

V.P. & R.P.T.P. SCIENCE COLLEGE

B.Sc. (SEMESTER – II) INTERNAL EXAMINATION

PHYSICAL CHEMISTRY: US02CCHE02

Time: 1:30 pm to 2:30 pm

Date: 15-03-2016, Tuesday

Total Marks: 25

Q – 1: Choose the correct option from the following. (Multiple choice question) [03]

- (i) For exothermic reactions, ΔH is _____ while for endothermic reactions it is _____.
- (a) positive, negative (b) positive, positive
(c) negative, negative (d) negative, positive
- (ii) The sum of power to which the concentration of a substance appears in the rate expression is known as _____.
- (a) rate of reaction (b) order of reaction w. r. to that substance
(c) overall order of reaction (d) molecularity of reaction
- (iii) Which of the following value is a slope for the plot of $\log k \rightarrow 1/T$?
- (a) $E_a/2.303R$ (b) $R/2.303 E_a$ (c) $-E_a/2.303 R$ (d) $-2.303 E_a/R$

Q – 2: Answer the following. (Any two) [04]

- (i) Show that $\Delta E = q_v$
- (ii) Define: (1) isobaric process (2) intensive properties
- (iii) Write mechanism and rate law of reaction: $2Br^- + 2H^+ + H_2O_2 = Br_2 + 2H_2O$.
- (iv) If concentration is measure in moles per liter and time in second then what is the unit of rate constant for first order and second order reaction.

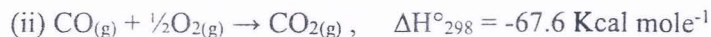
Q – 3 (a) Define work. Derive the expression for work associated with pressure volume change. [05]

- (b) For the reaction $N_2O_{4(g)} \rightarrow 2NO_{2(g)}$ at 298 K and 1 atm pressure, the heat of reaction is -14.1 kcal/mole then what is ΔE of the reaction. Given: $R = 1.987$ cal. [04]

OR

Q – 3 (a) Define standard enthalpy change. Derive Kirchoff's equation. [05]

- (b) Using Hess' law, calculate the standard heat of formation of carbon monoxide. [04]



Q – 4 (a) Derive the integrated rate law for first order reaction. Write its characteristics also. [05]

(b) State and explain the principle of detailed balancing for single-step reaction. [04]

OR

Q – 4 (a) For the reaction between gaseous chlorine and nitric oxide, $2\text{NO} + \text{Cl}_2 \rightarrow 2\text{NOCl}$ [05]

It is found that doubling the concentration of both reactants, increases the rate by a factor of eight, but doubling the chlorine concentration alone only doubles the rate. What is the order of reaction with respect to nitric oxide and chlorine?

(b) “The mechanism of a reaction may change if the conditions under which it is run are altered.” Explain giving suitable example. [04]

