

NOVEMBER - 1994

[ND 567]

FIRST B.Pharm. DEGREE EXAMINATION.

(Revised Regulations)

Paper III — PHARMACEUTICAL PHYSICAL CHEMISTRY

Time : Three hours

Maximum : 90 marks

Two and a half hours  
for Sections A and B

Sections A and B : 60 marks

Answer Sections A and B in separate answer books.

Answer Section C in the answer sheet provided.

SECTION A — (2 × 15 = 30 marks)

Answer any TWO questions.

1. State the assumptions of kinetic theory of gases and deduce the kinetic equation for the gases.
2. (a) State and explain Faraday's laws of electrolysis.  
(b) Define  
(i) Electrochemical equivalent.  
(ii) Transport number.  
(iii) Equivalence conductance.
3. (a) State first and second law of thermodynamics.  
(b) What are isothermal and adiabatic processes?  
(c) Define entropy and enthalpy.

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4. (a) What are buffers? Derive Henderson-Hasselbach buffer equation for weak acid and its salt.  
(b) Define buffer capacity and give its applications.  
(c) Write an account of modern theories of acids and bases.

SECTION B

5. Write any SIX short notes :
  - (1) What do you understand by  
(a) Critical temperature.  
(b) Critical temperature of gas.  
(c) Indicate their importance in liquification of gases.
  - (2) State Raoult's laws for depression of freezing point.
  - (3) Describe an accurate method of determination of osmotic pressure.
  - (4) Define (a) Heat of reaction (b) Heat of neutralization.
  - (5) Discuss the application of phase rule to the equilibrium between different phases of water system.
  - (6) Define and explain parachor viscosity and refractivity.
  - (7) Explain the solubility of liquids in liquids.
  - (8) Explain X-rays and crystal structures.
  - (9) Explain in brief about universal indicator and mixed indicator.

APRIL - 1995

[SB 570]

**First B.Pharm Degree Examination**

(Revised Regulations)

Paper III - PHARMACEUTICAL PHYSICAL CHEMISTRY

Time : Three hours Maximum : 90 marks.

Two and a half hours Sections A and B : 60 Marks  
for section A and B

Answer Section A and B in Separate answer books

Answer Section C in the answer sheet provided.

Section—A (2×15 = 30)

Answer any TWO questions

1. Differentiate between
  - a) Isothermal and Adiabatic processes
  - b) Reversible and irreversible processes
  - c) Isolated, closed and open systems. (5+5+5)
2.
  - a) Explain the term molar elevation constant of a solvent.
  - b) Describe an experimental method for the determination of the molecular weight of a non volatile solute by elevation of boiling point. (7+8)
3.
  - a) Define phase rule, explaining the terms phase, component and degree of freedom.
  - b) Discuss the applications of the phase rule to ice-water-water vapour system.
  - c) Explain the term triple point. (5+5+5)
4. State and illustrate Hess's law of constant heat summation. (15)

SECTION—B

(6×5 = 30)

Answer any SIX questions.

5. Explain the terms
  - a) Molecular refraction
  - b) Specific rotation
6. State and explain Le-chateiiier's principle. Discuss its application to any one osmotic heterogeneous system.
7. Define osmosis and osmotic pressure of a solution.
8. Write a note on fractional distillation.
9. Discuss the statement "Multi-step extraction is more economical than a single-step extraction".
10.
  - a) Distinguish between the terms adsorption and absorption.
  - b) Write the applications of adsorption.
11. Explain the terms
  - a) Specific conductivity
  - b) Equivalent conductivity
  - c) Molecular conductivity
12. Explain the 'Solubility product' and 'common ion effect'. Write a note on their applications.
13. What is auto-catalysis and negative catalysis? Explain with examples.

[AK 707]

Sub. Code : 4163

[AK 707]

FIRST M.B.B.S DEGREE EXAMINATION.

