in the answers are to be underlined or encircled.*

(iv) *Examiners need not hesitate in awarding full marks to the examinee if the answer/s is/are absolutely correct.*

(v) *Examiners are requested to ensure that every answer is seriously and honestly gone through before it is awarded mark/s. It will ensure the authenticity as their evaluation and enhance the reputation of the Institution.*

(vi) A question having parts is to be evaluated and awarded partwise.

(vii) If an examinee writes an acceptable answer which is not given in the marking scheme, he or she may be awarded marks only after consultation with the head-examiner.

(viii) If an examinee attempts an extra question, that answer deserving higher award should be retained and the other scored out.

(ix) Word limit wherever prescribed, if violated upto 10%. On both sides, may be ignored. If the violation exceeds 10%, 1 mark may be deducted.

(x) Head-examiners will approve the standard of marking of the examiners under them only after ensuring the non-violation of the instructions given in the marking scheme.

(xi) Head-examiners and examiners are once again requested and advised to ensure the authenticity of their evaluation by going through the answers seriously, sincerely and honestly. The advice, if not headed to, will bring a bad name to them and the Institution.

महत्त्वपूर्ण निर्देश :

(i) अंक-योजना का उद्देश्य मूल्यांकन को अधिकाधिक वस्तुनिष्ठ बनाना है। अंक-योजना में दिए गए उत्तर-बिन्दु अंतिम नहीं हैं। ये सुझावात्मक एवं सांकेतिक हैं। यदि परीक्षार्थी ने इनसे भिन्न, किन्तु उपयुक्त उत्तर दिए हैं, तो उसे उपयुक्त अंक दिए जाएँ।

(ii) शुद्ध, सार्थक एवं सटीक उत्तरों को यथायोग्य अधिमान दिए जाएँ।

(iii) परीक्षार्थी द्वारा अपेक्षा के अनुरूप सही उत्तर लिखने पर उसे पूर्णांक दिए जाएँ।

(iv) वर्तनीगत अशुद्धियों एवं विषयांतर की स्थिति में अधिक अंक देकर प्रोत्साहित न करें।

(v) भाषा-क्षमता एवं अभिव्यक्ति-कौशल पर ध्यान दिया जाए।

(vi) मुख्य-परीक्षकों/उप-परीक्षकों को उत्तर-पुस्तिकाओं का मूल्यांकन करने के लिए केवल Marking Instructions/Guidelines दी जा रही हैं, यदि मूल्यांकन निर्देश में किसी प्रकार की त्रुटि हो, प्रश्न का उत्तर स्पष्ट न हो, मूल्यांकन निर्देश में दिए गए उत्तर से अलग कोई और भी उत्तर सही हो तो परीक्षक, मुख्य-परीक्षक से विचार-विमर्श करके उस प्रश्न का मूल्यांकन अपने विवेक अनुसार करें।

SET – A

1.	(i)	(A)	1
	(ii)	(B)	1
	(iii)	(A)	1
	(iv)	(A)	1
	(v)	(C)	1
	(vi)	(A)	1
	(vii)	(C)	1

