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Assiut University
Faculty of science **January 2024**
Chemistry Departement **Time 2 hours**

Final examination in organic chemistry 211C for non chemistry students(chemistry Of aliphatic compounds and some selected aromatic compounds)

Answer the following questions **50marks**

Question1 Answer five only of the following **20 marks**

- a- Reaction of 1,3-butadiene with HBr and give the type of this reaction
b—Complete the following reactions
$HOCH_2CH(OH)CH_2OH$+conc.H_2SO_4/heat----------? + HCN----------?
c-Reaction of 3-methyl-1-butene with NBS/ROOR,give the type of this reaction
d-Reaction of sodi malonic ester wth bromocyclohexane followed by hydrolysis
e-Reaction of EAA(ethyl acetoacetate) with $MeNHNH_2$ and name the product
f-Predict the major product and propose a mechanism for the following reaction
Iodocyclohexane+MeOH/heat----------?

Question 2 Answer five only of the following---------- 20 marks
a-Reaction of 3-phenylpropene with HCl and give a mechanism
b-Prepare phenylethene from benzene
c-Predict the major product of the following reaction and give a mechanism
1-bromobutane +alc.KOH/heat----------?
d-Reaction of benzene with $ClCOCH_3$/AlCl3and propose a mechanism
e-Complete the following sequences of reactions
Bromobenzene+ethyl bromide/Na/ether------?+KMnO4-------? +HNO3/H2SO4---------?
f-Which of the following compounds reacts with bromine without lewis acid(ALCL3).predict the product and condition iPhNHCOMe, iiPhCl iiiPhBr iv-PhCOOH –

Question 3 Carry out the following conversions---------- 10 marks
a-p-bromoacetanilide to m-dibromobenzene
b-Benzene to 3-bromopropylbenzene

GOOd LuCk
Prof.Dr.Sh.M.Radwan

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Assiut University **January 2023**
Faculty of Science
Department of Chemistry **Time: 2 hours**

Final Exam. of Organic Chemistry "C-201" for 2nd year Students

Section (A) (Aliphatic Chemistry)

Answer the following questions.

1) Write the structures for five only from the following compounds: (5 Marks)

a) Acetophenone b) Formic anhydride c) N,N-diethylpropane amide

d) Valeric acid e) 3-Methylbutanal f) Acetyl chloride

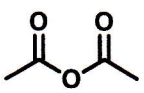
2) Write one method to prepare five only: (5 Marks)

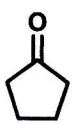
a) 3-Pentanone b) Acetic Formic anhydride c) Acetyl chloride

d) Acetic acid e) Formamide f) Urea

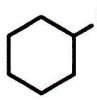
3) Complete the following equations: (8 Marks)

(i) $CH_3CONH_2 \xrightarrow{P_2O_5}$?

(ii)  $\xrightarrow{Cl_2}$?

(iii)  $\xrightarrow{NH_2NH_2.H_2O}$? $\xrightarrow{KOH/\ heat}$?

(iv) $CH_3CH_2CH_2Br \xrightarrow[ii)\ H_2O/\ H^+/\ heat]{i)\ NaCN}$? $\xrightarrow[H^+]{CH_3OH}$?

(v)  $\xrightarrow[ii)\ H_2O/H^+]{i)\ CO_2}$?

(vi) $H_2C{=}C{=}O + HCOOH \longrightarrow$?

4) Write the mechanism for the reaction of ethylamine with acetic anhydride. (4 Marks)

5) Arrange the following acids according to the acidity from weak to strong acid: (3 Marks)

$ClCH_2CO_2H$, ICH_2CO_2H, FCH_2CO_2H, CH_3CO_2H, $BrCH_2CO_2H$

Section (B) (Aromatic Chemistry)