(Revised Regulations)

Paper III — PHARMACEUTICAL PHYSICAL CHEMISTRY

Time : Three hours

Maximum : 90 marks

Two and a half hours

Sections A and B : 60 marks

for Sec. A and B

Answer Section A and B in separate answer books.

Answer Section C in the answer sheet provided.

SECTION A — (2 × 15 = 30 marks)

Answer any TWO questions.

All questions carry equal marks.

1. Give the definition, procedure for determination and pharmaceutical significance of molar refraction, optical rotation and absorptivity.
2. Define and explain elevation of boiling point and depression of freezing point. Prove that they are colligative properties. How can we determine the molecular weight using these properties?
3. State and explain distribution law. What is the pharmaceutical significance of partition coefficient?
4. Explain what is common ion effect. What are buffers and how are pharmaceutical buffers made?

SECTION B — (6 × 5 = 30 marks)

Answer any SIX questions.

All questions carry equal marks.

5. Explain with examples how the melting point reflects the molecular structure of molecules.
6. State and explain law of mass action.
7. Define osmotic pressure. Give one method for the determination of osmotic pressure.
8. What are constant boiling mixtures? Explain with examples.
9. What is conductivity? How do you determine the conductivity of an electrolyte?
10. What is Ostwalds dilution law? How do indicators function?
11. State Hess's law of constant heat summation. Explain with an example.
12. State and explain the phase rule using a one component system.
13. What is adsorption? How is it applicable in the pharmaceutical field?



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[MS 703]

(b) State and explain Hess's Law of constant heat summation with an example.

(c) What is optical activity? How is it related to specific rotation? What is the cause of optical activity?

(4 + 5 + 6 = 15)

3. (a) Discuss Ostwald's dilution law and its applications.

(b) Define 'osmosis' and 'osmotic pressure'. Explain the relationship between osmotic pressure and vapour pressure.

(c) Describe an accurate method for measuring osmotic pressure of a solution. (5 + 5 + 5 = 15)

4. Write notes on any THREE of the following : (5 × 3 = 15)

(a) Fractional distillation.

(b) Sublimation.

(c) Crystal lattices.

(d) Common ion effect.

SECTION B — (6 × 5 = 30 marks)

Answer any SIX questions.

All questions carry equal marks.

5. Define 'Buffer solution' and 'Buffer capacity' and mention their applications.

6. State and explain Parachor viscosity and refractivity.

7. Derive the relationship between elevation of boiling point and molarity of a solution.

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8. Define pH. Calculate the pH of a solution whose hydrogen ion concentration is  $1.7 \times 10^{-6}$ .

9. Give a short account of Reference electrodes.

10. Explain the term "Eutectic Mixture" with suitable example.

11. Why do certain salts hydrolyse in solution? Give examples of salt hydrolysis.

12. Explain the terms 'Catalysis', 'Negative catalysis', 'Auto catalysis' and 'Catalytic poison'.

13. Write briefly on X-rays and crystal structure.

APRIL - 1998

[SV 703]

Sub. Code : 4163

FIRST B.Pharm. DEGREE EXAMINATION.

(Revised Regulations)

Paper III — PHARMACEUTICAL PHYSICAL  
CHEMISTRY

Time : Three hours

Maximum : 90 marks

Two and a half hours

Sec. A & Sec. B : 60 marks

for Sec. A and Sec. B

Section C : 30 marks

Answer Sections A and B in separate answer books.

Answer Section C in the answer sheet provided.

SECTION A — (2 × 15 = 30 marks)

Answer any TWO questions.

All questions carry equal marks.

1. (a) Define Ebullioscopic constant and derive a relation between molecular weight of a non-volatile solute and elevation in boiling point. (8)  
(b) Explain one method to determine molecular weight of a solute by using depression in freezing point method. (7)
2. Define Phase, Component and Degrees of freedom by giving examples. Explain the phase diagram of water in detail. (15)
3. (a) What is salt hydrolysis and how do you calculate the pH of a salt derived from weak acid and strong base? (8)  
(b) Explain the pharmaceutical applications of Buffer solutions and Buffered isotonic solutions. (7)
4. (a) What is the theory of adsorption and mention its application in pharmacy? (10)  
(b) Write a note on Ionic product of water. (5)

SECTION B — (6 × 5 = 30 marks)

Answer any SIX questions.