(viii) (A) 1

(ix) (C) 1

(x) (B) 1

(xi) (A) 1

(xii) (A) 1

2. (i) Freezing point - Correct Def. 1

(ii) Molal depression constant - Correct Def. 1

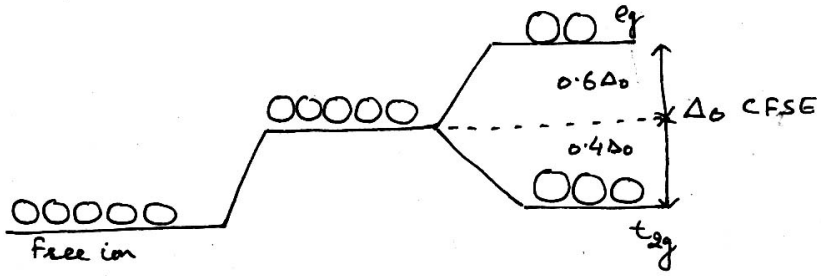
3. (a) Half life time - Correct def. 1

(b) Order of a reaction - Correct def. 1

4. Correct explanation with example & reaction 2

$4NaCN + ZnS \rightarrow Na_2[Zn\ (CN)_4] + Na_2S$

5. Correct diagram for splitting of d-orbitals 2



6. (i) Pentane-2,4- diol 1

(ii) Phenoxybenzene 1

7. Correct explanations give full credit. 2

8. Correct def. Co-polyrnerization 1

Example : Nylon 6, 6 or any correct example 1

9. Correct explanations give full credit otherwise 1 mark for Resonance structure of phenol & phenoxide and 1 mark for other part if attempted.

10. Antibiotics: - correct def. 1

Example: Chloramphenicol, Tetracycline or any two

11. In $NaCl$ $Z = 4$, $M = 23 + 35.5 = 58.5$ gm mol^{-1}
$\rho = 2.165$ gm cm^{-3}

Edge length $a = 2 \times 281$ pm $= 562 \times 10^{-10}$ cm 1

$\rho = Z \times M/a^2 \times N_0$ 1

$2.165 = 4 \times 58.5/562 \times 10^{-10} \times N_0 = 6.09 \times 10^{23}$ mol^{-1}. 1

12. Normal hydrogen electrode (NHE) Construction 1
Correct working 1

Any Correct cell reaction 1

As anode $H_2 \rightarrow 2H^+ + 2e$ or

As cathode $2H^+ + 2e \rightarrow H_2$

13. Correct explanation of Tyndal effect 2
Importance : 1

(i) Construction of Ultra microscope
(ii) Heterogeneous nature of colloids

14. (i)

$$CH_3 - CH_2 - Br + H_2 \xrightarrow{Ni} CH_3 - CH_3 + HBr \quad 1$$

(ii) $CH_2 - CH_2 - Br + NaOCH_2CH_3 \xrightarrow{\Delta}$

$$CH_3 - CH_2 - O - CH_2 - CH_3 + NaBr \quad 1$$

(iii) $CH_3 - CH_2 - Br + KCN\ (alc) \xrightarrow{\Delta}$

$$CH_3 - CH_2CN + KBr \quad 1$$

15. Correct Def. (i) Essential amino acid 1
Correct Def. (i) Non essential amino acid 1

Example essential amino acid = valine, leucine, lysine etc.
Non essential amino acid = glycine, alanine serine etc. 1

16. (a) Correct explanation with figure 1

Correct shape = Trigonal bipyramidal 1

Correct hybridization = sp^3d 1

(b) Anomalous behavior is due to 2
(i) Small size
(ii) High electronegativity
(iii) High ionization energy
(iv) Absence of d-orbital

OR

(a) Preparation of HNO_3 by Ostwald process

Oxidation of NH_3 by atmospheric O_2 1

$NH_3(g) + O_2 \rightarrow 4NO + 6H_2O\ (g)$ 1

$2NO\ (g) + 50_2(g) \rightarrow 2NO_2(g)$ 1

$3NO_2\ (g) + H_2O(l) \rightarrow 2HNO_3(aq) + NO\ (g)$ 1

(b) Any ***two*** test for NH_3 are

(i) Brown ppt with Nessler's reagent 1

(ii) Dense white fumes with HCI 1

17. (a) Correct def. transition elements 1

(i) $Cr(24) = 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^1, 3d^5$ 1

(ii) $Cu\ (29) = 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^1, 3d^{10}$ 1

(b) Correct explanation. 2

OR

(a) (i) Correct explanation of Ionic radii 1

(ii) Correct explanation of Complexing tendency 1

(iii) Correct explanation of Catalytic properties 1

(b) Correct explanation 2

18. (a) Give 1 mark for each correct reaction :

(i) $R-CH_2OH+[O] \xrightarrow[H_2SO_4]{K_2Cr_2O_2} R-CHO+H_2O$ 1

(ii) $\begin{matrix} R-COO \\ R-COO \end{matrix}\!\!\diagdown\!\!\diagup Ca \xrightarrow[Distis]{Dry} R-CHO+CaCO_3$ 1