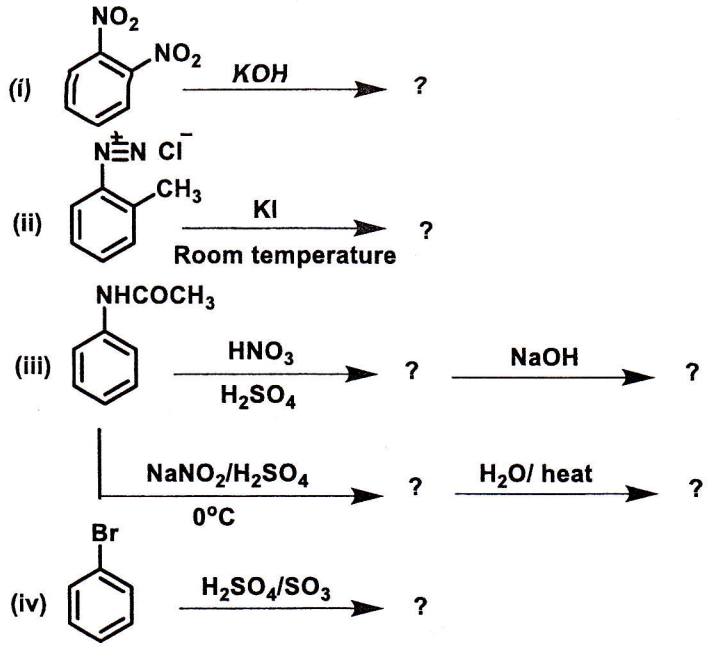
Answer the following questions:

1) Write the structures for five only from the following compounds: (5 Marks)

a) 2,4-Dimethoxybenzaldehyde **b) TNP** **c) *p*-aminobenzoic acid**

d) 2,4,6-Tribromotoluene **e) Biphenyl** **f) 3-Fluoroaniline**

2) Complete the following equations: (4 Marks)



3) Starting with benzene, how would you prepare five only: (10 Marks)

a) Fluorobenzene **b) *p*-Nitrobenzoic acid** **c) Benzoic acid**

d) Aniline **e) 2,6-Dinitrophenol** **f) p-Chlorobenzene sulfonic acid**

4) By equations only, illustrate the mechanism of the following: (6 Marks)

i) Preparation of acetophenone **ii) Preparation of bromobenzene**

Regards,
Dr. Abdelreheem A. Saddik

Assiut University
Faculty of science
Department of chemistry

Jan. 2024
Time: 2h

Inorganic chemistry (1) (220 Chem.)

Answer the following questions: (10 Marks)

A- Mark with (x) for the wrong statement or (√) for the correct statements of the following :

1- Iodine has lower reactivity than group (VII) elements. ( )
2- Lithium has higher electronegativity than Flourine. ( )
3- Reactivity of HBr is lower than HI. ( )
4- Water gas is made by blowing air through red hot coke. ( )
5- Sodium salts conduct electricity more than Lithium salts. ( )
6- Freon does not cause any damage to ozone layer. ( )
7- Helium forms calthrate compounds . ( )
8- Compounds formed by halogens and metals are covalent.( )
9- Diamond conducts electricity more than Graphite. ( )
10- Hydrogen peroxide can act as both reducing and oxidizing agent. ( )

B- Give reason for the following statements: (Answer Five only) (10 Marks)

1- Products of the reaction of NH_3 with chlorine are dependent on the amount of chlorine.
2- Oxygen is never more than divalent.
3- CO is a poisonous gas for human beings.
4- Cesium salts conducts electricity more than sodium salts.
5- Tl (II) is more stable than Tl (IV).
6- Xenon reacts directly with fluorine depending on the ratio of xenon to fluorine.

C- Complete the following statements: (5 Marks)

1- Complex formation is dependent on 1....2....3....
2- The mixture of CO , N_2 called .....
3- The acidity of HF is ..... than HI
4- The Diagonal relationship in periodic table exists between .....
5- The melting point of lithium salts is lower than calcium salts due to 1..... 2.....
6- Permanente hardness is due to the presence of 1..... 2.....

