

FEBRUARY 2011

[KY 760]

Sub. Code : 4254

FIRST B.PHARM. DEGREE EXAMINATION.

(Regulations 2009)

(Candidates admitted from 2009–10)

Paper IV — BIOCHEMISTRY

Q. P. Code : 564254

Time : Three hours

Maximum : 80 marks

I. Essay Questions : Answer any **TWO** questions. **(2 x 20 = 40)**

1. (a) What are lipids? Classify them with examples.
(b) Describe the β oxidation of fatty acids write the energetics for palmitic acid oxidation.
2. (a) Describe in detail about glycolysis with energetics and its regulation.
(b) Explain the structure of haemoglobin.
3. (a) Define enzyme and discuss the various types of enzyme inhibition with suitable examples.
(b) Describe the renal functions tests in brief.

II. Write short notes : Answer any **SIX** questions. **(6 x 5 = 30)**

1. Transport process across cell membrane.
2. Essential aminoacids.
3. Mechanism of enzyme action.
4. Prostaglandins.
5. Vitamin K.
6. Genetic code.
7. Nucleoprotein.
8. Biochemical role of calcium and iron.

III. Short Answers : Answer any **FIVE** questions. **(5 x 2 = 10)**

1. Define coenzymes and give examples.
2. Define gluconeogenesis and glycogenesis.
3. Racemic mixture and invert sugar.
4. Define hyperbilia rubinaemia.
5. Deficiency disease of vitamin D and niacin.
6. Explain the term BMR.
7. Digestion of carbohydrates.

August 2011

[KZ 4254]

Sub. Code: 4254

FIRST B.PHARM. EXAMINATION

Paper IV – BIOCHEMISTRY

Q.P. Code : 564254

Time : Three hours

Maximum : 100 marks

I. LONG ESSAYS

(2 x 20 = 40)

1. What are carbohydrates? Classify. Describe the Hexose Monophosphate shunt pathway and add a note on metabolic significance. (2+4+10+4)
2. What are enzymes? Classify, discuss its mechanism of action and also enzymes of clinical importance. (2+4+8+6)

II. SHORT NOTES

(8 x 5 = 40)

1. Prostaglandins.
2. Structure and functions of hemoglobin.
3. Denaturation.
4. Structure of t-RNA.
5. Phospholipids.
6. Ketone bodies.
7. Briefly discuss the composition of DNA with a suitable diagram.
8. Biochemical functions of vitamin E.

III. SHORT ANSWERS

(10 x 2 = 20)

1. Name any two markers of liver function.
2. Saponification number.
3. Thalassemia.
4. What is protein efficiency ratio (PER)? Give PER value for egg protein?
5. Hypernatremia.
6. Hyperthyroidism.
7. Atherosclerosis.
8. Nucleotides.
9. Expand LDH and ACTH and write two sentences about it.
10. Give any two sources of vitamin D.

February 2012

(LA 4254)

Sub. Code: 4254

FIRST B.PHARM. EXAMINATION

Paper IV – BIOCHEMISTRY

Q.P. Code: 564254

Time: Three Hours

Maximum: 100 marks

Answer ALL questions

I. Elaborate on:

(2 x 20 = 40)

1. (a) Write in detail about the co-enzyme form, biochemical function, deficiency diseases of thiamine.
(b) Discuss the metabolism of calcium.
2. (a) Classify the proteins with suitable examples.
(b) Discuss the reaction of gluconeogenesis.

II. Write notes on:

(8 x 5 = 40)

1. Write down the reaction of β -oxidation.
2. Make a note on the biochemistry of urine.
3. Discuss the functions of Thyroid hormone.
4. Describe any two functional tests of liver.
5. Brief account of genetic engineering.
6. Ketosis.
7. Nucleic acids.
8. Dietary fibers.

III. Short Answers:

(10 x 2 = 20)

1. Structure of Vitamin A.
2. Ketone bodies.
3. Proteinuria.
4. Electrophoresis.
5. Insulin.
6. Macromolecules.
7. Phospholipids.
8. Identification tests for amino acids.
9. Lipids.
10. Anemia.

