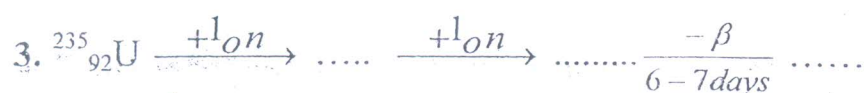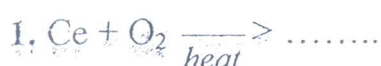| Mansoura University Faculty Of Science Chemistry Department Subject : Chemistry Course(s): Inorganic | | First term Year : 4$^{Th}$ level Bio. Chemistry Program: Chemistry Date: Jan. 2014 Time Allowed: 2 Hours Full Mark: 80 Marks |

## Answer The Following Questions

**1. a)** Complete the following equations          [ Each 2 Marks ]

1. $Ce + O_2 \xrightarrow[heat]{} \ldots\ldots$          2. $Eu_2(SO_4)_3 \xrightarrow{Electroltsis} \ldots\ldots$

3. $^{235}_{92}U \xrightarrow{+^1_0 n} \ldots \xrightarrow{+^1_0 n} \ldots\ldots \xrightarrow[6-7days]{-\beta} \ldots\ldots$

4. $^{243}_{95}Am + \, ^4_2He \rightarrow$          5. $^{238}_{92}U + \, ^{16}_8O \rightarrow$

6. $^{246}_{96}Cm + \, ^{12}_6C \rightarrow$          7. $UO_2 + HF \rightarrow \ldots \xrightarrow[900°C]{Al} \ldots\ldots$

8. $UO_2(NO_3)_2 \, 2H_2O \xrightarrow{350°C} \ldots\ldots \xrightarrow[350°C]{CO} \ldots\ldots$

**b.** Explain the most important, most rapid and most effective general method for the separation of lanthanide ions.          [ 9 Marks ]

**2.a)** Write shortly on color and absorption spectra of lanthanide ions.   [ 8 Marks

**b)** Lanthanide ions do not form complexes very readily. Discuss this statement. [ 7 Marks ]

**c)** Write shortly on assumptions of VBT.          [ 5 Marks ]

**d)** The magnetic moment of $[MnBr_4]^{2-}$ is 5.9 B.M. use VBT to predict the geometry of this complex.          [ 5 Marks ]

**3.a)** Calculate the CFSE for $d^4$ and $d^7$ ion in octahedral complexes.     [ 8 Marks]

**b)** $[Ni(CN)_4]^{2-}$ is diamagnetic. Explain this experimental observation using VBT [ 4 Marks

**c)** Which complex of the following pairs has the larger value of $\Delta_o$ [10 Marks

i) $[V(H_2O)_6]^{2+}$ and $[Cr(H_2O)_6]^{3+}$          ii) $Co(H_2O)_6]^{3+}$ and $[Rh(H_2O)_6]^{3+}$

iii) $[CO(H_2O)_6]^{3+}$ and $(Co(H_2O)_6]^{2+}$   iv) $[Co(CN)_6]^{3-}$ and $[CoF_6]^{3-}$

v) $[Co(H_2O)_6]^{2+}$ and $[Ni(H_2O)_6]^{2+}$

**d)** $[CoF_6]^{3-}$ is paramagnetic Explain this experimental observation using CFT and MOT  [ 8 Mark

( Atomic numbers ( V=23, Cr=24, Mn=25, Fe=26 Co=27, Ni=28, Rh=45 )

Mansoura University
Faculty of Science
Chemistry Department
Subject: Biochemistry
Course: Molecular Biology 471

First Term Examination
4rd Level Students
Date Dec 29, 2013.
Time Allowed: Two hours
Full Marks: 60 Marks

## Answer the following questions

I. What is the difference between? **(15 Marks)**
   a. Genomic and cDNA library.
   b. Sanger and Maxam Gilbert sequencing method
   c. Miniosatellites and microsatellites