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D- Write the preparation equation of the following : (Choose Five only)

1-HF 2- Thermite reaction 3- CO 4- H_2 5- H_2O_2 6- interhalogen (10 Marks)

E- Complete the following equations: (Choose Five only) (5 Marks)

1- **Xe + F_2 (2:1 mixture) $\longrightarrow$**

2- **NH_3+ NaOCl $\longrightarrow$**

3- **$NH_4NO_3 \longrightarrow$**

4- **CaO+ $H_2O \longrightarrow$**

5- **LiN+ $H_2O \longrightarrow$**

6- **$4O_3$+3PbS $\longrightarrow$**

F- Write the structure of the following : (Choose Five only) (5 Marks)

1- **Diboran** 2- **Hydrazine**

3- **Freon** 4- **Dithionic acid**

5-**Some Xenon compounds** 6- **nitrogen sesquioxide**

"Good Luck "

Examiner

Prof. Dr. Dina M. Fouad

Assiut University
Faculty of Science
Chemistry Department

2 January 2024
Time: 2 Hours
Inorganic Chemistry

Final Examination for the 2nd Year Students of Materials Science and Nanotechnology Program (Chem203)

Answer the Following Questions: (50 Marks)

1) Give reasons that may explain the following: (10 Marks)
   a) Pb(II) compounds are more stable than Pb(IV) compounds.
   b) CO is toxic to human.
   c) Adding glucose to H_3BO_3 solution during titration with NaOH.
   d) CrO_4^{2-} is strong oxidizing agent, while MoO_4^{2-} and WO_4^{2-} are stable.
   e) Graphite conducts electricity.

2) Write the IUPAC name, primary and secondary valence for the following coordination compounds: (10 Marks)
   (a) $[Co(NH_3)_6]Cl_3$ (b) $[Cr(en)_2Cl_2]^+$ (c) $K_3[Fe(CN)_6]$ (d) $K_2[PtCl_4]$
   e) $Ag[Ag(CN)_2]$

3) Write the formula of the following compounds: (10 Marks)
   a) Pyroposphoric acid b) Orthophosphoric acid c) Chromyl chloride d) Diborane
   e) Cryolite

4) Complete the following equations (balance if necessary): (10 Marks)
   a) $(VO)^{2+} + H^+ + Sn^{2+}$ = ... +..... + ...
   b) $BiCl_3 + H_2O$ = ... + ...
   c) $2VF_4$ + Heat = ... + ...
   d) $K_2Cr_2O_7$ + S = ... + ...
   e) CrO_3 + NaOH aq. = ... + ... + ...
   f) $2NH_4VO_3$ + Heat = ... + ... + ...
   g) $K_2Cr_2O_7$ + HCl (conc. H_2SO_4) = ... +.....+ .....
   h) $TiCl_4$ + HCl = ... + ...

5) Choose the correct answer from the following: (10 Marks)
   1. Permanganate ion MnO_4^- has intense purple color due to:
      a) d-d Transition b) Charge transfer c) Defect in the crystal structure d) Polarization
   2. Ziegler-Natta catalyst is used in the ethylene polymerization, it is composed of:
      a) $TiCl_4$ b) $TiCl_4/AlEt_3$ c) $TiCl_2$ d) $TiOCl_2$
   3. $Fe_{0.95}O$ is a non-stoichiometric oxide, it has:
      a) Deficient oxygen sites b) Deficient Fe sites c) Rich oxygen sites d) Rich Fe sites
   4. In the vanadium group, the basic properties of the oxides M_2O_5 .....down the group.
      a) Increase b) Decrease c) Remain unchanged d) None of them

5. Boron has several allotropes, all are based on:

a) B4 tetrahedral b) B6 octahedrons c) B12 icosahedron d) none of them

6. The catalyst used in Haber-Bosh process for the industrial preparation of ammonia is:

a) V_2O_5 b) Finely divided Ni c) Promoted iron d) Pd

7. With increasing the number of unpaired electrons, the magnetic moment (μ):

a) Decreases b) Increases c) Doesn't affect d) None of them

8. The oxide N_2O_4 is:

a) Colorless and paramagnetic b) Colored and diamagnetic
c) Colorless and diamagnetic d) Colored and paramagnetic