(LB 4254)

AUGUST 2012
FIRST YEAR B.PHARM. EXAM
Paper IV – BIOCHEMISTRY
Q.P. Code: 564254

Sub. Code: 4254

Time: Three Hours

Maximum: 100 marks

(180 Min) Answer ALL questions in the same order.

I. Elaborate on:

Pages Time Marks
(Max.)(Max.)(Max.)

- | | | | |
|---|----|----|----|
| 1. Define lipids. Name the essential fatty acids. Explain the pathway of beta-oxidation of palmitic acid. Add a note on its energetics. | 19 | 33 | 20 |
| 2. What are vitamins, Classify them. Explain the sources, chemistry, functions and deficiency manifestations of vitamin A. | 19 | 33 | 20 |

II. Write notes on:

- | | | | |
|--------------------------------|---|---|---|
| 1. Ribonucleic acid (RNA). | 3 | 8 | 5 |
| 2. Absorption of glucose. | 3 | 8 | 5 |
| 3. Iso enzymes. | 3 | 8 | 5 |
| 4. Gluconeogenesis. | 3 | 8 | 5 |
| 5. Insulin. | 3 | 8 | 5 |
| 6. Functions of iron. | 3 | 8 | 5 |
| 7. Porphyrins. | 3 | 8 | 5 |
| 8. Classification of proteins. | 3 | 8 | 5 |

III. Short Answers:

- | | | | |
|--|---|---|---|
| 1. Define transamination. | 1 | 5 | 2 |
| 2. Define BMR. | 1 | 5 | 2 |
| 3. Name the bile salts. | 1 | 5 | 2 |
| 4. What is ADH? What is its function? | 1 | 5 | 2 |
| 5. Mention two reactions in which NADH participates. | 1 | 5 | 2 |
| 6. Draw structure of immunoglobulins. | 1 | 5 | 2 |
| 7. Define anaemia. | 1 | 5 | 2 |
| 8. What is heparin? Function? | 1 | 5 | 2 |
| 9. Define glycogenesis. | 1 | 5 | 2 |
| 10. What are allosteric enzymes? Give examples. | 1 | 5 | 2 |

(LC 4254)

FEBRUARY 2013

Sub. Code: 4254

FIRST B.PHARM. EXAM

Paper IV – BIOCHEMISTRY

Q.P. Code: 564254

Time: Three Hours

Maximum: 100 marks

(180 Min)

I. Elaborate on:

(2 x 20 = 40 marks)

1. What is glycogen? Explain the process of glycogen breakdown and glycogen synthesis. (Glycogenolysis and glycogenesis) (2 + 9 +9)
2. Explain the various types of enzyme inhibition with suitable examples and lineweaver-burke's plots.

II Short Notes

(8 x 5 = 40 marks)

1. Essential aminoacids
2. Immunoglobulins
3. Niacin and its coenzyme function
4. Lipoproteins
5. Adenosine Triphosphate (ATP)
6. Deoxy Ribonucleic acid (DNA)
7. Cholesterol
8. Jaundice

III Short answers

(10x 2 = 20 marks)

1. Define a cell. Mention its functions
2. Name the enzymes of clinical significance
3. What is inulin? Mention its function
4. What is the significance of HMP shunt.
5. Name the phospholipids. Mention any two functions
6. Classify immunoglobulins. Give functions of any two
7. What is xerophthalmia
8. Name the group II hormones
9. Give any two differences between DNA and RNA
10. What is creatinine clearance test?

(LD 4254)

AUGUST 2013

Sub Code: 4254

FIRST B.PHARM. EXAM
Paper IV – BIOCHEMISTRY
Q.P. Code : 564254

Time : Three hours

Maximum : 100 marks

I. Elaborate on:

(2X20=40)

1. a) Write the source, functions, deficiency manifestations of vitamin-B6 and riboflavin.
b) Define hyperbilirubinaemia? Explain its types, causes and treatment.
2. Define HMP Shunt? Explain it in detail with its significance & reactions? Briefly explain about glycogen storage diseases.

