

7. The emf of the cell: $\text{Pt} | \text{H}_2 (1 \text{ atm}) | \text{H}^+(x \text{ M}) || \text{KCl}(\text{sat}) | \text{Hg}_2\text{Cl}_2 | \text{Hg}$ at 25°C is 0.445 V , ($E^\circ_{\text{cal}} = 0.2415 \text{ V}$), the pH of the unknown solution is
- A. 1.44 B. 2.44 C. 3.44 D. 4.44
8. What is E°_{cell} for a cell using $\text{Pb}^{2+} / \text{Pb}$ and $\text{Mg}^{2+} / \text{Mg}$ half-reactions? Which metal is the cathode? (E° for $\text{Pb}^{2+}/\text{Pb} = -0.124 \text{ V}$, $\text{Mg}^{2+}/\text{Mg} = -2.37 \text{ V}$).
- A. $+2.246 \text{ V}$, Pb is the cathode B. -2.246 V , Pb is the cathode
C. $+2.246 \text{ V}$, Mg is the cathode D. -2.246 V , Mg is the cathode

III- Discuss with equations the calomel electrode and lead-storage battery.

With my best wishes

Prof. Dr. Ahmed Fawzy

Part II - Electrochemistry (16 Marks)

Answer TWO ONLY from the following questions:

I- Put (✓) in front of the correct statement and (x) for the wrong one:

1. Anode acts as a reducing agent. ()
2. The more positive E^0 the greater the tendency for the substance to be oxidized. ()
3. In the galvanic cells the reactions are exothermic. ()
4. Amalgamated metal is less activated than the pure metal. ()
5. Potential of gas electrode depends on $[Cl^-]$. ()
6. Representation of calomel electrode is: $Pt \ Hg/Hg_2Cl_2 \ Cl^-$. ()
7. Lead storage battery is not rechargeable. ()
8. Reducing power is increased with increasing the negative value of E^0 . ()

II- Select the correct answer:

1. What is the E^0_{cell} for an electrochemical cell with the following reaction?
 $2Au^{3+} + 3Co = 3Co^{2+} + 2Au$ ($E^0_{Au/Au^{3+}} = +1.5 \text{ V}$, $E^0_{Co/Co^{2+}} = -0.28 \text{ V}$)
A. 1.78 V B. -1.22 V C. 1.22 V D. 3.84 V
2. When hydrogen gas reacts with calcium metal, what are the oxidation numbers of the calcium and hydrogen in the CaH_2 product?
A. +2 and -1 B. +1 and -2 C. -2 and -1 D. +2 and -2
3. The standard cell potential is calculated using the equation:
A. $E^0_{cell} = E^0_{anode} - E^0_{cathode}$ B. $E^0_{cell} = E^0_{cathode} - E^0_{anode}$
C. $E^0_{cell} = E^0_{cathode} + E^0_{anode}$ D. $E^0_{cell} = E^0_{cathode} / E^0_{anode}$
4. is the process in which electrical energy is used to cause a non-spontaneous chemical reaction to occur.
A. Hydrolysis B. Photolysis C. Osmosis D. Electrolysis
5. cell is an electrochemical cell that requires a continuous supply of reactants to keep functioning.
A. Reversible B. Fuel C. Daniell D. Alkaline
6. Which four quantities a, b, c and d are required to balance the following equation:
 $aFe_2O_{3(s)} + bCO_{(g)} = cFe_{(l)} + dCO_{2(g)}$
A. 2,3,4,6 B. 2,6,4,3 C. 1,6,2,6 D. 1,3,2,3

The Final Physical Chemistry-2 Examination (C-232) for 2nd Level Students [The Summer Term]

Answer the following questions:

I- Colloids:

1- Explain what is meant by Only Three from the following terms (Give an example for each one): (4.5 Marks)

- i) Associated Colloids. ii) Electroosmosis.
- iii) Protective colloids. iv) Conversion of emulsions.