9. In naming of the coordination compounds ..... always named first.

a) Metal ion b) Ligands c) Cations d) Counter ion

10. During the formation of the complex compounds, metal ion act as:

a) Lewis acid b) Arrhenius acid c) Arrhenius base d) Lewis base

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Best Wishes

Examiner: Dr. Mohamed Abdel megeed

Assiut university
Faculty of science
Chemistry department

Date: 02/01/ 2024
Time allowed: 3 hours

Final exam in 210 C course for second level's students

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Answer the following questions: .....(50 marks).
Part 1 (Reaction Mechanism)..... (25 marks).
I- Mark (√) or (X) for the following sentences (write your answers in table): (5 Marks)

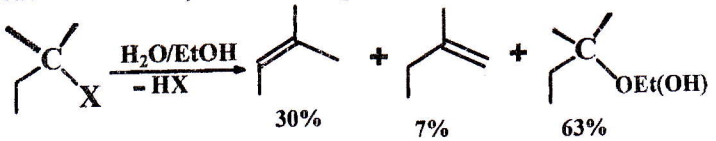
1. Tertiary alkyl halides react rapidly in protic solvents by a mechanism that involves departure of the nucleofuge prior to addition of the nucleophile.
2. Chemical trapping and isolation are methods used to determine the rate of reaction.
3. Toluene considers as a polar solvent.
4. Markowinkoff's rule is observed only when asymmetric alkene react with symmetric reagent.
5. The E_1cB mechanism is usually second order rate law.

II- Choose the correct answer for the following questions: ..... (10 marks)

1.Which of the following compound is classified as allylic halide:
a. $PhCH{=}CBrCH_3$, b. $PhCH{=}CH\text{-}CH_2Br$, c. $PhCBr{=}CHCH_3$
2. which alkyl halid of the following reacts with CH_3O^- via S_N2 reaction:
a. (S)-2-bromopentane , b. (R)-2-bromo-2-methylbutane , c. (R)-2-bromo-2-methylpentane
3. Cyclopentyl bromide reacts with sodium cyanid in the precense of DMSO to give:
a. cyclopentylcyanid, b. cyclopentene , c. cyclopentylcyanid and cyclopentene .
4. Which of the following reagent would you expect to react with 2-bromopropane to give a substitution product. a. H_2O , b. NaN_3 , c. HCOOH , d. CH_3OH
5. The compound $PhCH_2CH_2CH_2Br$ reacts with CH_3COONa/DMSO via :
a. S_N1, b. S_N2, c. E1, d. E2
6.Allylic and benzylic intermediates stabilized by :
a. delocalization of charge , b. positive inductive effect , c. positive hyperconjugation
7.Electron donating groups :
a. weakens the acidity of carboxylic acids., b. strenthens the acidity of carboxylic acids., c. no effect.
8. Which acid is most highly ionized in water?
a. $(CH_3)_2CHCOOH$, b. CH_3CH_2COOH , c. Cl_2CHCH_2COOH , d. CH_3CCl_2COOH
9. Based on Saytzeffs rule, select the most stable alkene :
a. 1-methylcyclohexene , b. 3-methylcyclohexene , c.4-methylcyclohexene, d. They are all of equall stability
10. Which of the following bases gives the highest anti-Zaytsev product in E2 reactions when reacted with 2-iodo-2,3-dimethylpentane ?
a. $(CH_3)_3CO^-$, b. CH_3O^- , C. $(CH_3)_2CHO^-$, d. $CH_3CH_2O^-$

III-answer the following: .....(10 Marks):

a. Draw the reaction mechanism with showing the selectivity, the energy diagram and type of the reaction for:
1,4-dimethyl-1-cyclohexene + H_2O/H^+ →
b. HI with 2-methylpropene in the presence of sun light.
c. Suggest the reactants which will react to give t.butyl-ethyl ether and then write the suitabule mechanismd.
d. Arrange the following according to its nucleophilicity order:
CH_3O^- HO^- $C_6H_5O^-$ CH_3OH H_2O
e. Give reason if X is Cl, Br or I the percent of products not change



Part 2 (Carbonyl Compounds) ..... (25 marks)

IV. (a) Explain by equation the following reaction and then discuss the mechanism, name the products and give the name of reaction (One Only) (2 marks)
1. Condensation of ethyl acetat in the presence of EtO^-Na^+.
2. Oxidation of acetophenone in the presence of RCO_3H .
3. Oxidation of 2-Propanol with oxallyl chloride in presence of DMSO.