All questions carry equal marks.

5. What is equivalent conductivity and how do you determine it?
6. Define surface tension and viscosity and mention its applications.
7. Define partition coefficient and mention its limitations and applications.
8. Define critical solution temperature and explain it in the case of phenol water system. What is the effect of impurity on critical solution temperature?
9. Explain the different types of crystal systems.
10. Define heat of solution and heat of neutralisation. Why heat of neutralisation of a strong acid and strong base is a constant.
11. Write a note on Calomel electrode.
12. Explain the Faradays laws of electrolysis.
13. Define solubility, saturated solution and supersaturated solution and what is the effect of temperature on solubility.

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[SM 703]

Sub. Code : 4163

FIRST B.Pharm. DEGREE EXAMINATION.

(Revised Regulations)

Paper III — PHARMACEUTICAL PHYSICAL CHEMISTRY

Time : Three hours Maximum : 90 marks

Two and a half hours Sec. A & Sec. B : 60 marks

for Sec. A and Sec. B Section C : 30 marks

Answer Section A and B in separate answer books.

Answer Section C in the answer sheet provided.

SECTION A — (2 × 15 = 30 marks)

Answer any TWO questions.

All questions carry equal marks.

- (a) Explain the theory and principle of fractional distillation based on boiling point-composition curve.  
(b) Explain the construction and working of fractionating column used in (i) laboratory (ii) industry. (8 + 7)
- (a) Explain the two theories of indicators.  
(b) What are buffers? Give examples. Explain the mode of action of any one of them. (8 + 7)
- (a) Define "OSMOSIS" and "OSMOTIC PRESSURE". How does osmosis differ from diffusion?  
(b) Explain two methods for the determination of Osmotic pressure.  
(c) What is reverse Osmosis? Mention its use. (3 + 10 + 2)

4. (a) What is adsorption? Explain the factors affecting the extent of adsorption of solute from solution.

(b) What are reference electrodes? Give examples and explain the construction and working of any one of them. (7 + 8)

SECTION B — (6 × 5 = 30 marks)

Answer any SIX questions.

All questions carry equal marks.

- Explain parachor and its application.
- What is heterogeneous equilibrium? Give example. How does law of mass action is applied to heterogeneous equilibrium?
- Write notes on Oswald's dilution law.
- Explain salt hydrolysis taking ammonium chloride as example.
- Explain the following (a) enthalpy (b) heat of formation.
- What is catalytic promotor? Give examples and its probable mode of action.
- Define dipole moment. Show the direction of net dipole moment for (a) CO<sub>2</sub> (b) NH<sub>3</sub> (c) H<sub>2</sub>O.
- Explain Henry's law and its limitations.
- State Nernst's law of distribution and mention its limitations.

[SM 703]

APRIL - 1999

[SG 703]

Sub. Code : 4163

FIRST B.Pharm. DEGREE EXAMINATION.

(Revised Regulations)

Paper III — PHARMACEUTICAL PHYSICAL  
CHEMISTRY

Time : Three hours                      Maximum : 90 marks

Two and a half hours                  Sec. A & Sec. B : 60 marks

for Sec. A and Sec. B                  Section C : 30 marks

Answer Sections A and B in separate answer books.

Answer Section C in the answer sheet provided.

SECTION A — (2 × 15 = 30 marks)

Answer any TWO questions.