2- Describe a method for the preparation of Only Three from the following: (4.5 Marks)

- i) Edible jelly. ii) Water in oleic acid emulsion.
- iii) Gold sol by the reduction method iv) Calcium acetate gel.

3- Write a short note on Only Two from the followings: (3 Marks)

- i) The physical properties of sols.
- ii) Purification of sols by electro-dialysis methods.
- iii) Demulsification of emulsions.

4-a) Give reasons for Only One from the following:- (2 Marks)

- i) The amount of electrolyte required to precipitate a given sol depends on the nature of the electrolyte added. Give an example.
- ii) The breaking of oil in water emulsion stabilized by sodium soap through addition of sulphuric acid.

5- a) Complete the following:- (2 Marks)

- i) is a common thixotropic gel, and the dispersed phase in emulsions are generally charged.
- ii) sol can be obtained by change of solvent, whereas can be obtained by hydrolysis.

b) Define: Isoelectric point of protein. (1 Mark)

..... Good Luck

Prof. Dr. Maher M. Girgis.



Physical Chemistry II (C-232) Examination For Second Level Students

Section II, Phase Rule (1 Hour)

Answer All the following questions: (17 Marks)

A) Explain briefly Only Two from the following: (10 Marks)

i- Sodium chloride-water system and its uses as freezing mixture.

ii- Two component system *A* and *B* forming compound *AB* with congruent melting point.

iii- The ternary system $\text{NH}_4\text{NO}_3 - \text{AgNO}_3 - \text{H}_2\text{O}$ where the binary compound $\text{NH}_4\text{NO}_3 - \text{AgNO}_3$ is formed at 30°C .

B) What are the main differences between the phase diagram of *Ag - Pb* system with that of *KI - Water* system? (4 Marks)

C) Complete each of the following: (3 Marks)

i- The three phases....., and co-exist in equilibrium at point C (119°C) in sulphur phase diagram system.

ii- Heating of solids above their transition point is known as while cooling of liquids below their freezing point is called

iii- The number of bivariant and univariant areas existing in phase diagram of *Aniline - Phenol - Water* system at lower temperature are and, respectively.

Good luck

Prof. Maher M. A. Hamed

Physical chemistry exam for 2nd year students
[Industrial Program] [208 C chemical thermodynamic]

Answer only four from the following:

[50 marks]

- 1- Derive the relation between internal energy and enthalpy changes.
- 2- Show how to calculate the enthalpy change of a reaction from the standard heat of formations for the reactants and products.
- 3- Derive an expression for the efficiency of heat engine.
- 4- Show how to calculate the entropy change for the following processes:
 - a) Isothermal and reversible expansion.
 - b) Processes accompanied by temperature change.
- 5- State the third law of thermodynamics.
- 6-explain by equations, that the free energy change of reaction represents the proper function for determining its spontaneity.

Thank You

Prof. Rabei Gabr

- A) Hexan-3-one. B) 2-Methyl-3-hexanone. C) Heptan-3-one. D) 2-Methyl-3-hexanone.
17. The common name $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$ is:
A) Valeraldehyde B) Caproaldehyde. C) Butyraldehyde. D) Propionaldehyde.
18. Which of the following acids is more acidic:
A- Ethanoic acid. B) Propanoic acid. C) Methanoic acid. D) Acetic acid.
19. Which of the following acids is more acidic:
A) $\text{BrCH}_2\text{CH}_2\text{CH}_2\text{COOH}$. B) $\text{CH}_3\text{CHBrCH}_2\text{COOH}$ C) $\text{CH}_3\text{CH}_2\text{CHBrCOOH}$. D) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$
20. Which of the following acids is more acidic:
A) $\text{CH}_3\text{CH}_2\text{COOH}$. B) $\text{ClCH}_2\text{CH}_2\text{COOH}$. C) $\text{Cl}_2\text{CHCH}_2\text{COOH}$. D) $\text{Cl}_3\text{CCH}_2\text{COOH}$.