**II. (15 Marks)**

a. Define each of the following : **(5 Marks)**
   Probe -promoter- Capping- -Exons - antisense gene therapy.
b. Illustrate how to use DNA Fingerprinting in identify criminal?**(5 Marks)**
c. Give three examples of post-transitional processing of proteins.**(5 Marks)**

**III.    (10 Marks)**
a. List the proteins involved in DNA replication and outline their function.**(5 Marks)**
b. Plasmid DNA digest with ApoI and EcoRI restriction endonucleases, when ran the DNA on gel, the gel looked like this…With both enzymes 4 fragments resulted 1386, 1323, 667and 24 With ApoI 2 fragments resulted 3376 and 24 With EcoRI 2 fragments resulted 2733and 667 Draw the map.**(5 Marks)**

**IV- Choose the best answer: (20 Marks, 2 for each)**

1. The following terms refer to human nuclear material. Arrange them in order of increasing size and structural complexity:
   A. codons, exons, genes, chromosomes, genome
   B. exons, genes, chromosomes, genome, codons
   C. genes, chromosomes, genome, codons, exons
   D. chromosomes, genome, codons, exons, genes

2. Which of the following enzymes is the major processive enzyme in leading strand synthesis during eukaryotic DNA replication?
   A. DNA polymerase $\alpha$(alpha)
   B. DNA polymerase $\beta$ (beta)
   C. RNA polymerase $\gamma$ (gamma)
   D. DNA polymerase $\varepsilon$ (epsilon)
   E. Telomerase

3. Eukaryotic protein synthesis:
   A. proceeds in a $5' \rightarrow 3'$ direction
   B. is coupled to transcription
   C. always begins with a formyl-methionine
   D. utilizes energy stored in the aminoacyl-tRNA
   E. terminates at the sequence 5'-AAUAAA-3'

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4. A patient presents with α-thalessemia. Below is the mRNA transcribed from the patient's α globin gene. What is the most likely result in this individual?

| 5' CAP | - AGAGAGAACCCACCAUGGTGCTGTCT...-3` Normal |
| 5' CAP | - AGAGAGAACCCACCAUAGTGCTGTCT...-3` Patient |

    A.  defective transcription initiation
    B.  normal protein, this is a silent mutation
    C.  defective translation initiation
    D.  shorter protein, this is a nonsense mutation
    E.  Glycine → Serine mutation in the protein

5. During DNA replication, the addition of each successive nucleotide occurs in:

    A. the 5' to 3' direction on both leading and lagging strands.
    B. the 5' to 3' direction on leading strand and 3' to 5' direction on lagging strand.
    C. the 3' to 5' direction on leading strand and 5' to 3' direction on lagging strand.
    D. either 3' to 5' or 5' to 3' depending on which side of the origin of replication.
    E. the 3' to 5' direction on both leading and lagging strands.

6. Which of the following sequences is a frame-shift mutation that causes termination of the encoded protein?    M 5'-CCC-CCT-AGG-TTC-AGG-3'

    A.  -CCA-CCT-AGG-TTC-AGGb.
    B.  -GCC-CCT-AGG-TTC-AGGc.
    C.  -CCA-CCC-TAG-GTT-CAGd.
    D.  -CCC-CTA-GGT-TCA-GG—
    E.  -CCC-CCT-AGG-AGG——

7. A western blot of a normal (N) and patient (P) sample is represented below. What conclusions can be drawn from these results regarding "X"?
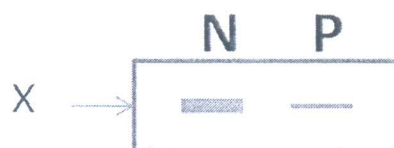


    A.  The patient has less DNA for gene X relative to normal
    B.  The patient has less RNA for gene X relative to normal
    C.  The patient has less protein X relative to normal
    D.  The patient has more protein X relative to normal
    E.  The patient has more DNA for gene X relative to normal

8. Which of the following components is/are needed to carry out the polymerase chain reaction (PCR)?

   A. A vector with a selectable marker
   B. An origin of replication specific for the bacterium Thermophilus aquaticus
   C. DNA ligase
   D. Fluorescent or radioactive probes to detect DNA fragments of interest
   E. Sense and antisense DNA primers encompassing the DNA region of interest