(iii) $CH \equiv CH + H_2O \xrightarrow[HgSO_4,\ 333K]{dil\ H_2SO_4}$

$[CH_2=CH-OH] \xrightarrow[-\text{merises}]{\text{Tauto}-} CH_3-CHO$ 1

(b) Correct IUPAC name of each 1 mark

(i) 2-Bromopropanoic acid

(ii) Butane-1,4- dioic acid

OR

(a) Correct explanation 3

(b) Correct explanation 2

SET – B

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1. (i) (C) 1

(ii) (C) 1

(iii) (A) 1

(iv) (B) 1

(v) (A) 1

(vi) (B) 1

(vii) (A) 1

(viii) (D) 1

(ix) (D) 1

(x) (A) 1

(xi) (B) 1

(xii) (A) 1

2. Correct def. 1

Example: $NaCl$, H_2, I_2, etc. 1

3. Correct explanation full credit 2

4. $E^o_{cell} = E^0 cathode = E^0{}_{anode}$ 1

= 0.76 – (-0.80) = 1.56 V 1

5. Correct def. 1

Correct ***one*** example : organic dye on animal charcoal or any 1

6. Correct ***two*** test otherwise 1 mark for each test 2

(i) Litmus test

(ii) $FeCl_3$

(iii) Coupling reaction

(iv) Br_2 water

7. Correct explanation. 2

8. Hint : Both aliphatic & aromatic primary amines on warming with Chloroform & alcoholic KOH produces isocyanides or carbylamines and for correct chemical reaction. 1

$R\text{-}NH_2 + CHCl_3 + 3KOH(alc)$ heat $\rightarrow R\text{-}NC + 3KCl + 3H_2O$ 1

9. (i) Glyptal – Ethylene glycol & Pthalic acid 1

(ii) Nylon-6, 6-Hexamethylenediamine & Adipic acid 1

10. Correct explanation. 2

11. Correct def. of terms

(i) Activation energy

(ii) Molecularity

(iii) Rate constant

12. (i) **Minerals** - naturally occurring chemical substances in which metals occur along with impurities are minerals. $1\frac{1}{2}$

(ii) Ore : mineral from which the metal is conviently & economically extracted is called an ore. $1\frac{1}{2}$

13. Correct definition of chelate 1
Example: EDTA or any other 1

Importance :

(i) In softening of water

(ii) Separation of lanthanoids and actnoids.

(iii) Estimation of *Ni*/ *Mg*/ *Cu* etc.

14. Correct mechanism give full credit 3

15. For each correct definition $1 \times 3 = 3$

16. (a) For each ***three*** correct name (any ***three***) $1\frac{1}{2}$

For correct structure $1\frac{1}{2}$

(b) Anomalous behavior due to 2

(i) Small size

(ii) High electronegativity

(iii) Absence of d- orbitals

OR

(a) If attempted any ***one*** reaction with H_2SO_4 + H_2O (Cold/hat) is correct

(i) $K_2Cr_2O_7 + H_2SO_2 \rightarrow 2CrO_3 + KHSO_4 + H_2O$ 1

OR

$2K_2Cr_2O_7 + 8H_2SO_4 \rightarrow K_2SO_4 + 2Cr_2(SO_4)_3 + H_2O + 3O_2$ 1

(ii) $4k_2Cr_2O_7 + 2KOH \rightarrow K_2CrO_4 + H_2O$ 1

(iii) $K_2Cr_2O_7 + 7H_2SO_4 + 6KI \rightarrow 4K_2SO_4 + Cr_2(SO_4)_3 + 7H_2O + 3I_2$ 1

(b) On heating a chloride with cone. H_2SO_4, reddish brown vapours of chromyl chloride are formed. Correct reaction 1