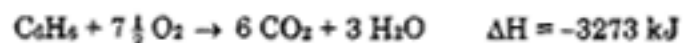
1. (a) What do you mean by catalyst? Explain the types of catalyst with example. (6)
- (b) Explain the theories of catalysts. (9)
2. (a) Define osmosis and osmotic pressure. Explain any two theories of osmosis. (7)
- (b) Explain two methods for the determination of osmotic pressure. (8)
3. (a) Explain the theory of fractional distillation based on boiling point – composition curve. (9)
- (b) Explain the apparatus used for fractional distillation. (6)



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4. (a) Explain Hess's law of summation with examples.

(b) Calculate the enthalpy of formation of benzene from the following data



(c) Explain the buffer action, taking Ammonia-Ammonium chloride as example. (3 + 5 + 7)

SECTION B — (6 × 5 = 30 marks)

Answer any SIX questions.

5. Define parachor and explain its applications.
6. Define distribution law. Explain the method for effective extraction with example.
7. What is reference electrode? Write the construction and working of any one of them.
8. What do you mean by solubility product? Mention its applications.
9. Explain the theories of indicators.
10. Write notes on the principle and applications of steam distillation.
11. What is energy of activation? How does it affect reaction?

12. Explain the principle involved in the assay of

- (a) Oxygen
- (b) Carbondioxide.

13. Define the following :

- (a) Molecular volume
- (b) Optical activity
- (c) Dipole moment.

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[KA 703]

Sub. Code : 4163

FIRST B.Pharm. DEGREE EXAMINATION.

(Revised Regulations)

Paper III — PHARMACEUTICAL PHYSICAL  
CHEMISTRY

Time : Three hours                      Maximum : 90 marks  
Two and a half hours                  Sec. A & Sec. B : 60 marks  
for Sec. A and Sec. B                  Section C : 30 marks

Answer Section A and B in separate answer books.

Answer Section C in the answer sheet provided.

SECTION A — (2 × 15 = 30 marks)

Answer any TWO questions.

All questions carry equal marks.

1. (a) State the Law of Mass Action. Apply the law of mass action to a reversible chemical reaction in order to find out its equilibrium constant.  
(b) Derive the relationship between elevation of boiling point and molarity of a solution.  
(c) What is optical activity? How is it related to specific rotation? (6 + 4 + 5 = 15)

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2. (a) State and explain the Faraday's Laws of electrolysis.

(b) What is Parachor? Give the uses of Parachor?

(a) Describe how the surface tension of a liquid is determined by means of stalagometer. (6 + 4 + 5 = 15)

3. (a) Define Osmosis and Osmotic pressure.

(b) Derive a relationship between osmotic pressure and lowering of vapour pressure.

(c) Give the Barkeley and Hartley method for the determination of osmotic pressure. In what ways this method is better than other methods? (4 + 5 + 6 = 15)

4. Write notes on any THREE of the following :  
(3 × 5 = 15)

- (a) Buffer solution
- (b) Transport numbers
- (c) Solubility product
- (d) Reverse Osmosis.

SECTION B — (6 × 5 = 30 marks)

Answer any SIX questions.

All questions carry equal marks.

5. State and explain the Abnormal molecular weight.

6. Give a short account of Adsorption.

7. Define pH. Calculate the pH of a solution where  $[H^+]$  is  $5 \times 10^{-7}$ .

8. State and explain Hess's law of constant heat summation with a suitable example.

9. What is catalysis? Give examples of different types of catalysis you know.

10. State and explain Henry's Law and discuss its applications.

11. State Kohlrausch's law of independent mobility of ions. Explain with illustrations.

12. What is meant by the terms, phase, component and degree of freedom?

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[KB 703]

Sub. Code : 4163

FIRST B. Pharm. DEGREE EXAMINATION.

(Revised Regulations)

Paper III — PHARMACEUTICAL PHYSICAL  
CHEMISTRY

Time : Three hours                      Maximum : 90 marks

Two and a half hours                  Sec. A & Sec. B : 60 marks  
for Sec. A & Sec. B.                      Section C : 30 marks

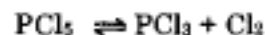
Answer Sections A & B in separate answer books.

