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Sample Question Paper -01 (2018-19)

Chemistry

Class- XII

Time Allowed : 3 Hours **Maximum Marks : 70**

GENERAL INSTRUCTION:

a) *All questions are compulsory; however internal choice is given in some questions.*
b) *Section A: Q.no. 1 to 5 are very short answer questions and carry 1 mark each.*
c) *Section B: Q.no. 6 to 12 are short answer questions and carry 2 marks each.*
d) *Section C: Q.no. 13 to 24 are also short answer questions and carry 3 marks each.*
e) *Section D: Q.no. 25 to 27 are long answer questions and carry 5 marks each.*
f) *There is no overall choice. However, an internal choice has been provided in two questions of one mark, two questions of two marks, four questions of three marks and all the three questions of five marks weightage. You have to attempt only one of the choices in such questions.*
g) *Use of log tables is allowed but use of calculators is strictly not allowed.*

Section – A

Q.01 In Corundum, O^{2-} ions from hcp and Al^{3+} occupy two third of octahedral voids. Determine the formula of corundum. 【1】

OR

Conductivity of silicon increases on doping it with phosphorous. Why?

Q.02 Do the vital functions of the body, such as digestion gets affected during fever? Explain your answer? 【1】

Q.03 Arrange the following complexes in increasing order of conductivity of their solution: 【1】

$$[Pt(NH_3)_3Cl_3],\ [Pt(NH_3)_4Cl_2]Cl,\ [Pt(NH_3)_5Cl]Cl_2,\ [Pt(NH_3)_6]Cl_3$$

OR

Arrange the following complexes ions in increasing order of crystal field splitting energy (Δ_0):

$$[Co(Cl)_6]^{3-},\ [Co(CN)_6]^{3-},\ [Co(NH_3)_6]^{3+}$$

Q.04 Why is it necessary to avoid even traces of moisture during the use of a Grignard reagent? 【1】

Q.05 Can nucleic acids, proteins and starch be considered as condensation polymers? 【1】

Section – B

Q.06 An aqueous solution containing 3.12 g of barium chloride in 250 g of water is found to be boil at 100.0832°C. Calculate the degree of dissociation of barium chloride. 【2】

[Given molar mass $BaCl_2$ = 208 g mol^{-1}, K_b for water = 0.52 K/m]

OR

Determine the amount of $CaCl_2$ (i = 2.47) dissolved in 2.5 litre of water such that its osmotic pressure is 0.75 atm at 27 °C. [Given R = 0.0821 atm L K^{-1}]

Q.07 Identify A and B in the following: 【2】

$$C_6H_5COOH \xrightarrow{PCl_5} A \xrightarrow{H_2/Pd-BaSO_4} B$$

OR

Identify A and B in the following:

$$HCHO \xrightarrow{Conc.\ KOH} A + B$$

Q.08 Write complete chemical equations for 【2】

(a) Oxidation of Fe^{2+} by $Cr_2O_7^{2-}$ in acidic medium.

(b) Oxidation of Mn^{2+} by MnO_4^- in neutral or faintly alkaline medium.

Q.09 What happens when: 【2】

(i) Phenol reacts with zinc metal.

(ii) phenol is treated with aqueous bromine.

Q.10 Define following: 【2】

(a) Rate law

(b) Molecularity of a reaction

Q.11 Complete the following chemical equation: 【2】

(a) $XeO_4 + H_2O \rightarrow$

(b) $Cu + HNO_{3(conc.)} \rightarrow$

Q.12 Write the name of monomers of following polymers. 【2】

(i) Nylon - 66

(ii) Teflon

Section – C

Q.13 (a) In reference to Freundlich adsorption isotherm, write the expression for adsorption of gases on solids in the form of an equation.

(b) Write any two important characteristics of lyophilic sols.

(c) Based on type of particles of dispersed phase, give one example each of associated colloid and multimolecular colloid. 【3】

Q.14. (a) What is the significance of Henry's law constant K_H.

(b) What is the advantage of using osmotic pressure as compared to other colligative properties for the determination of molar mass of solutes in solutions?

(c) How does sprinkling of salt help in clearing snow covered roads in hilly areas? Explain the phenomenon involved in the process. 【3】

Q.15 (a) Explain versatile nature of alcohols?

(b) Write the mechanism of dehydration of ethyl alcohol in the presence of conc. H_2SO_4 at 413 K? 【3】

Q.16 (a) Which sugar is called invert sugar? Why is it called so? 【3】

(b) Why must vitamin C be supplied regularly in diet?