(b) Choose the correct answer from the following: (Two Only) (2 marks)

1. Which of the following compounds would give the Aldol condensation reaction:
   (i) Benzyl alcohol (ii) Benzaldehyde (iii) Acetophenone
2. The product formed when treatment of 2-Propanone with ethylene glycol in acidic medium is
   (i) Cyclic acetal (ii)Acetal (iii)Hemiacetal
3. Oxidation of allylic alcohol to aldehyde in presence of PDC is called
   (i) Jones Oxidation (ii) CoreyShmidt Oxidation (iii) Collins Oxidation

(c) Mark(√)or (x) for (Five Only) from the following sentences (5 marks)

1. Ethyl formate esters can not undergo Claisen self condensation.
2. All aldehydes and ketones react with base to give α ,β-unsaturated ketone via aldol condensation.
3. Dichloroacetic acid is more acidic than difluoroacetic acid.
4. Zn/(Hg)/conc.HCl convert 2-butanone into 2-butanol .
5. The most reactive of carboxylic acid derivatives is amide
6. Dimethyl ketone reacts with $LiAlH_4$ forming 2-propanol .

(d) Startig with ethylacetoacetat , dimethyl malonate or acetic anhydride show by equations how to synthesis (Tow Only): (2 marks)

a. Cyclopentane carboxylic acide b. 3-phenyl-2-butanone
c. 2-Methylpropanoic acid d. Acetamide

V. (a) What products, would you expect from the reaction of (Two Only) (2 marks)

1. Heating of CH_3CHO in NaOH 2.1,3-Butadiene with 2- propenal
3. Heating of benzoic acid with PCl_5 .

(b) Draw the structure formula of the following : (2 marks)

(a) 3-Pentynoic acid (b) 4,6-Dimethylheptanal (c) 5,5-Dichloro-3-hexanone

(c) Compelet the following equations. (Five Only).....(5 marks)

1. Butanal + 2 Ethanol $\xrightarrow{H^+}$ --------

2. PhCHO + CH_3CHO $\xrightarrow[(ii)\ -H_2O]{(i)\ OH^-}$ -------

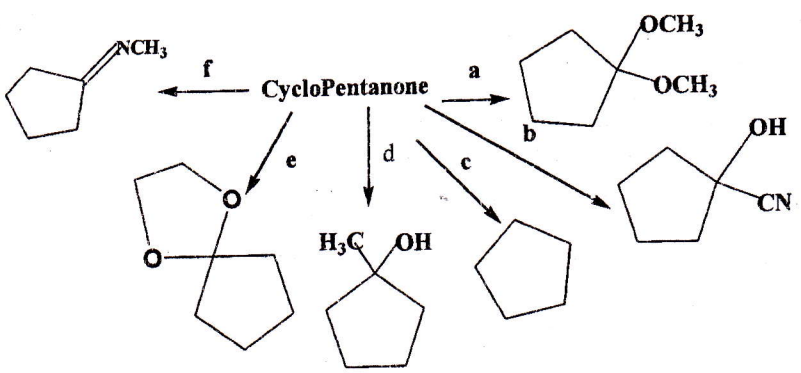
3. 1-Methylcyclohexen $\xrightarrow[(ii)Zn/H^+]{(i)\ O_3}$ ------

4. $CH_3COOC_2H_5$ $\xrightarrow{DIBAl\text{-}H}$ -----

5.  $\xrightarrow[H_2O]{Hg^{++}/\ H_2SO_4}$ -----

6. $C_6H_5CH_2Cl$ + NaCN $\xrightarrow{H_3O+}$ ------

(d)Show reagent and conditions to bring each reaction (Five Only): ....., (5 marks)



Good Luck

الممتحنين : ا.د.عادل محمد كمال أ.د. زينب حزين ا.د.اميمه سعد د. أحمد عبده

Assiut University
Faculty of Science
Department of Chemistry

January 2023

Time: 2 hours

Final Exam. of Organic Chemistry "C-201" for 2nd year Students

Section (A) (Aliphatic Chemistry)

Answer the following questions.