II. Write notes on:

(8X5=40)

1. Explain about mutation and its types
2. Nitrogen balance
3. List out the liver function tests & explain about any one
4. Vitamin E properties and functions
5. Biosynthesis of Porphyrins
6. Significance of TCA Cycle
7. Coenzyme functions of pyridoxine
8. Classification of enzymes

III. Short Answers:

(10X2=20)

1. Functions of thyroid hormones – any four
2. Define gluconeogenesis and glycolysis
3. Name any two reduction potentials & its functions
4. Peroxisomal oxidation
5. Hydrolysis of pattern of starch
6. List out the abnormal constituents of urine
7. Define about allosteric inhibition with one example
8. Define trace elements with examples
9. Causes of ketosis
10. Scurvy

(LE 4254)

FEBRUARY 2014
FIRST B.PHARM. EXAM
Paper IV – BIOCHEMISTRY
Q.P. Code : 564254

Sub Code: 4254

Time : Three hours

Maximum : 100 marks

I. Elaborate on:

(2X20=40)

1. a) Write detail about the sources, chemistry, biochemical role, daily requirements and deficiency manifestations of vitamin B
- b) Coenzymes forms and biochemical synthesis of pyridoxine.
2. a) Give a brief account of the different transport process across biomembranes.
- b) Describe the citric acid cycle with energetic.

II. Write notes on:

(8X5=40)

1. Write notes on nucleoproteins.
2. Describe the michaelis – menten equation.
3. Brief account of genetic engineering.
4. Clinical applications of enzymes.
5. Classify lipids with suitable examples.
6. Explain the role of immunoglobulins.
7. Discuss the structure of DNA.
8. Abnormal constituents of urine.

III. Short Answers:

(10X2=20)

1. Basal metabolic rate.
2. Isoenzymes.
3. Codons.
4. Phenylketonuria
5. Structure of sulphur containing amino acids.
6. What are the functions of Vitamin K?
7. Difference between reducing sugars and non reducing sugars.
8. Transport systems.
9. Define nitrogen balance.
10. PUFA.

(LF 4254)

AUGUST 2014

Sub Code: 4254

**FIRST YEAR B.PHARM. EXAM
PAPER IV – BIOCHEMISTRY**

Q.P. Code : 564254

Time : Three hours

Maximum : 100 marks

Answer All Questions

I. Essay:

(2X20=40)

1. Write the definition, location, importance, reactions of gluconeogenesis.
2. Write briefly on the laboratory investigations employed to assess liver function.

II. Short notes:

(8X5=40)

1. Ketone Bodies.
2. Bio chemical functions, sources, diseases status of sodium.
3. Write on account of the anterior pituitary hormones.
4. Mutations.
5. Thiamine.
6. Factors affecting enzyme activity.
7. Write down the reactions of β -oxidation.
8. Renal function tests.

III. Short Answers:

(10X2=20)

1. Digestion of protein.
2. Define hyper bilirubinaemia.
3. FAD.
4. Give the structure of vit D and pyridoxine
5. Mutarotation.
6. What are called macromolecules?
7. Atherosclerosis.
8. Define glycogenesis and glycogenolysis.
9. What are the factors that regulate plasma calcium level?
10. Sodium pump.

(LG 4254)

FEBRUARY 2015

Sub Code: 4254

**B.PHARM. EXAMINATION
FIRST YEAR
PAPER IV – BIOCHEMISTRY**

Q.P. Code : 564254

Time : Three hours

Maximum : 100 marks

I. Essays:

(2 x 20 = 40)

1. a) Define an equation to show that the velocity of enzyme catalyzed reaction is dependent on the substrate concentration.
b) Explain enzyme inhibition with examples.
2. What are proteins? Classify them with examples and describe the biosynthesis of proteins.

II. Short notes:

(8 x 5 = 40)

1. β oxidation of fatty acids.
2. Biochemical role of calcium and iron.
3. Mention the biological significance of polyunsaturated fatty acids.
4. t-RNA.
5. Write on account of digestion and absorption of carbohydrates in the body.
6. Write the physical, chemical properties, structure of hemoglobin.
7. Insulin.
8. Explain glycogenolysis.