(c) Which amino acid is optical inactive and why?

OR

(a) Coagulation of egg white on boiling is an example of denaturation of protein. Explain in terms of structural changes.

(b) How do you explain the presence of an aldehydic group in a glucose molecule?

(c) Write two important functions of nucleic acids?

Q.17 (a) Convert: (i) Acetophenone to ethylbenzene (ii) Methyl chloride to ethanoic acid

(b) How will you distinguish between following pairs by suitable chemical tests.

(i) Benzaldehyde and Acetophenone (ii) Ethanal and propanal. 【3】

Q.18 (a) Explain why some times foaming is seen in river water near the place where sewage water is poured after treatment?

(b) What is scientific explanation for the feeling of depression?

(c) What is the medicinal use of narcotic drugs? (Any two) 【3】

Q.19 (a) An alkyl halide with molecular formula C_4H_9Br is optically active. What is its structure?

(b) Allyl chloride is hydrolysed more readily than *n*-propyl chloride. Why?

(c) *p*-Dichlorobenzene has higher melting point than *o*- and *m*-isomers. Discuss. 【3】

OR

Write the major product when ethyl bromide reacts with following pairs.

(a) $AgNO_3$ and KNO_3

(b) KCN and AgCN

(c) Aq. KOH and alc. KOH.

Q.20 The following data were obtained during the first order thermal decomposition of SO_2Cl_2 at a constant volume. 【3】

$$SO_2Cl_{2(g)} \rightarrow SO_{2(g)} + Cl_{2(g)}$$

Experiment	Time/s^{-1}	Total pressure
1	0	0.5
2	100	0.6

Calculate the rate of the reaction when total pressure is 0.65 atm.

OR

The rate of a reaction quadruples when the temperature changes from 293 K to 313 K. Calculate the energy of activation of the reaction assuming that it does not change with temperature.

Q.21 An element occurs in *bcc* structure. It has a cell edge length of 250 pm. Calculate the molar mass if its density is 8.0 g/cm^3. Also, calculate the radius of an atom of this element. 【3】

Q.22 (a) Name the method of refining to obtain low boiling point metals like mercury.
(b) What is the role of pine oil in froth flotation process?
(c) How is cast iron different from pig iron? 【3】

OR

(a) Indicate the principle behind the method used for the refining of nickel.
(b) What is the role of silica in the extraction of copper?
(c) Reduction of metal oxide to metal becomes easier if the metal obtained in liquid state. Why?

Q.23 How would you account for the following: 【3】

(a) The chemistry of actinoids is more complicated as compared to lanthanoids.
(b) Transition metals form complex compounds.
(c) The enthalpies of atomization of transition metals are quit high.

Q.24 (a) Define synergic effect. 【3】

(b) Write the hybridization and magnetic behaviour of the complex $[Ni(CO)_4]$.
(c) On the basis of crystal field theory, write the electronic configuration of d^6 if,

(i) $\Delta o > P$ (ii) $\Delta o < P$.

Section – D

Q.25 (a) Arrange the following in the order of property indicated against each set: 【5】

(i) F_2, Cl_2, Br_2, I_2 (increasing bond dissociation enthalpy)

(ii) H_2O, H_2S, H_2Se, H_2Te (increasing acidic character)

(b) A colourless gas 'A' with a pungent odour is highly soluble in water and it's aqueous solution is weakly basic. As a weak base it precipitates the hydroxides of many metals from their salt solution. Gas 'A' finds application in detection of metal ions. It gives a deep blue colouration with copper ions. Identify the gas 'A' and write the chemical equations involved in the following:

(i) Gas 'A' with copper ions

(ii) Solution of gas 'A' with $ZnSO_4$ solution.

OR

Answer the following questions

(a) Sulphur in vapour state exhibits paramagnetism.

(b) F_2 is stronger oxidising agent than Cl_2. Why?

(c) Nitric acid forms an oxide of nitrogen on reaction with P_4.Write the formula of the stable molecule formed when this oxide undergoes dimerization.

(d) Bleaching action of chlorine is permanent. Justify.

(e) Write the disproportionation reaction of that oxoacid of nitrogen in which nitrogen is in +3 oxidation state.