Q2: Choose (T) for true sentence or (F) for false sentence: (1 Mark/each)

- The electron releasing group strengthen the acid. (T / F)
- Oxidation of methylene acetylene with ozone gives acetic and formic acids. (T / F)
- Alkyl group is a type of releasing group. (T / F)
- Reduction of nitrobenzene using Zn(Hg)/HCl gave aniline. (T / F)
- OH group is a type of withdrawing group. (T / F)
- COOH group is a type of withdrawing group. (T / F)
- Jones' reagent is consists of KMnO_4 . (T / F)
- The activating group is groups that can donate electron density to the aromatic ring. (T / F)
- Oxidation of acetylene with KMnO_4 gives 2 mole of formaldehyde. (T / F)
- Reaction of acetic anhydride with alcohol gives ester. (T / F)
- Reaction of acetic anhydride with aniline gives *N*-phenylacetamide. (T / F)
- The aliphatic acid reacts with diazomethane to give the ester derivative. (T / F)
- Benzoic acid carries carboxylic group with OH group in benzene structure. (T / F)
- The reaction of acid with alcohol is type of hydroxyl group reaction. (T / F)
- 5-Bentanolide is formed from the cyclization of 5-hydroxypentanoic acid. (T / F)
- δ -Lactone is type of five membered rings. (T / F)
- Acetylene reacts with acetic acid to give vinyl acetate. (T / F)
- The dipyridine Chromium (VI) oxide is the Dess-Martin reagent. (T / F)
- Triacetoxyperiodinane is the Collins reagent. (T / F)
- The direct nucleophilic acyl substitution of a carboxylic acid is easy. (T / F)
- The treatment of aliphatic carboxylic acids with P_2O_5 gives anhydrides (T / F)
- The reaction of acid anhydride with water gives the corresponding acids. (T / F)
- Friedel-Crafts reaction is used to introduce alkyl or acyl group in benzene ring. (T / F)
- Acid chlorides are produced from losing water of two molecules of carboxylic acid. (T / F)
- Sodium salt of carboxylic acid react with alkyl halide to give ether. (T / F)
- Carboxylic acids do not react directly with amines to give amides. (T / F)
- The IUPAC name of $\text{NH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{COOH}$ is called 4-aminobutanoic acid. (T / F)
- Acid amide are more reactive than the corresponding acid anhydrides. (T / F)
- Oxidation of toluene gives toluic acid. (T / F)
- The carboxylic acids are more reactive than the corresponding amides. (T / F)

GOOG LUCK

Prof. Ahmed Abdou Omar



Final Examination of Organic Chemistry I (201C)

Answer the following questions: (50 Marks)

Q1: Choose the correct answer A, B, C, or D: (1 Mark/each)

1. Hydrolysis of sulfonic acid with super-heated steam gives:

- A- Phenol. B- Benzene. C- Benzoic acid. D- Amine.

2. Anisole structure is:

- A. Benzene with OH. B. Benzene with OCH_3
C. Benzene with NH_2 D. Benzene with CH_3

3. Chloramine T is produced from: A. *p*-Toluensulfonic acid

B. *o*-Toluensulfonic acid

C. *p*-Chlorobenzene sulfonic acid D. *o*-Chlorobenzene sulfonic acid

4. Nitrobenzene react with nitric acid to give:

- A- *p*-Nitrobenzene B- *o*-Dinitrobenzene C- *o*- and *p*-Dinitrobenzene D- *m*-Dinitrobenzene

5. Nitration of benzene sulfonic acid gives: A. *p*-Nitrobenzene sulfonic acid. B. Benzene

C. *m*-Nitrobenzene sulfonic acid. D. Phenol

6. Xylene is aromatic compound with:

- A. Two methyl group B. Two chlorine atoms C. Two chlorine atoms D. Methyl group and chlorine.

7. Reaction of acetic acid with PCl_5 gives:

- A- Acetyl chloride. B- Benzene sulfonyl chloride. C. Chlorobenzene D- Nitrobenzene.