III. Short answers:

(10 x 2 = 20)

1. Write the structure and functions of cholesterol
2. Functions of nucleic acids
3. Substrate specificity
4. Biochemical functions of vit E
5. Hemolytic jaundice
6. Fatty liver
7. Define transamination
8. Identification tests for proteins
9. Saponification number
10. Other names of glycolysis

[LH 4254]

AUGUST 2015

Sub. Code: 4254

B.PHARM. DEGREE EXAMINATION

FIRST YEAR

PAPER IV – BIOCHEMISTRY

Q.P. Code: 564254

Time : Three Hours

Maximum : 100 marks

Answer All Questions

I. Essay:

(2 x 20 = 40)

1. a) Write the classification of amino acids with examples and also write a note on the properties of amino acids.
b) Write a note on the different levels of organization of Protein structure.
2. Describe TCA cycle. Give the significance, energetics, regulation and other names of TCA cycle.

II. Short notes :

(8 x 5 = 40)

1. Starch.
2. Phospholipids.
3. Isoenzymes.
4. Differences between DNA and RNA.
5. Diabetes mellitus.
6. Adrenal gland Hormones.
7. BMR and factors affecting BMR.
8. Genetic engineering.

III. Short answers:

(10 x 2 = 20)

1. Name the Immunoglobulin that crosses the placenta and which is released in allergic reactions.
2. Name two reducing Disaccharides.
3. What is Heparin and give its function?
4. Types of Thalassemia.
5. Beri-beri.
6. Name the Protein Energy Malnutrition disorders.
7. Mutations.
8. cAMP.
9. Formation of Acetyl CoA from Pyruvate.
10. How many ATPs will Glucose and Palmitic acid give respectively, on complete oxidation?

(LI 4254)

FEBRUARY 2016

Sub Code: 4254

**FIRST YEAR B.PHARM. EXAMINATION
PAPER IV – BIOCHEMISTRY**

Q.P. Code: 564254

Time: Three hours

Maximum : 100 Marks

I. Essays:

(2 x 20 = 40)

1. Define and classify Vitamins. Write in detail about the structure, synthesis, functions, sources recommended daily allowances and deficiency diseases of Vitamin A.
2. a) Describe Urea cycle.
b) Explain the Watson & Crick's double helical structure of DNA.

II. Short notes:

(8 x 5 = 40)

1. Disaccharides.
2. Essential amino acids and Essential fatty acids.
3. Structure and functions of Immunoglobulins.
4. Denaturation of Proteins.
5. Sickle cell Anemia.
6. Vitamin D.
7. Functions of Hemoglobin.
8. Mechanism of action of Enzymes.

III. Short answers:

(10 x 2 = 20)

1. Name the storage form of Carbohydrate in plants and in animals.
2. Name the Good Cholesterol and Bad Cholesterol.
3. Name the Aromatic Amino Acids.
4. Deamination.
5. Insulin.
6. Glycosuria.
7. Pellagra.
8. Name the Purine and Pyrimidine bases present in the Nucleic acids.
9. Multi enzyme complex.
10. Balanced diet.

(LJ 4254)

AUGUST 2016

Sub Code : 4254

**B.PHARM. EXAMINATION
FIRST YEAR
PAPER IV – BIOCHEMISTRY**

Q.P. Code : 564254

Time: Three hours

Maximum: 100 Marks

I. Elaborate on :

(2 x 20 = 40)

1. a) Briefly explain about Enzyme induction and inhibition.
b) Explain the causes of Mutagenesis.
2. a) Explain the biosynthesis of Porphyrin.
b) Mucopolysaccharide with example.
c) Calcium metabolism.

II. Short notes on :

(8 x 5 = 40)

1. Write in detail about Jaundice.
2. Explain urea clearance test.
3. Explain about classification of proteins.
4. Explain the transport across the cell membrane.
5. Insulin.
6. Eicosanoids.
7. Urea cycle.
8. HMP shunt.

III. Short answers on :

(10 x 2 = 20)

1. Trace element
2. GTT
3. Genome
4. Isoenzyme
5. Rickets
6. Dextrin
7. Ketone bodies
8. Structure of Vitamin D
9. Steroid
10. VLDL

(LK 4254)

FEBRUARY 2017

Sub Code: 4254

**B.PHARM. EXAMINATION
FIRST YEAR
PAPER IV – BIOCHEMISTRY**

Q.P. Code: 564254

Time: Three hours

Maximum : 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. Define Carbohydrate and its classification.
2. Explain about B-Oxidation of lipids.