Q.26 (a) Identify A and B in the following sequence of reaction. 【5】

$$\boldsymbol{C_7H_7ON\ (A)} \xrightarrow{Br_2+KOH} \boldsymbol{C_6H_5NH_2} \xrightarrow{CHCl_3+NaOH} \boldsymbol{(B)}$$

(b) Illustrate the following reaction giving suitable example in each case:

(i) Gabriel phthalimide synthesis

(ii) Diazotization

(c) A compound Z with molecular formula C_3H_9N reacts with $C_6H_5SO_2Cl$ to give a solid, insoluble in alkali. Identify Z.

OR

(a) Identify A and B in the following sequence of reaction.

$$C_6H_5NH_2 \xrightarrow{CH_2COCl/Pyridine} (A) \xrightarrow{Br_2\ /H^+} (B)$$

(b) Illustrate the following reaction giving suitable example in each case:

(i) Hoffmann's Bromamide degradation reaction

(ii) Coupling reaction

(c) Arrange the following in the increasing order of their basic character in aqueous solution:

CH_3NH_2, $(CH_3)_2NH$, $(CH_3)_3N$

Q.27 (i) Predict the products of electrolysis of the following: 【5】

(a) An aqueous solution of $AgNO_3$ with Silver electrodes.

(b) An aqueous solution of $CuCl_2$ with platinum electrodes.

(ii) The conductivity of 0.001 M acetic acid is 4×10^{-5} S cm^{-1}. Calculate the dissociation constant of an acid, if molar conductivity at infinite dilution for acetic acid is 390 S cm^2 mol^{-1}.

OR

(i) State Kohlrausch law of independent migration of ions. Write an expression for the molar conductivity of acetic acid at infinite dilution according to Kholrausch's law.

(ii) A voltaic cell is set up at 25°C with the following half cells Al^{3+} (0.001 M) and Ni^{2+} (0.50 M).

Write an equation for the reaction that occurs when the cell generates an electric current and determine the cell potential.

[Given; $E^\circ_{Ni^{2+}/Ni}$ = - 0.25 V, $E^\circ_{Al^{3+}/Al}$ = -1.66 V]

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Chemistry

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Q.No.	Answers	Marks
Q.01	Al_2O_3 **OR** It is because silicon forms n-type semiconductor in which electron are free to move.	01 **OR** 01
Q.02	Yes, because these are condensation polymers involving loss of small molecules like H_2O, NH_3 etc., therefore, these are step growth polymers.	01
Q.03	$[Pt(NH_3)_3Cl_3] < [Pt(NH_3)_4Cl_2]Cl < [Pt(NH_3)_5Cl]Cl_2 < [Pt(NH_3)_6]Cl_3$ **OR** $[Co(Cl)_6]^{3-} < [Co(NH_3)_6]^{3+} < [Co(CN)_6]^{3-}$	01 **OR** 01
Q.04	Enzymes help in digestion process which works well at optimum temperature at 298 to 310 K. During fever, enzymatic activity is affected due to increases in temperature(>310 K)	01
Q.05	It is because Grignard reagent reacts with water to give hydrocarbon.	01
Q.06	$BaCl_2 \rightarrow Ba^{2+} + 2Cl^- \; ; n = 3$ $\Delta T_b = i \times K_b \times m$ $\Delta T_b = 373.0832\,K - 373.0\,K = 0.0832\,K$ $0.0832 = i \times 0.52 \times \frac{3.12 \times 1000}{208.34 \times 250}$ $i = 2.67$ $\alpha = \frac{i-1}{n-1}$ $\alpha = \frac{2.67-1}{3-1} = 0.835\ or\ 83.5\ \%$ **OR** $\pi V = i\frac{W_B}{M_B} RT$ $0.75\ atm \times 2.5\ L = 2.47 \times \frac{W_B}{111} \times 0.082 \times 300\ K$	½ ½ 1 1 **OR** 1 1