1) Write the structures for <u>five only</u> from the following compounds: (5 Marks)

a) Acetone b) Acetic anhydride c) N-Ethyl-N-methyl propane amide

d) α-Chlorobutyric acid e) Propanal f) Acetyl chloride

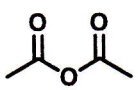
2) Write one method to prepare <u>five only</u>: (10 Marks)

a) 2-Butanone b) Formic anhydride c) Acetaldehyde

d) Propanoic acid e) N-methyl formamide f) Urea

3) Complete the following equations: (8 Marks)

(i) $CH_3CH_2CH_2CONH_2 \xrightarrow{P_2O_5} ?$

(ii)  $\xrightarrow{PCl_5} ?$

(iii)  $\xrightarrow{NH_2NH_2.H_2O} ? \xrightarrow{KOH/\ heat} ?$

(iv) $CH_3CH_2CH_2Br \xrightarrow{NaCN} ? \xrightarrow{H_2O/\ H^+/\ heat} ?$

(v)  $\xrightarrow[ii)\ H_2O/H^+]{i)\ CO_2} ?$

(vi) $H_3CHC{=}CHCH_3 \xrightarrow{O_3} ?$

4) Arrange the following acids according to the acidity from weak to strong acid: (2 Marks)

$CH_3CH_2CO_2H$, HCO_2H, $(CH_3)_3C\text{-}CO_2H$, CH_3CO_2H, $CH_3CH_2CH_2CH_2CO_2H$

Section (B) (Aromatic Chemistry)

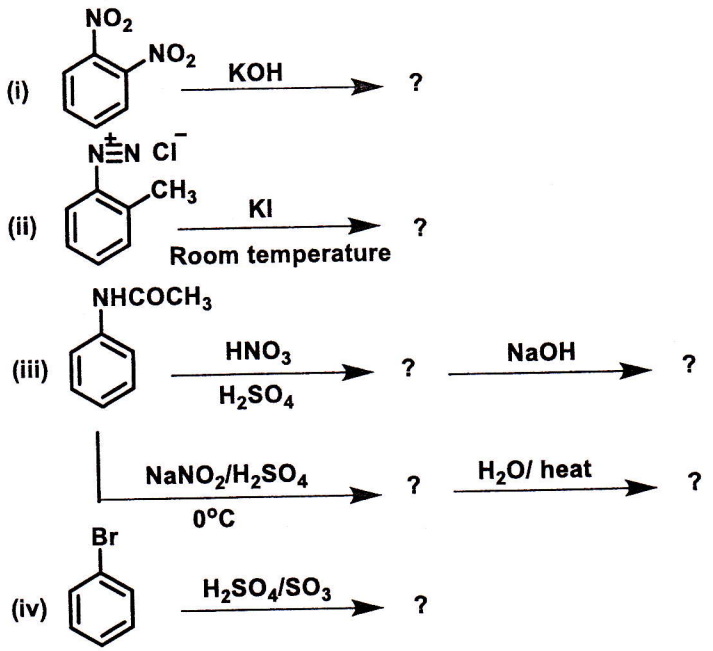
Answer the following questions:

1) Write the structures for <u>five only</u> from the following compounds: (5 Marks)

a) *p*-Bromobenzaldehyde b) 1-Phenylbutane c) 3,5-dinitrobenzoic acid

d) 1,2,4-Tribromobenzene e) *o*-Xylene f) 3-Nitroaniline

2) Complete the following equations: (4 Marks)