9. The process by which a recombinant DNA is introduced into the host is called:

   A. ligation
   B. recombination
   C. screening
   D. selection
   E. Transformation

10. Which of the following results is provided by northern blot analysis?

    A. Detects specific base pairs
    B. Detects DNA molecules
    C. Detects RNA molecules
    D. Detects proteins
    E. Determines chromosome structure

Good luck

| Mansoura University | | Frist term Examination |
|---|---|---|
| Faculty of Science | | Subject: Spectroscopy |
| Chemistry Department | | Fourth Level |
| Course: Physical Chemistry | | Full Mark : 80 Marks |
| Date : 1/ 1/ 2014 | | Time Allowed : 2hours |

## Question (1)                                                                                    (26 marks)

### a- Complete the following:                              (each one 2 marks)

1- Absorption _____ is the measurement of the amount of light absorbed by a compound as a function of the wavelength of light.

2- An infrared wavelength of 4.48µm is equivalent to a wavenumber of _____cm-1.

3- Which has the higher speed in a vacuum, ultraviolet or infrared light?--------------

4- In what units are frequency values typically given? -----------

5- Which region of the electromagnetic spectrum, IR or UV, contains photons of the higher energy?----------

6- Which has a lower characteristic stretching frequency, the C=H or C=D bond?-----

7- In order for a vibration mode to be observable in the IR, the vibration must change the _____ of the molecule.

8- A nonlinear molecule with n atoms generally has _____ fundamental vibrational modes.

**b- The splitting between the spectral lines in $^{12}C^{16}O$ spectrum is 3.8626 cm$^{-1}$. Find the value of r (intermolecular distance) ?**

## Question (2)                                                                                    (32 marks)

A- Pure Microwave absorption at 84.421, 90.449 and 96.477 GHz on flowing dibromine gas over hot copper metal at 1100K.                              (12 Marks )

**i- What transition do these frequencies represent?**

**ii- What is the bond length of the species formed?**

B- An $^{1}H^{35}Cl$ molecule has a force constant of 516 Nm$^{-1}$. Calculate the vibrational stretching frequency?                              (10 Marks )

C-The following data were observed in an experiment on the photoelectric effect using potassium:

| Kinetic Energy $(10^{-19}$ J) | 4.49 | 3.09 | 1.89 | 1.34 | 0.700 | 0.311 |
|---|---|---|---|---|---|---|
| Wavelength (nm) | 250 | 300 | 350 | 400 | 450 | 500 |

**Graphically evaluate these data to obtain values for the work function of potassium and Planck's constant.?** (10 Marks )

## Question (3) (22 marks)

a- write short note on vibration rotational transition (10 Marks )

b- In the microwave spectrum of $^{12}C^{16}O$, the J = 0 --> 1 transition was measured at 115217.204 MHz. (12 Marks )

i) Calculate the moment of inertia (in amu $Å^2$), rotational constant B (in MHz), and the bond length of CO (in Å).

ii) Predict the rotational constant for $^{13}C^{16}O$ (in MHz).

iii) Determine which transition has the maximum intensity in the pure rotational spectrum of $^{12}C^{16}O$ at 300 K.

--------------------------------------------------------------------------------

1 e.v = 1.602 * $10^{-19}$    1 amu = 1.66x$10^{-27}$ kg    h = 6.63x$10^{-34}$ J•s

$\hbar$ = 1.05x$10^{-34}$ J•s   C = 3.00x$10^{10}$ cm/s

Atomic weight H= 1,  N= 14,  O= 16,  C= 12

*With my Best wishes*                                    Dr. Amr Awad

| Mansoura University | | First Term |
| --- | --- | --- |
| Faculty of Science | | Date : Jan, 2014 |
| Chemistry Department | | Time Allowed: 2 hours |
| Subject:  Chemistry (Immunology) | كلية العلوم<br>جامعة المنصورة | Full Mark:  80 Marks |
| Course(s):٤٧٢ ح ك. | | |