	$W_B = 3.425\ g$	½
	$No.\ of\ moles = \frac{3.425}{111} = 0.03\ mol$	½
Q.07	$C_6H_5COOH \xrightarrow{PCl_5} C_6H_5COCl \xrightarrow{H_2-pd-BaSO_4} C_6H_5CHO$ **OR** $HCHO \xrightarrow{Conc.\ KOH} CH_3OH + HCOOH$	½ + ½ **OR** ½ + ½
Q.08 (i)	$Cr_2O_7^{-2} + 6\,Fe^{+2} + 14H^+ \rightarrow 2\,Cr^{+3} + 6\,Fe^{+3} + 7\,H_2O$	01
(ii)	$2\,MnO_4^- + 3\,Mn^{+2} + 2\,H_2O \rightarrow 5\,MnO_2 + 4H^+$	01
Q.09 (i) (ii)	Benzene is formed Tri bromo phenol is gformed	 01 01
Q.10 (a) (b)	The sum of powers to which the concentrations terms are raised in a rate law expression is called order of reactions. It is defined as the number of atoms or molecules or ions which must collide to each other simultaneously as to result in chemical reaction.	 01 01
Q.11 (a) (b)	$6XeO_4 + 12H_2O \rightarrow 4Xe + 2XeO_3 + 24HF + 3O_2$ $3Cu + 8HNO_{3(dilute)} \rightarrow 3Cu(NO_3)_2 + 2NO_2 + 4H_2O$	 01 01
Q.12 (a) (b)	Adipic acid and hexamethylene diamine Tetra fluoro ethane	 01 01
Q.13 (a) (b) (c)	$log\frac{x}{m} = \log k + \frac{1}{n}\log p\ \ or\ \ \frac{x}{m} = k\ .\ P^{\frac{1}{n}}$ Lyophilic sols are stable and reversible. Soaps and detergents from associated colloids. Whereas As_2S_3 and gold sol form multimolecular sols.	01 ½ + ½ ½ + ½
Q.14 (a) (b) (c)	The higher the value of K_H, the lower will be the solubility of the gas in the liquid. Osmotic pressure is determined at room temperature and has appreciable value which can be easily measured. When salt is spread over snow covered roads, snow starts melting from the surface because of the depression in freezing point of water and it helps in clearing the roads.	 01 01 01

Q.15		
(a)	Alcohols act as electrophiles as well as Nucleophiles (Explanation)	01
(b)	Mechanism of dehydration of ethyl alcohol in the presence of conc. Sulphuric acid at 413 k, it gives the yield of diethyl ether. *Protonation of alcohol $C_2H_5OH + H^+ \rightarrow C_2H_5OH_2^+$ *Nucleophilic attack of alcohol $C_2H_5OH_2^+ + C_2H_5OH \rightarrow C_2H_5O^+C_2H_5$ (H) *Deprotonation $C_2H_5O^+C_2H_5$ (H) $\rightarrow C_2H_5OC_2H_5 + H^+$	02
Q.16		
(a)	Sucrose is called invert sugar.	½
(b)	Because, sucrose is dextrorotatory but after hydrolysis gives laevorotatory mixtures of glucose and fructose.	½
(c)	Vitamin C is water soluble therefore it is readily excreted in urine and cannot be stored in our body.	01
(a)	Glycine, because 2 H-atom contains by carbon, or all four atom/group are not different. **OR** The hydrogen bonds are disturbed. Due to this, globules unfold and helix get uncoiled and protein loses its biological activity.	½ + ½ **OR** 01
(b)	Glucose reacts with mild oxidant like Br_2 water and gives the Gluconic acid, which indicates the presence of aldehydic group in it.	01
(c)	Two functions of nucleic acids are: **Replication **Protein synthesis	½ ½
Q.17		
(a) i.	$C_6H_5COCH_3 \xrightarrow{NH_2,KOH,ethylene\ glycol} C_6H_5CH_2CH_3 + H_2O$	½
ii.	$CH_3Cl + KCN \rightarrow CH_3CN + H_2O \xrightarrow{H^+} CH_3COOH$	½
(b) i.	Aceto phenone + I_2 solution + NaOH → yellow ppt of iodoform is formed. Benzaldehyde + I_2 solution + NaOH → No yellow ppt of iodoform is formed.	01
ii.	Ethanal + I_2 solution + NaOH → yellow ppt of iodoform is formed. Propanal + I_2 solution + NaOH → No yellow ppt of iodoform is formed.	01