3) Starting with benzene, how would you prepare <u>five only</u>: (10 Marks)

a) *p*-Nitrobenzoic acid b) *m*-Chloronitrobenzene c) Acetophenone

d) Biphenyl e) 1,3-Dinitrobenzene f) TNT

4) By equations only, illustrate the mechanism of the following: (6 Marks)

i) Preparing of toluene ii) Preparing of benzenesulfonic acid

Regards,
Dr. Abdelreheem A. Saddik

Examination of Physical and Inorganic chemistry for Students (Chem.250)

Assiut University

Time :2 h

Date: 15 / 1 / 2024

Faculty of Science

Chemistry Department

Section 1

Answer the Following Questions:

A)- Choose The Correct Answer **(10 Marks)**

1. The work done in case of isothermal free expansion is .....
   (a) Maximum (b) Minimum (c) Zero (d) Positive

2. The temperature of the system decreases in an .....
   (a) Adiabatic compression (b) Isothermal expansion (c) Isothermal compression
   (d) Adiabatic expansion

3. In a reversible process the system absorbs 600 kJ heat and performs 250 kJ work on the surroundings. What is the increase in the internal energy of the system?
   (a) 850 kJ (b) 600 kJ (c) 350 kJ (d) 250 kJ

4. A system absorb 10 kJ of heat at constant volume and its temperature rises from 270° C to 370° C. The value of ΔE is.....
   (a) 100 kJ (b) 10 kJ (c) 0 kJ (d) 1 kJ

5. Carnot cycle efficiency depends on .....
   (a) Properties of the medium substance used (b) Condition of engine
   (c) Working condition (d) Temperature range of operation

6.Carnot cycle is.....
   (a) A reversible cycle (b) A semi-reversible cycle (c) An irreversible cycle
   (d) An adiabatic irreversible cycle

7. First law of thermochynamics furnishes the relationship between .....
   (a) Heat and work (b) Heat work and properties of the system
   (c) Various properties of the system (d) Heat and internal energy

8. In an isothermal process the internal energy of gas molecules.....
   (a) Increases (b) Decreases (c) Remains constant (d) May increase / decrease depending on the properties of gas

9. Heat and work are .....
   (a) Point functions (b) System properties (c) Path function (d) Intensive properties

10. The efficiency of the carnot cycle is (Where T_1 and T_2 -highest and lowest temperature during the cycle)
   (a) $T_1/T_2 - 1$ (b) $1 - T_1/T_2$ (c) $1 - T_2/T_1$ (d) $1 + T_2/T_1$

2- Define a cycle and drive an equation be used for calculation of maximum work of an ideal engine that operating under ideal condition between T_2 and T_1. (5 Marks)

3-Answer two only of the following **(10 Marks)**

a. Three moles of an ideal gas (C_v = 5 cal deg^{-1} mo^{-1}) at 10.0 atm and 0°C are converted to 2.0 atm at 50°C. Find ΔE and ΔH for the change. R = 2 cal mol^{-1} deg.

b. Find ΔE, q and *w* if 2 moles of hydrogen at 3 atm pressure expand isothermally at 50°C and reversibly to a pressure of 1 atm.

c. Calculate the value of ΔE and ΔH on heating 64.0 g of oxygen from 0°C to 100°C. C_v and C_p on an average are 5.0 and 7.0 cal mol^{-1} degree $^{-1}$.

Section 2

Answer the following questions **(25 Marks)**

1. a) Explain the reasons for **Five only** from the following:
   (i) The Unexpected high boiling point of H_2O.
   (ii) NO_2 is an acidic Oxide
   (iii) SF6 is known but OF6 is not
   (iv) Tl^{+3} is so strong an oxidizing agent.
   (v) Cesium ions conduct electricity more than lithium ions.
   (vi) NH_3 is a poisonous gas .

   b) How you can prepare **Three only** from the following:
   Super phosphate, water gas, NH_3, HBr

   c) What are the differences between the green and blue hydrogen?

2. a) Choose the correct answer and comment:
   i). In which species does **Iodine** exhibit its highest oxidation state: (IO_4^-,IO_2^-,I) .
   ii). Which one of the following species contains an **even** number of electrons:(NO_2,NH_4^+, NO)
   iii). The species which contains **diamagnetic** properties is (NO, O_2, N_2).
   iv). The element which is **monoatomic** (Ne,N,Cl)

   b) Element X dissolves in water to give a colorless and odorless gas.It reacts with Cl_2 to give a white solid XCl.
   i. Which could be the identity of X? (Argon, Sodium, Carbon)
   ii. Write the equations of the reactions.

   c) How does SO_2 effect on the climate change?