$K_2Cr_2O_7 + 6H_2SO_4 + 4KCl \rightarrow CrO_2Cl_2 + 6KHSO_4 + 7H_2O$ 1

17. (a) Correct chemical reaction of each with $KMnO_4$

(i) $2KMnO_4 + H_2O + KI \rightarrow 2MnO_2 + 2KOH + KIO_3$ 1

(ii) $2KMnO_4 + 3H_2SO_4 + 5H_2S \rightarrow K_2SO_4 + 2MnSO_4 + 3H_2O + 5S$ 1

(iii) $2KMnO_4 + 8H_2SO_4 + 10FeSO_4 \rightarrow K_2SO_4 + 2MnSO_4 + Fe_2(SO_4)_3 + 8H_2O$ 1

(b) Structure of MnO_4^- & hybridization sp^3 2

OR

(a) Correct explanation with example. 3

(b) (i) $Ni\ (28) = 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^8$ 1

(ii) $Zn(30) = 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^{10}$ 1

18. (a) Any two methods with correct chemical reaction of each. $1\frac{1}{2} + 1\frac{1}{2}$

(b) IUPAC name 2

(i) 2-Methylpropanal

(ii) 2- Phenylethanal

OR

(a) Correct Chemical reaction : 1

(i) $HCHO + CaOH(50\%) \rightarrow CH_3OH + HCOONa$

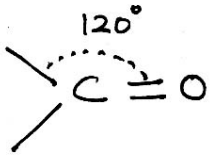
OR

$$C_6H_5CHO + NaOH(50\%) \rightarrow C_6H_5OH + C_6H_5COONa$$

Correct mechanism stepwise 2

(b) Correct structure of carbonyl group

Shape = Ttriangular, Bond angle = 120^0, Hybridization = sp^2 2



SET – C

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1. (i) (A) 1

(ii) (C) 1

(iii) (A) 1

(iv) (B) 1

(v) (C) 1

(vi) (C) 1

(vii) (A) 1

(viii) (A) 1

(ix) (A) 1

(x) (C) 1

(xi) (B) 1

(xii) (B) 1

2. (i) Correct definition Paramagnetism 1

(ii) Correct example : $O_2, Cu^{2+}, Fe^{3+}, Cr^{3+}$ etc. 1

3. FCC crystal: particles at Faec = $6 \times \frac{1}{2} = 3$ 1

Particles at edges = $8 \times 1/8 = 1$

Total number of particles = 3 + 1 = 4 1

4. Correct any ***two*** differences 2

Or **1** mark for ***one*** correct difference.

5. Correct definition :

(i) Positive catalysis 1

(ii) Negative catalysis 1

6. Correct definition optical isomerism 1

Example : $[CO\ (en)_3]^{3+}$, $[Cr\ (OX)_3]^{3-}$ or any other correct example. 1

7. **Wurtz reaction :** ***two*** molecules of alkyl halides react

with Na metal in presence of dry ether to give higher alkane

Example : R - X + 2Na + X-R $\xrightarrow{\text{Dry ether}}$ R-R + 2Na-X

8. Correct explanation with chemical reaction give full credit 2

9. Correct definition : biodegradable polymer. 1

example : PHBV (poly - β-hydroxybutyrate-co-β-hydroxyvalerate 1

10. Correct def. Antiseptics 1

Correct def. Disinfectant 1

11. Definition of Boiling point 1

Correct explanation with diagram 2

12. Correct derivation of the integrated rate equation full credit
Otherwise step wise

A → Products

Rate of reaction a (a-x), dx/dt = k (a-x) 1
dx / (a-x) = kdt

Integrating above equation we get

$$\int \frac{dx}{a-x} = \int k\ dt$$

–ln(a - x) = Kt + I 1

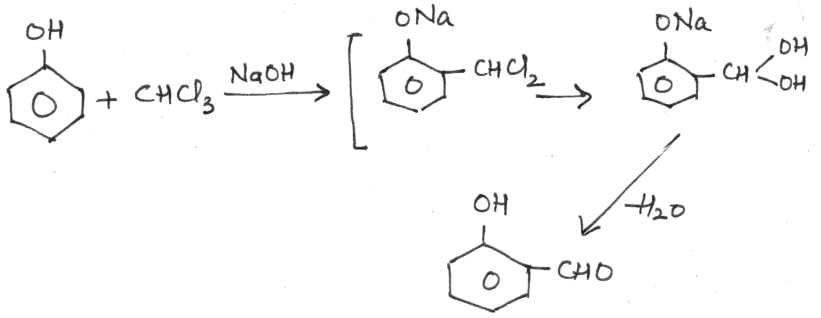
$k = 2.303/t \log a/(a-x)$ or $K = \frac{2.303}{t} \log \frac{[A]_0}{[A]}$ 1

