



## Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3 of UGC Act 1956)

Re-accredited with 'A+' Grade by NAAC. Recognised by UGC Under Section 12B

Coimbatore - 641 043, Tamil Nadu, India

### Bachelor's Degree Examination –November 2019

#### III Semester

**Class : II UG**  
**Major : Chemistry**

**Time: 3 hours**  
**Max. Marks: 100**

#### 18BCH08 – Thermodynamics-I and Solid State Chemistry

##### Part A

**10 x 1 = 10**

##### Choose the correct answer

- Which one of the following is an open system?  
a. Water boiling in a vessel without lid      b. Water boiling in a vessel with lid  
c. Water kept in a thermos flask              d. Water kept in a closed bottle
- Pick a path function from the following.  
a. internal energy      b. work              c. enthalpy              d. entropy
- The enthalpy (H) and the internal energy (U) of a system are related by  
a.  $U = H + PV$       b.  $H = UPV$               c.  $H - U = PV$               d.  $U = H/nRT$
- The inversion temperature of hydrogen is  
a. 80 °C              b. 80 K              c. 298 K              d. -80 °C
- The enthalpy of formation ( $\Delta H_f^0$ ) of  $O_2$  is \_\_\_\_\_ kJ/mol.  
a. -110.5              b. 0              c. -393.5              d. +52.3
- For an endothermic reaction,  $\Delta H$  is  
a. zero              b. positive              c. negative              d. unpredictable
- The least symmetric crystal system among the 7 basic crystal systems is  
a. triclinic              b. monoclinic              c. cubic              d. hexagonal
- A cubic crystal possesses \_\_\_\_\_ elements of symmetry in total.  
a. 7              b. 32              c. 23              d. 3
- Absorbance (A) and transmittance (T) are related as \_\_\_\_\_.  
a.  $T = 10^{-A}$               b.  $A = 10^{-T}$               c.  $A = T^{10}$               d.  $T = 10^A$
- The enzyme responsible for light in glow worms is  
a. kinase              b. glycanase              c. amylase              d. luciferase

**Part B****5 x 6 = 30****Answer ALL questions****Each answer should not exceed 400 words or two pages**

- 11.a. Define surroundings, isolated system and closed system.  
(or)
- 11.b. Explain reversible and irreversible expansion of a gas.
- 12.a. Explain briefly the internal energy and enthalpy of a system.  
(or)
- 12.b. Discuss zeroth law of thermodynamics and its significance.
- 13.a. Deduce the relation between enthalpy of a reaction at constant volume and at constant pressure.  
(or)
- 13.b. Define enthalpy of formation and enthalpy of combustion with one example each.
- 14.a. State and illustrate law of interfacial angles and law of rotational indices.  
(or)
- 14.b. Explain about nematic and cholestric liquid crystals in brief.
- 15.a. State and explain Grotthuss-Draper law and Stark-Einstein's law.  
(or)
- 15.b. Discuss quantum yield of photochemical reactions and its experimental determination.

**Part C****5 x 12 = 60****Answer ALL questions****Each answer should not exceed 800 words or four pages**

- 16.a. Explain (i) intensive and extensive properties (ii) state and path functions.  
(or)
- 16.b. Explain isothermal, adiabatic, isobaric and isochoric processes.
- 17.a. Explain Joule-Thomson effect and calculation of Joule-Thomson coefficient for ideal and real gases.  
(or)
- 17.b. Derive the relationship between  $C_p$  and  $C_v$ .
- 18.a. Explain the use of bomb calorimeter in measuring the enthalpy of combustion.  
(or)
- 18.b. Discuss bond energies, flame temperature and explosion temperature.
- 19.a. Derive Bragg equation and explain Debye-Scherrer method for X-ray diffraction.  
(or)
- 19.b. Explain the crystal structure of NaCl and CsCl.
- 20.a. Draw Jablonski diagram and explain the phenomena of fluorescence and phosphorescence.  
(or)
- 20.b. Derive the expression for the rate of photochemical formation of HBr.

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