## Answer The Following Questions

1. Give an account about phagocytosis and its mechanism        [ 20 Marks ]

2. Write about :

    a) Phases of the immune response                        [ 15 Marks ]
    b) Methods for immunosuppression                     [ 15 Marks ]

3. Show and write about factors played by the parasite to cause infection
                                                  [ 30 Marks ]

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مع تحيات ،

أ.د محمد عبد الحافظ الفار

**Mansoura University**
**Faculty of Science**
**Chemistry Department**
**Subject: Biochem. 474**
**Course(s): Advanced Methods in**
**Biochemistry**

**First Term-Final Exam**
**Fourth Level (Biochemistry)**
**Date: 12$^{th}$ January 2014**
**Time Allowed: Two hours**
**Full Mark: 60 Marks**

## Answer ALL the Following Questions; Each Question [20] Marks

[1] A- State whether each of the following definitions is true or false, correct the false one(s), and replace the correct definition with the term it describes:

  i- Analytical methods of measuring the amount of light transmitted by a substance in solution.

  ii- The process in which many organic substances emit light of a shorter wavelength after absorbing light of a longer wavelength.

  iii- A spectrum consists of the adsorption bands of specific functional groups in the molecule.

  iv- A chromatographic technique is frequently performed in a column that is packed with the desorbent.

  v- The potential of an antibody to stimulate an immune response in a particular host.
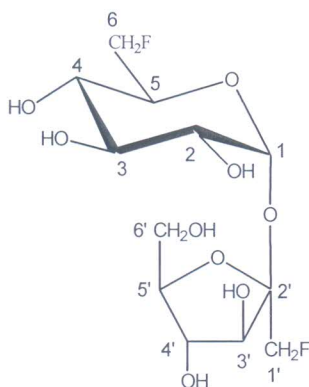
[15] Marks

  B- Illustrate the ELISA method used to measure HIV antibodies in serum.        [5] Marks

[2] A- Draw an absorption spectrum graph for a red-coloured substance.        [5] Marks

  B-



  i- Indicate the number of signals that would appear for the above compound in:
   (a) $^1$H NMR spectrum.                    (b) $^{13}$C{$^1$H} NMR spectrum.
   (c) $^{13}$C DEPT NMR spectrum.

[3] Marks

1

ii- Predict how the signal for a fluorine atom on $C_1$ will appear in $^{19}F$ NMR spectrum. Give a reason for your answer. [3] Marks

C- Enumerate the advantages and disadvantages of RIA. [9] Marks


**[3] A- Polyacrylamide gel electrophoresis is the most widely used method for analysing protein mixtures qualitatively.**

    i- Show how polyacrylamide gel is formed. [5] Marks

    ii- Choose the most suitable acrylamide gel concentration (%) for separating each of the following proteins:

    (a) 20 kDa protein            (5% - 10% - 15%)
    (b) 150 kDa protein          (5% - 10% - 15%)
    (c) 350 kDa protein          (5% - 10% - 15%)

                                        (kDa = kilo Dalton)
                                              [3] Marks

**B- The separation of components of nucleic acid was among the earliest applications of ion-exchange chromatography.**

    i- In the light of your study, give the name and chemical structure for a suitable charged group (chemically linked to an inert solid) used in the ion-exchange column for the separation of ribonucleic acids.

                                              [3] Marks

    ii- Mention the general methods used for eluting molecules from the exchanger.

                                              [3] Marks

C- Discuss the types of separation methods developed for HPLC. [6] Marks


**Examiner: Dr. Ahmed EL-Sokkary**

-Good Luck-

2

| Mansoura University Faculty of Science Chemistry Department Subject: Chemistry Course(s): Chromatography & Spectroscopic methods | كلية العلوم جامعة المنصورة | Summer Exam Fourth Level Biological Chem. Time Allowed: 2 hours Full Mark: 80 Marks Date: 15, 1,, 2014 |

## Answer The Following Questions

**Section (A)**                                                                    [ Score : 40]

### Discuss the following :-

**a)** A 100ml sample of a pollutant (1PPM) with M.W. = 100, was extracted with 100ml solvent . The remained concentration = $10^{-6}$M. Calculate D and the total amount extracted after 4 times. What types of detectors that should be used if the pollutant is pesticide or radioisotope.