13. Correct def. Benefaction of ore 1

Correct explanation froth floatation process. 2

14. Hint: Treatment of phenol with $CHCl_3$ or CCl_4 in presence of $NaOH$ (aq) at 340K followed by hydrolysis gives salicyaldehyde or salicylic acid called Reimer- Tiemann reaction 1

Correct reaction : 2



15. Correct Def. denaturation of protein 1

Correct explanation with example 2

16. Explanation with

(i) Atomic sizes $2\frac{1}{2}$

(ii) Chemical reactivity $2\frac{1}{2}$

OR

(i) Correct explanation $2\frac{1}{2}$

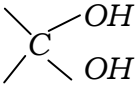
(ii) Correct explanation $2\frac{1}{2}$

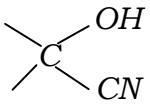
17. (a) Correct explanation 3
(b) Correct explanation 2

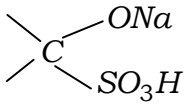
OR

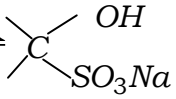
(a) Correct explanation 3
(b) Correct explanation 2

18. (a) Reaction of carbonyl group with

(i) $C=O + H_2O \rightarrow$  1

(ii) $C=O + HCN \rightarrow$  1

(iii) $C=O + N_a^+HSO_3^- \rightarrow$ 

$\rightleftharpoons$  1

(b) Correct explanation with chemical reaction 2

OR

(a) Correct explanation with chemical reaction 3

(b) Any ***two*** imp. uses : 2

(i) As solvent in industry

(ii) As acid bath in textile dyeing ,

(iii) Higher fatty acids used in manufacture of soaps/detergents.

SET – D

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1. (i) (B) 1

(ii) (A) 1

(iii) (C) 1

(iv) (B) 1

(v) (A) 1

(vi) (A) 1

(vii) (D) 1

(viii) (C) 1

(ix) (A) 1

(x) (D) 1

(xi) (A) 1

(xii) (D) 1

2. Hint : Conductivity of a solution is the conductance of ions present in a unit volume of the solution. On dilution, the number of ions per unit volume decreases. Hence, the conductivity decreases. 2

3. Correct definition lyophobic colloids. 1

Example: like gold sol, silver sol etc. 1

4. Correct explanation 2

5. Correct IUPAC name

(i) hexaamminecobalt (III) chloride 1

(ii) potassiumtrioxalatoferrate (Ill) 1

6. Correct explanation with chemical reaction 2

7. Correct explanation give full credit 2

8. Correct definition 1

One correct example: Polythene, Teflon etc. 1

9. Correct explanation of Vitamin A & C 1

Example of source : Vitamin A= Butter, Milk, Carrot etc.

Vitamin C = Citrus fruit, amla, green leafy vegetable. 1

10. Correct def. of Antioxidant

Correct Example : BHT (Butylated Hydroxyl Toluene) 1

BHA (Butylated Hydroxyl Anisole) 1

11. Def. of point defect : 1

Discussion of Schottky defect with example 2

12. Correct def. Osmotic Pressure 1

Correct explanation to show it as Colligative property 2

13. Hint : Given

$= [A]_0 = 5\text{gm}, \ (A) = 3\text{gm}, k = 1.15 \times 10^{-3} s^{-1}$

t = 2.303/k log $[A]_0 / [A]$ 1

$= 2.303 / 1.15 \times 10^{-3} s^{-1} \times \log 5/3$ 1

$= 2 \times 10^3 \log (1.667)\ s = 443.8\ s$ 1

14. Correct def. of primary / secondary / tertiary alcohol. $1\frac{1}{2}$

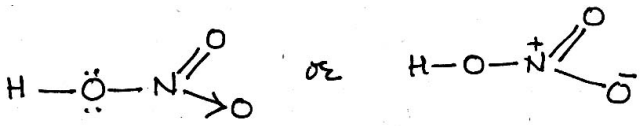
Example : primary alcohol = $CH_3–CH_2–OH$ $\frac{1}{2}$