II. Write notes on:

(8 x 5 = 40)

1. Write the structure of DNA.
2. Explain the any two tests for Liver function test.
3. Explain the TCA cycle.
4. Insulin.
5. Classification and nomenclature of enzymes.
6. Explain the essential amino acid with structure.
7. Briefly about Genetic code.
8. Explain about Vitamin A.

III. Short answers on:

(10 x 2 = 20)

1. Iodine value.
2. Define Protein.
3. Define BMR.
4. Glycolysis.
5. Write the equation for enzyme kinetics.
6. Define Coenzyme.
7. Classification of Vitamin.
8. Name the Bile pigment.
9. Define Cell.
10. RNA.

(LL 4254)

AUGUST 2017

Sub Code: 4254

**B.PHARM. DEGREE EXAMINATION
FIRST YEAR
PAPER IV – BIOCHEMISTRY**

Q.P. Code: 564254

Time: Three hours

Maximum : 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Explain absorption, digestion and metabolism of Carbohydrate.
b) Biochemical organization of cells.
2. a) What are hormones? Classify hormones.
b) Write chemical nature, properties of action, biochemical function of Hormone.

II. Write notes on:

(8 x 5 = 40)

1. Structure of Immunoglobulin.
2. Gluconeogenesis.
3. Classification of protein.
4. Metabolism of potassium.
5. Biochemistry of urine.
6. Fat soluble Vitamin.
7. Nitrogen balance.
8. Essential fatty acids.

III. Short answers on:

(10 x 2 = 20)

1. Amino acids.
2. Nucleotide.
3. APO-Enzyme.
4. Sugar part of De-oxy Ribonucleic acid.
5. Bile salt.
6. Haemoglobin.
7. Functions of phosphorous.
8. Calorific value.
9. Mutation.
10. Adrenaline.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

(LM 4254)

FEBRUARY 2018

Sub Code: 4254

**B.PHARM. DEGREE EXAMINATION
FIRST YEAR
PAPER IV – BIOCHEMISTRY**

Q.P. Code: 564254

Time: Three hours

Maximum : 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. What is Glycogen? Explain the process of Glycogenolysis with its regulations.
2. Define Lipids. Classify Phospholipids with suitable examples. Explain the functions of Phospholipid.

II. Write notes on:

(8 x 5 = 40)

1. Define and classify proteins.
2. Glycolysis.
3. Phenylketonuria.
4. Structure and functions of hemoglobin.
5. Ketone bodies.
6. Co-enzymes.
7. Transcription.
8. Glucose tolerance test.

III. Short answers on:

(10 x 2 = 20)

1. Write the importance of sodium pump.
2. What is Km value? What does it indicate and significance?
3. What is inulin? Give its use.
4. What is carnitine and its function?
5. What is the main function of folic acid?
6. What is the function of anti-diuretic hormone?
7. What is carbamoyl phosphate synthetase II?
8. Give examples for post-translational modifications.
9. Give any two differences between DNA and RNA.
10. What are the factors that regulate plasma calcium level?

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

(LN 4254)

AUGUST 2018

Sub Code: 4254

**B.PHARM. DEGREE EXAMINATION
FIRST YEAR
PAPER IV – BIOCHEMISTRY**

Q.P. Code: 564254

Time: Three hours

Maximum : 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Explain the structure of Ribonucleic (RNA).
b) Bio-synthesis of De-oxy Ribonucleic acid (DNA).
2. Explain digestion, absorption and metabolism of Protein and Nucleo Protein.

II. Write notes on:

(8 x 5 = 40)

1. Sterols.
2. Glucose tolerance test.
3. Phospholipids and Sphingolipid.
4. Mutation.
5. Metabolism of magnesium.
6. Vitamin B-complex.
7. Bio-chemical mode of action of drugs.
8. Enzymes of clinical importance.

III. Short answers on:

(10 x 2 = 20)

1. Energetics of Tri-carboxylic acid cycle.
2. Thiamine.
3. Non-reducing sugar.
4. Biuret test.
5. Lecithin.
6. Normal values of urine.
7. Haemoglobin.
8. Nucleoside.
9. Insulin.
10. Glucosazone.