Good luck

Examiners: prof. Abd El-Aziz A. Said and Prof. Asmaa S. Zidan,

Assiut University
Faculty of Science
Chemistry Department

2 January 2024
Time: 2 Hours
Inorganic Chemistry

Final Examination for the 2nd Year Students of Applied Industrial Chemistry Program (C207)

Answer the Following Questions: (50 Marks)

1) Give reasons that may explain the following: (10 Marks)
   a) Pb(II) compounds are more stable than Pb(IV) compounds.
   b) CO is toxic to human.
   c) Adding glucose to H_3BO_3 solution during titration with NaOH.
   d) CrO_4^{2-} is strong oxidizing agent, while MoO_4^{2-} and WO_4^{2-} are stable.
   e) Graphite conducts electricity.

2) Write the IUPAC name, primary and secondary valence for the following coordination compounds: (10 Marks)
   (a) $[Co(NH_3)_6]Cl_3$ (b) $[Cr(en)_2Cl_2]^+$ (c) $K_3[Fe(CN)_6]$ (d) $K_2[PtCl_4]$
   e) $Ag[Ag(CN)_2]$

3) Write the formula of the following compounds: (10 Marks)
   a) Pyroposphoric acid b) Orthophosphoric acid c) Chromyl chloride d) Diborane
   e) Cryolite

4) Complete the following equations (balance if necessary): (10 Marks)
   a) $(VO)^{2+} + H^+ + Sn^{2+}$ = ... + ... + ...
   b) $BiCl_3 + H_2O$ = ... + ...
   c) $2VF_4$ + Heat = ... + ...
   d) $K_2Cr_2O_7$ + S = ... + ...
   e) CrO_3 + NaOH aq. = ... + ... + ...
   f) $2NH_4VO_3$ + Heat = ... + ... + ...
   g) $K_2Cr_2O_7$ + HCl (conc. H_2SO_4) = ... + ... + ...
   h) $TiCl_4$ + HCl = ... + ...

5) Choose the correct answer from the following: (10 Marks)
   1. Permanganate ion MnO_4^- has intense purple color due to:
      a) d-d Transition b) Charge transfer c) Defect in the crystal structure d) Polarization
   2. Ziegler-Natta catalyst is used in the ethylene polymerization, it is composed of:
      a) $TiCl_4$ b) $TiCl_4/AlEt_3$ c) $TiCl_2$ d) $TiOCl_2$
   3. $Fe_{0.95}O$ is a non-stoichiometric oxide, it has:
      a) Deficient oxygen sites b) Deficient Fe sites c) Rich oxygen sites d) Rich Fe sites
   4. In the vanadium group, the basic properties of the oxides M_2O_5 .....down the group.
      a) Increase b) Decrease c) Remain unchanged d) None of them

5. Boron has several allotropes, all are based on:

a) B4 tetrahedral b) B6 octahedrons c) B12 icosahedron d) none of them

6. The catalyst used in Haber-Bosh process for the industrial preparation of ammonia is:

a) V_2O_5 b) Finely divided Ni c) Promoted iron d) Pd

7. With increasing the number of unpaired electrons, the magnetic moment (μ):

a) Decreases b) Increases c) Doesn't affect d) None of them

8. The oxide N_2O_4 is:

a) Colorless and paramagnetic
b) Colored and diamagnetic
c) Colorless and diamagnetic
d) Colored and paramagnetic

9. In naming of the coordination compounds ..... always named first.

a) Metal ion b) Ligands c) Cations d) Counter ion

10. During the formation of the complex compounds, metal ion act as:

a) Lewis acid b) Arrhenius acid c) Arrhenius base d) Lewis base

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Best Wishes

Examiner: Dr. Mohamed Abdel megeed