: secondary alcohol = CH_3-$CH(OH)$–CH_3 $\frac{1}{2}$

: tertiary alcohol = $CH_3 - C(OH) - (CH_3)_2$ $\frac{1}{2}$

15. Correct explanation of deactivating & m-directing nature of nitro group gives full credit otherwise $1\frac{1}{2}$ marks. for each part. 3

16. (a) Correct structure of HNO_3 1



(b) Any ***two*** correct uses of $\underline{HNO_3}$ 2

(i) Manufacture of NH_4NO_3,

(ii) As a reagent in Laboratory

(iii) In the preparation of nitro compounds which are used as perfumes/dyes/Medicines etc.

OR

(a) Correct explanation with diagram of XeF_4 shape = Square planar 1

Bond angle = 90° 1

Hybridization = sp^3d^2 1

(b) Correct explanation of inert pair effect 2

17. (a) Correct electronic configuration

(i) $CO^{2+}(27) = 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^s, 3d^5$

1

(ii) $Ce^{4+}(58) = [Xe]\, 4f^0, 5d^0, 6s^0$ 1

(iii) $Lu^{2+}(71) = [Xe]\, 4f^{14}, 5d^1, 6s^0$ 1

$(Xe\ (54) = 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^{10},$

$4s^2, 4p^6, 4d^{10}, 5s^2, 5p^6)$

(b) Hint : This is because that 2nd ionization energy of Cu^+ is large but hydration energy for Cu^{2+} is much more -ve than for $Cu^+(aq)$. Therefore many compounds are unstable in aqueous solution and undergoes disproportionation. 2

OR

(a) Correct structure of dichromate ion (Cr Sp^3 hybridization)

Any ***two*** imp uses of $K_2Cr_2O_7$. 1

(i) In volumetric analysis 2

(ii) In industry

(iii) In chrome tanning

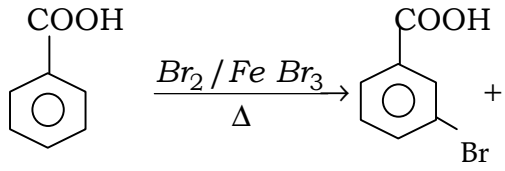
(iv) As oxidizing agent.

(b) Short note on Interstitial comp. 2

18. (a) Correct reaction of each conversion

(i) $CH_3COOH + 6HI \xrightarrow[473\ K]{\text{Red } P} CH_3 - CH_3 + 2H_2O + 3I_2$ 1

(ii) $CH_3COOH \xrightarrow[H_3O^+]{LiAlH_4 / ether} CH_3 - CH_2 - OH$ 1

(iii)  1

(b) Correct explanation. 2

OR

(a) For each Correct reaction

(i) $CH \equiv CH + H_2O \xrightarrow[HgSO_4, 333\ k]{dil\ H_2SO_4} CH_3 - CHO$ 1

(ii) $CH_3CHO \xrightarrow{HCN} CH_3 - C(OH)(CN)$ 1

(iii) $HCHO \xrightarrow{NaOH} CH_3 - OH + HCOONa$ 1

(b) Preparation of *RCOOH* from :

(i) Alcohol

$$R - CH_2 - OH \xrightarrow[\Delta]{KM_nO_4\ (alk)} R - COOK$$

$$\xrightarrow{H^+} R - COOH \quad 1$$

(ii) Nitriles

$$R - C \equiv N + H_2O \xrightarrow[\Delta]{H^+ / OH^-} R - CONH_2$$

$$\xrightarrow[\Delta]{H^+ / OH^-} R - COOH + NH_3 \quad 1$$