Answer Section C in the answer sheet provided.

SECTION A — (2 × 15 = 30 marks)

Answer any TWO questions.

1. (a) State law of mass action and explain the effect of pressure, addition of reactant and addition of an inert gas on the following equilibrium.



- (b) Write notes on energy of activation. (12 + 3)

2. (a) What do you mean by colligative property? Give example.

- (b) Explain in detail the determination of elevation of boiling point and determination of molecular weight from elevation of boiling point including mathematical derivation. (2 + 13)

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3. Write an essay on catalysis covering the following points : (2 + 3 + 4 + 6)

- (a) Definition
- (b) Types with examples
- (c) Characteristics of catalysis
- (d) Mechanisms.

4. (a) State phase-rule and explain phase-rule as applicable to water system.

- (b) Explain the followings : (11 + 4)
- (i) excication and desiccation
  - (ii) Hygroscopic and deliquescent.

SECTION B — (6 × 5 = 30 marks)

Answer any SIX questions.

5. Define the following

(a) Parachor (b) Optical activity (c) Dipole moment.

6. What is Vant Hoff's factor? Mention its use.

7. Write notes on steam distillation.

8. Explain the Faraday's laws of electrolysis.

9. What is solubility products? Explain the application of this concept.

10. Explain Hess law of summation.

11. What is eutectic mixture and mention its applications in pharmacy?

12. Write notes on the applications of adsorption in pharmacy.

13. Explain the principle involved in the assay of (a) oxygen (b) Nitrous oxide (excluding procedure).

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[KC 703]

Sub. Code : 4163

FIRST B.Pharm. DEGREE EXAMINATION.

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CHEMISTRY

Time : Three hours                      Maximum : 90 marks  
Two and a half hours                  Sec. A & Sec. B : 60 marks  
for Sec. A & Sec. B                      Section C : 30 marks

Answer Sections A and B in separate answer books.

Answer Section C in the answer sheet provided.

SECTION A — (2 × 15 = 30 marks)

Answer any TWO questions.

All questions carry equal marks.

1. (a) State Raoult's law for the lowering of vapour pressure of a solvent by a solute. Derive the relation between the relative lowering of vapour pressure and molecular weight. (9)

(b) 18.2 g of urea is dissolved in 100 g of water at 50°C. The lowering of vapour pressure produced in 5 mm of Hg. Calculate the molecular weight of urea. The vapour of water at 50°C is 92 mm of Hg. (6)

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2. (a) Write a note on Absolute Ionic mobility and Equivalent conductivity. (7)

(b) Describe the method of determination of transference number of  $\text{Ag}^+$  and  $\text{NO}_3^-$  ions in a solution of  $\text{AgNO}_3$  by using Hittorf's method. (8)

3. (a) Explain the phase diagram of water. Calculate the number of degrees of freedom in the case of

(i) aqueous solution of  $\text{NaCl}$

(ii) saturated solution of oxalic acid. (8)

(b) Define law of mass action and explain the effect of temperature and pressure on chemical equilibrium. (7)

4. (a) Explain the theory of steam distillation and explain what do you mean by Azeotropic mixtures. (8)

(b) Define salt hydrolysis and write a note on Ostwald's dilution law. (7)

SECTION B — (6 × 5 = 30 marks)

Answer any SIX questions.

All questions carry equal marks.

5. Define Kohlraush's law and mention its applications.

6. Explain the Faradays laws of electrolysis.

7. Define dipole moment and compare the biological activity of D.D.T. with dipole moment.

8. Define Heat of formation and Heat of neutralisation. Why heat of neutralisation of a strong acid and strong base is constant?

9. Define viscosity and surface tension and what is the effect of temperature on it.

10. What is parachor and mention its applications?

11. What are the various absorbents used in gas analysis, explain.

12. What are the limitations and applications of partition coefficient experiment?

13. Write a note on Buffer systems used in pharmacy and its applications.