(LO 4254)

FEBRUARY 2019

Sub Code: 4254

**B.PHARM. DEGREE EXAMINATION
FIRST YEAR
PAPER IV – BIOCHEMISTRY**

Q.P. Code: 564254

Time: Three hours

Maximum : 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. Explain the reactions of the Citric Acid cycle. Give the significance, and its regulations.
2. Define Enzyme, classify enzymes based on International Union of Biochemistry (IUB) system with suitable examples. Explain the factors affecting the enzyme activity.

II. Write notes on:

(8 x 5 = 40)

1. Classify lipids.
2. Significance of the Pentose Phosphate Pathway.
3. Wald's Visual Cycle.
4. Significance of the Genetic code.
5. Renal function tests.
6. Lipoproteins.
7. Discuss the functions of Pituitary gland hormone.
8. Jaundice.

III. Short answers on:

(10 x 2 = 20)

1. Tests to differentiate Glucose from Fructose.
2. Mutarotation.
3. How Vitamin D is activated?
4. Source and functions of Vitamin B₆.
5. What is transamination and its biological significance?
6. What are the levels of organizations of proteins?
What is meant by primary structure of a protein?
7. Name some enzymes that are used as therapeutic agents.
8. What is the function of pancreatic lipase?
9. What is the normal level of calcium in blood and its functions?
10. What are the enzymes needed for salvage pathway of purines, and importance of the salvage pathway.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

(LP 4254)

AUGUST 2019

Sub Code: 4254

**B.PHARM. DEGREE EXAMINATION
FIRST YEAR
PAPER IV – BIOCHEMISTRY**

Q.P. Code: 564254

Time: Three hours

Maximum : 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Define proteins and classify it based on functions with examples.
b) Write a note on the different levels of organization of protein structure.
2. a) Write in detail about the co-enzyme form, biochemical function, deficiency diseases of Pyridoxine.
b) Discuss the metabolism of Iron.

II. Write notes on:

(8 x 5 = 40)

1. HMP shunt and its importance.
2. Fatty acid and its importance.
3. Structure and functions of messenger RNA (mRNA).
4. Note on factors affecting enzyme activity with suitable example.
5. Bile salts.
6. Folic acid.
7. Renal function tests.
8. Biochemical role of haemoglobin.

III. Short answers on:

(10 x 2 = 20)

1. Write the functions of 2, 3-Bis-phosphoglycerate.
2. Biochemical functions of Vitamin C.
3. Write the structure and functions of Cholesterol.
4. What is Heparin and give its functions?
5. Write the functions of Glutathione.
6. Lesch-Nyhan syndrome.
7. What are the functions of Vitamin K?
8. Define Nitrogen balance and its significance.
9. Hyperthyroidism.
10. Leukotrienes.

THE TAMIL NADU Dr.M.G.R. MEDICAL UNIVERSITY

(LQ 4254)

FEBRUARY 2020

Sub Code: 4254

**B.PHARM. DEGREE EXAMINATION
FIRST YEAR
PAPER IV – BIOCHEMISTRY**

Q.P. Code: 564254

Time: Three hours

Maximum : 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Explain Electron Transport Chain (ETC) and its mechanism.
b) What is Glycolysis? Explain its pathway and energetics.
2. Give the detail notes on conversion of cholesterol into bile acids, steroid hormone and Vitamin D.

II. Write notes on:

(8 x 5 = 40)

1. Enzyme inhibitors with examples.
2. Synthesis of 5-HT and Noradrenaline.
3. DNA replication.
4. De novo synthesis of fatty acids.
5. Relationship between free energy, enthalpy and entropy.
6. Diabetes Mellitus.
7. Classification of lipids and its biological role.
8. Therapeutic and diagnostic applications of enzymes.

III. Short answers on:

(10 x 2 = 20)

1. Confirmatory tests for Carbohydrate.
2. Biochemical functions of co-enzymes.
3. Hypercholesterolemia.
4. Difference between DNA and RNA.
5. Significance of HMP shunt.
6. Enzyme repression.
7. Ketoacidosis.
8. Iodine value.
9. BMR.
10. ATP.