8. Reaction of bromine with benzene gives:

- A. Benzyl bromide B. Bromobenzene C. *m*-Bromotoluene D. *o*-Bromobenzene

9. Benzene reacts as:

- A- Electrophile. B- Nucleophile. C- Electrophile and nucleophile. D- None of them

10. is the deactivating groups and directing *m* in the monosubstituted benzene reactions.

- A- OH B- NH_2 C- COOH D- Cl

11. is the deactivating group and directing *o-p* in the mono substituted benzene reactions.

- A- Br B- OH C- NH_2 D- CN

12. has two alkyl (or aryl) group bonded to the carbonyl carbon

- A) Ketone. B) Aldehyde. C) Carboxylic acid. D) Alcohol.

13. Which of the following is true about the five membered rings?

- A) Ketone has a hydroxyl functional group.
B) Aldehyde has a carbonyl functional group.
C) The nucleophilic substitution occurs at carbonyl oxygen.
D) Carboxylic acids have a nitro functional group.

14. The simplest acid is: A) Acetic acid. B) Ethanol. C) Methanal. D) Methanoic acid.

15. The IUPAC name of HCOOH is: A) Methanoic acid. B) Methanal. C) Ethanal. D) Ethanoic acid.

16. The IUPAC name of $\text{CH}_3\text{CH}_2\text{CH}_2\text{COCH}_3$ is:

17. The common name $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CHO}$ is:
 A- Butyraldehyde. B) Caproaldehyde. C) Valeraldehyde. D) Propionaldehyde.
18. Which of the following acids is more acidic:
 A- Methanoic acid. B) Propanoic acid. C) Ethanoic acid. D) All are equals.
19. Which of the following acids is more acidic:
 A) $\text{ClCH}_2\text{CH}_2\text{CH}_2\text{COOH}$. B) $\text{CH}_3\text{CHClCH}_2\text{COOH}$. C) $\text{CH}_3\text{CH}_2\text{CHClCOOH}$. D) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$
20. Which of the following acids is more acidic:
 A) Acetic acid. B) Monochloroacetic acid. C) Dichloroacetic acid. D) Trichloroacetic acid.

Q2: Choose (T) for true sentence or (F) for false sentence: (1 Mark/each)

1. The electron withdrawing group strengthen the acid. (T / F)
2. Nitro group directs at ortho position. (T / F)
3. Amino group is a type of releasing group. (T / F)
4. Reduction of acetophenone using Zn(Hg)/HCl gave ethyl benzene. (T / F)
5. Nitro group is a type of withdrawing group. (T / F)
6. Chlorine group is a type of withdrawing group. (T / F)
7. Jones' reagent is consists of only chromic acid. (T / F)
8. Hydrolysis of benzene sulfonic acid gives benzene. (T / F)
9. Oxidation of acetylene with ozone gives acetic and formic acids. (T / F)
10. Oxidation of ethylene with KMnO_4 gives formaldehyde. (T / F)
11. The reaction of aldehyde with sodium cyanide then hydrolysis is called Strecker reaction. (T / F)
12. The aliphatic acid reacts with diazomethane to give the ester derivative. (T / F)
13. Salicylic acid carries amino group with OH group in benzene structure. (T / F)
14. The reaction of acid with SO_2Cl_2 is type of hydroxyl group reaction. (T/F)
15. 4-Butanolide is formed from the cyclization of 4-hydroxybutanoic acid. (T / F)
16. δ -Lactone is type of six membered rings. (T / F)
17. Reduction of malononitrile gives aliphatic amine. (T / F)
18. Triacetoxyperiodinane is the Dess-Martin reagent. (T / F)
19. The dipyridine Chromium (VI) oxide is the Collins reagent. (T / F)
20. The direct nucleophilic acyl substitution of a carboxylic acid is difficult. (T / F)
21. The treatment of carboxylic acid with thionyl chloride SO_2Cl_2 . (T / F)
22. The reaction of acid anhydride with water gives the corresponding acids. (T / F)
23. Swern oxidation used oxalyl chloride and dimethyl sulfoxide as reagent. (T / F)
24. Acid Anhydrides are produced from losing water of two molecules of carboxylic acid. (T / F)
25. Sodium salt of carboxylic acid react with alkyl halide to give ether. (T / F)
26. Carboxylic acids react directly with amines to give amides. (T / F)
27. Carboxylic acids reduced by LiAlH_4 to give primary alcohols. (T / F)
28. Acid anhydrides are more reactive than the corresponding acids. (T / F)
29. Oxidation of TNT gives toluic acid. (T / F)
30. Acid chlorides are more reactive than the corresponding amides. (T / F)