Q.18		
a)	Detergents persist in water even after sewage treatment and therefore, cause foaming in river water.	01
(b)	A person suffers from depression when he has low level of noradrenaline. Low level of noradrenaline lowers the signal-sending activity and make the person suffer from depression.	01
(c)	The narcotic drugs relive pain and produce sleep. Therefore, these are commonly used for the relief of postoperative pain, cardiac pain and pain of terminal cancer and in child birth.	½ ½
Q.19		
(a)	2-bromo butane **(marks awarded for Structure)**	01
(b)	Due to resonance in allyl chloride it becomes more stable or less reactive towards hydrolysis.	01 01
(c)	p-dichlorobenzen is a symmetrical structure which is better fit in crystal lattice, thus it required more temperature/energy to overcome the lattice energy.	½
	OR	
(a)	$C_2H_5Br + AgNO_3 \rightarrow C_2H_5NO_2$	½
	$C_2H_5Br + KNO_3 \rightarrow C_2H_5ONO$	
(b)		½
	$C_2H_5Br + KCN \rightarrow C_2H_5CN$	½
(c)	$C_2H_5Br + AgCN \rightarrow C_2H_5NC$	½
	$C_2H_5Br + KOH_{(alc)} \rightarrow C_2H_4.$	½
	$C_2H_5Br + KOH_{(aq)} \rightarrow C_2H_5OH$	
Q.20	$SO_2Cl_{2(g)} \rightarrow SO_{2(g)} + Cl_{2(g)}$ Pi 0 0 Pi – x x x	
	Pt = Pi + x+ x = Pi + x	½
	As we know that from 1st order reaction in gaseous state can be written as,	½
	$$k = \frac{2.303}{t} log \frac{p_i}{2p_i - p_t}$$	
	At 100 sec	
	$$k = \frac{2.303}{100} log \frac{0.5}{2 \times 0.5 - 0.6}$$	01
	$$k = \frac{2.303}{100} log \frac{0.5}{0.4} = 2.23 \times 10^{-3} s^{-1}$$	
	Pi + x = Pt **0.50 + x = 0.65** **x = 0.15**	
	$$Rate = k(p_{(SO_2Cl_2)} = k\,(p_i - x)$$	01
	$$= 2.23 \times 10^{-3}\,(0.5 - 0.15) = 7.805 \times 10^{-4} atm\, s^{-1}$$	
	OR	**OR**

	$$log\frac{k_2}{k_1} = \frac{E_a}{2.303\,R}\left(\frac{T_2 - T_1}{T_1T_2}\right)$$	01
	$$log\,4 = \frac{E_a}{2.303 \times 8.314}\left(\frac{313 - 293}{293 \times 313}\right)$$	½
	$$E_a = \frac{19.147 \times 313 \times 293}{20 \times 1000} \times 0.6021$$	½
	$$E_a = 52.86\ kj\ mol^{-1}$$	½ + ½
Q.21	$$d = \frac{Z \times M}{a^3 \times N_A}$$	½
	$$M = \frac{d \times a^3 \times N_A}{Z}$$	1
	$$M = \frac{8.0 \times (250)^3 \times (10)^{-30} cm \times 6.023 \times 10^{23}}{2}$$	½
	$$M = 37.64\ gm/mol$$	
	For bcc, $4r = \sqrt{3}\,a$	½
	$$r = \frac{\sqrt{3}\,a}{4}$$	
	$$r = \frac{1.732 \times 250}{4} = 108.25\ pm$$	½
Q.22		
(a)	Distillation	01
(b).	It acts as collector.	01
(c)	Cast iron is harder than pig iron.	01
	OR	**OR**
(a)	Nickel can refine by vapour phase refining, principle associated with as following. **Metal can convert into volatile substances with a suitable reagent like CO. **Volatile compound can easily decomposable.	01
(b)	FeO is gangue. SiO_2 acts as flux to remove FeO by chemical reaction in the form	01
(c)	of slag. The entropy is higher if metal is in liquid state. ΔS is more +ve, so the value of ΔG^o becomes more –ve and the reduction becomes easier.	01
Q.23		
(a)	It is because they are radioactive and some of them have very short half-life.	01
(b)	It is due to small size, high charge and availability of vacant *d* –orbital of suitable	01
(c)	energy. It is due to smaller size of transition metals and strong metallic bonds due to the presence of of large number of unpaired electrons.	01