**b) i)** State five distinct stationary phases with their chemical constitution

   **ii)** How we avoid disadvantages in gel chromatography.

   **iii)** Tr or Vr is a constant value at ……………. and used for ……….. of analytes.

   **iv)** Show the conditions where D and K becomes similar ( give example ).

   **v)** Depict soxhlet apparatus and how it function .

   **vi)** The conditions necessary to determine metal ions in gas chroatography . ( Give examples )

   **vii)** Effect of PH.

**c)** Discuss and compare between two of the most sophisticated techniques in chromatography .

## Section ( B )    (40 Marks)

1-Define each of the followings:

i. Ground, excited and relaxation states.

ii. Absorption & Emission .    iii. Chromphores.

iv. Accuracy &Detection Limit &Sensitivity     v. Turbidimetry.

vi. Ionization suppressors and releasing agents.

2- Briefly discus  each of the followings:

    i.   Atomization process in AAS.

    ii.  Components required for UV-Visible spectrometry
            (illustrate your answer with a diagram)

iii.   Absorption by organic compounds

iv.  **Absorption by inorganic species**

V. Quantitative applications of ultraviolet/visble radiation

Vi . Determinatn of the relationship between absorbance and concentration

3- At 510 nm, the  Fe(II) complex with o-phenanthroline has a molar
absorptivity of $1.00 \times 10^4$ L cm$^{-1}$mol$^{-1}$. If an absorbance of 0.01 is
the lowest detectable signal, what concentration (part per million)
can be detected in a 10 cm cell ?

    (At. wt.  Fe =56)

With best Wishes

        Prof. Dr. A. El-Wakail    Prof. Dr. M. Akl

| Mansoura University Faculty of Science Chemistry Department Subject: Chemistry Course(s): Food Chem. & Analysis | | Chem. 473 Date : Jan. 2014 Time Allowed: 2 hours Full Mark: 60 Marks |
|---|---|---|

كلية العلوم
جامعة المنصورة

## ANSWER ALL QUESTIONS

1. a. Alkali treatment of proteins is becoming more common in the food industry and may result in several undesirable reactions. Discuss in detail. (5 Marks)

   b. Give a detailed account on the methods used for analyzing lipid oxidation in foods. (10 Marks)

2. a. Draw the figures illustrating the effects of temperature and pH on the reaction rate of D-glucose with DL-leucine during the browning reaction of foods containing proteins. (5 Marks)

   b. Write short notes on :
   i. Interesterification in lipids (5 Marks)
   ii. Unsaponifiable fraction of fats. (5 Marks)

   c. How can proteins be separated according to their adsorption characteristics. (5 Marks)

3. a. Most proteins in foods or in their solutions are denatured or coagulated at 55-75°C. Casein and gelatin in their solutions are not denatured even at boiling. Why? (5 Marks)

   b. The Kjeldahl method is usually considered to be the standard method for the estimation of proteins in foods and other samples. Describe the method in detail. (10 Marks)

4. Answer using ✓ or X (10 Marks)
   a. Propyl galate can be used as a synthetic emulsifier.
   b. A mixture of $H_2SO_4$ and amyl alcohol is used for the extraction of milk lipids in the Gerber method.
   c. Excessive heating of proteins in absence of $H_2O$ damages all essential amino acids.
   d. I. E. P. of milk casein is 4.8
   e. Fish proteins contain myosin and actomyosin which are deteriorated by heat and storage.
   f. X-ray absorbance decreases as the lipid concentration increases in lean meat
   g. B-amino-alanine is formed on treating proteins with conc. $NH_3$.
   h. Treatment of milk casein with proteolytic enzymes (Trypsin) produces phosphopeptone M. Wt 3,000.
   i. B-Lactoglobulin is a component of whey proteins.
   j. Soybean proteins contain all essential A. As. except Meth. and Trypt.

**Prof A. El-Waseef**