GOOG LUCK

Prof. Ahmed Abdou Omar



Final Examination of Organic Chemistry (211C) for Non-Chemistry Students

Answer the following questions: (50 Marks)

Q1: Choose the correct answer A, B, C, or D: (1 Mark/each)

1. Fusion of sulfonic acid with water gives: A- Phenol. B- Aniline. C- Benzoic acid. D- Toluene.
2. Saccharin is produced from: A. *p*-Toluensulfonic acid B. *o*-Toluensulfonic acid
C. *p*-Chlorobenzene sulfonic acid D. *o*-Chlorobenzene sulfonic acid
3. Chloramine T is produced from: A. *p*-Toluensulfonic acid B. *o*-Toluensulfonic acid
C. *p*-Chlorobenzene sulfonic acid D. *o*-Chlorobenzene sulfonic acid
4. Benzene react with nitric acid to give:
A- Nitrobenzene B- Dinitrobenzene C- Benzene D- Nitrous acid.
5. Nitration of benzene sulfonic acid gives: A. *m*-Nitrobenzene sulfonic acid. B. Benzene
C. *o*-Nitrobenzene sulfonic acid. D. Phenol
6. Fusion of benzoic acid with soda lime produces:
A. Benzene B. Acetylene C. Sodium salt of benzene D. Phenol.
7. Reaction of benzene sulfonic acid with PCl_5 gives:
A- *p*-Nitrobenzene sulfonic acid. B- Benzene sulfonyl chloride. C. Chlorobenzene D- Nitrobenzene.
8. Reaction of bromine with benzene gives:
A. Benzyl bromide B. Bromobenzene C. *m*-Bromotoluene D. *o*-Bromobenzene
9. Toluene reacts with chlorine in the presence of sun light to give benzyl chloride by:
A- Electrophilic addition B- Nucleophilic addition C- Free radical addition D- None of them
10. From the deactivating groups and directing *m* in the monosubstituted benzene reactions:
A- Br B- NH_2 C- NO_2 D- Cl
11. From the deactivating group and directing *o-p* in the mono substituted benzene reactions
A- Br B- OH C- NH_2 D- CN
12. has one alkyl (or aryl) group and one hydrogen bonded to the carbonyl carbon
A) Ketone. B) Aldehyde. C) Carboxylic acid. D) Alcohol.
13. Which of the following is not true about the five membered rings?
A) Ketone has a carbonyl functional group.
B) Aldehyde has a carbonyl functional group.
C) The nucleophilic addition occurs at carbonyl carbon.
D) The electrophilic addition occurs at carbonyl carbon.
14. The simplest aldehydes is: A) Acetaldehyde. B) Methanol. C) Methanal. D) Methanoic acid.
15. The IUPAC name of CH_3COOH is: A. Methanoic acid. B. Methanal. C. Ethanal. D. Ethanoic acid.
16. The IUPAC name of $\text{CH}_3\text{CH}_2\text{CH}_2\text{COCH}(\text{CH}_3)_2$ is:
A) Hexan-3-one. B) 2-Methyl-3-hexanone. C) Heptan-3-one. D) 2-Methyl-3-hexanone.

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GOOG LUCK

Prof. Ahmed Abdou Omar



Final Examination of Organic Chemistry (211C) for Non-Chemistry Students

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