Q.24		
(a)	The metal carbon bond in metal carbonyls possess both s and p character. The M-C sigma bond is formed by the donation of lone pair of electrons on the carbonyl carbon into a vacant orbital of the metal. The M-C pi bond is formed by the donation of a pair of electron from a filled d orbital of a metal into the vacant antibonding orbital of carbon monoxide. The metal to ligand bonding creates a synergic effect which strengthens the bond between CO and the metal.	1
(b)	Hybridization = sp^3	½
	Magnetic behaviour = Diamagnetic	½
(c)	$\Delta o > P$, $d^7 = t_{2g}^6 e_g^0$	½
	$\Delta o < P$, $d^7 = t_{2g}^5 e_g^1$	½
Q.25		
(a) (i)	$I_2 < F_2 < Br_2 < Cl_2$	01
(ii)	$H_2O < H_2S < H_2Se < H_2Te$	01
(b) (i)	NH_3	01
(ii)	$Cu^{+2}_{(aq)} + 4NH_3 \rightarrow [Cu(NH_3)_4]^{+2}_{(aq)}$	01
(iii)	$ZnSO_{4\,(aq)} + 2\,NH_4OH_{(aq)} \rightarrow Zn(OH)_{2(s)} + (NH_4)_2SO_{4(aq)}$	01
	OR	**OR**
(a)	Sulphur has unpaired electron in its antibonding orbitals.	01
(b)	Due to low bond dissociation enthalpy and high hydration enthalpy of F_2.	01
(c)	N_2O_4	01
(d)	Bleaching action of chlorine is permanent due to oxidation of chlorine. $Cl_2 + H_2O \rightarrow 2\,HCl + [O]$ Coloured substance + [O] → Colourless substance	01
(e)	$HNO_2 \rightarrow HNO_3 + H_2O + 2\,NO$	01
Q.26		
(a)	**'A' = $C_6H_5CONH_2$, 'B' = C_6H_5NC**	01 + 01
(b)	**NCERT PART-II – PAGE NO. – 386 & 396**	01 + 01
(c)	Z = $CH_3 - NH - C_2H_5$	01
	OR	**OR**
(a)	**'A' = $C_6H_5NHCOCH_3$, 'B' = *p*-Br-$C_6H_5NH_2$**	01 + 01
(b)	**NCERT PART-II – PAGE NO. – 386 & 398**	01+ 01
(c)	$(CH_3)_3N < CH_3NH_2 < (CH_3)_2NH$	01
Q.27		
(i) (a)	$at\ anode: [Ag_{(s)} \rightarrow Ag^+_{(aq)} + e^-]\ Oxidation$	½
	$at\ cathode: [Ag^+_{(aq)} + e^- \rightarrow Ag_{(s)}]\ Reduction$	½
	$CuCl_2 \rightarrow Cu^{2+} + 2Cl^{-1}$	

(b)	$H_2O \rightarrow H^+ + OH^{-1}$ $at\ anode: [2Cl^{-1} \rightarrow Cl_2 + 2e^-]\ Oxidation$ $at\ cathode: [Cu^{2+}_{(aq)} + 2e^- \rightarrow Cu_{(s)}]\ Reduction$	½ ½
(ii)	$$\Lambda_m = \frac{1000\kappa}{M} = \frac{1000 \times 4 \times 10^{-5}}{0.001} = 40\ S\ cm^2\ mol^{-1}$$	01
	$$\alpha = \frac{\Lambda_m}{\Lambda_m^o} = \frac{40}{390} = 0.1026$$	01
	$$K_a = \frac{C\alpha^2}{1-\alpha} = \frac{0.001 \times (0.1026)^2}{1-0.1026} = 1.17 \times 10^{-5} mol\ L^{-1}$$	01
	OR	
(i)	Kohlrausch's law of independent migration of ions: According to this law, molar conductivity of an electrolyte, at infinite dilution, can be expressed as the sum of the contribution from its individual ions. $$\Lambda_m^o CH_3COOH = \lambda_m^o CH_3COO^- + \lambda_m^o H^+$$	01 01
(ii)	$$[Al_{(s)} \rightarrow Al^{3+}_{(aq)} + 3e^-] \times 2$$ $$[Ni^{+2}_{(aq)} + 2e^- \rightarrow Ni_{(s)}] \times 3$$ $$2\ Al_{(s)} + 3\ Ni^{+2}_{(aq)} \rightarrow 2\ Al^{3+}_{(aq)} + 3\ Ni_{(s)}\ ; n = 6$$	01
	$$E_{cell} = \left(E^o_{Ni^{+2}/Ni} - E^o_{Al^{+3}/Al}\right) - \frac{0.0591}{n} \log \frac{[Al^{+3}]^2}{[Ni^{+2}]^3}$$	½
	$$E_{cell} = [-025 - (-1.66)] - \frac{0.0591}{6} \log \frac{[10^{-3}]^2}{[0.50]^3}$$	01
	$$E_{cell} = 1.41\ V - \frac{0.0591}{6} \log \frac{8 \times 10^{-6}}{1}$$ $$E_{cell} = 1.46\ V$$	½

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