

TDC (CBCS) Even Semester Exam., 2019

CHEMISTRY

(2nd Semester)

Course No. : CHMDSC/CHMGEC-201T

(**Chemical Energetics, Equilibria and
Functional Organic Chemistry**)

Full Marks : 50

Pass Marks : 20

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

SECTION—A

(**Physical Chemistry**)

UNIT—I

1. Answer any *three* questions from the following : 1×3=3
- (a) What is standard enthalpy of formation?
 - (b) How does enthalpy vary with temperature?
 - (c) Define resonance energy.
 - (d) Give two examples of extensive property.

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(Turn Over)

2. Answer either (a) or (b) from the following : 2

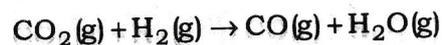
(a) Write the mathematical statement of first law of thermodynamics.

(b) What is integral enthalpy of solution?

3. Answer either (a) or (b) from the following : 5

(a) (i) Explain the terms 'intensive property' and 'isolated system'. 2

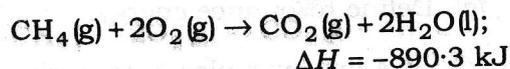
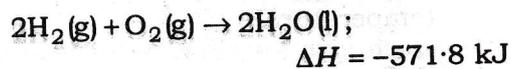
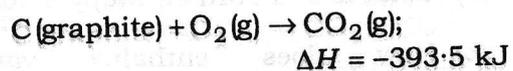
(ii) Calculate ΔH° for the reaction



given that ΔH_f° for $\text{CO}_2(\text{g})$, $\text{CO}(\text{g})$, $\text{H}_2\text{O}(\text{g})$ and $\text{H}_2(\text{g})$ are -393.5 kJ/mol , -111.3 kJ/mol , -241.8 kJ/mol and -542.6 kJ/mol respectively. 3

(b) (i) Explain the terms 'adiabatic process' and 'intensive property'. 2

(ii) Calculate enthalpy of formation of CH_4 from the following thermochemical data : 3

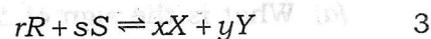


UNIT—II

4. Answer any *three* questions from the following : 1×3=3
- (a) What is the sign of ΔG° for spontaneous reaction?
 - (b) Give one example each of strong and weak electrolytes.
 - (c) What is buffer solution?
 - (d) What do you mean by solubility product?
5. Answer *either (a) or (b)* from the following : 2
- (a) What are the differences between ΔG and ΔG° ?
 - (b) Distinguish between solubility product and ionic product of a sparingly soluble salt.
6. Answer *either (a) or (b)* from the following : 5
- (a) (i) Give one example each of acidic and basic buffer solutions. 2
 - (ii) State and explain Le Chatelier's principle. 3

(b) (i) Write a note on applications of solubility product. 2

(ii) Establish the relationship between K_P and K_C for the reaction



SECTION—B

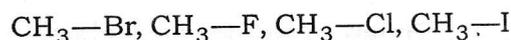
(Organic Chemistry)

UNIT—III

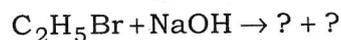
7. Answer any *three* questions from the following : $1 \times 3 = 3$

(a) What is nucleophilic reaction?

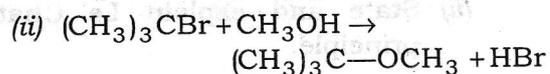
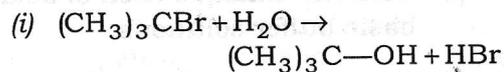
(b) Arrange the following molecules in ascending order of reactivity :



(c) Complete the following reaction :

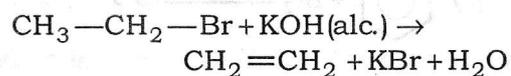


(d) Which one of the following reactions would you expect to take place more rapidly?

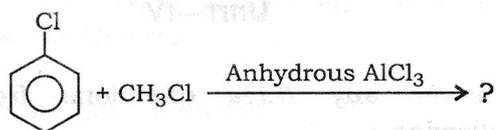


8. Answer either (a) or (b) from the following : 2

(a) Propose the mechanism for the following reaction :

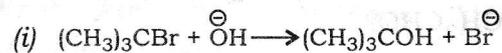


(b) Name and complete the following reaction :

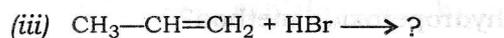
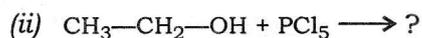
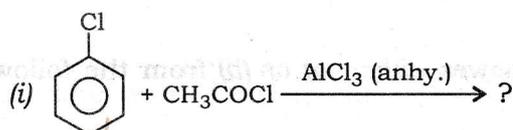


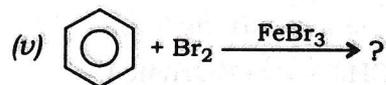
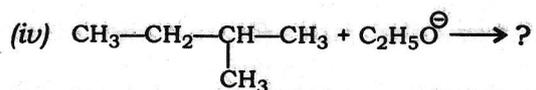
9. Answer either (a) or (b) from the following : 5

(a) Write the S_N1 and S_N2 mechanism for the following reactions : $2\frac{1}{2} \times 2 = 5$



(b) Complete the following reactions : $1 \times 5 = 5$





UNIT—IV

10. Answer any *three* questions from the following : 1×3=3

(a) Give one example of 3°-alcohol and write its IUPAC name.

(b) How is CH₃CH₂OH prepared from CH₃CHO?

(c) Why are alcohols soluble in water?

(d) What is Lucas reagent?

11. Answer *either* (a) or (b) from the following : 2

(a) What is esterification? Give one example.

(b) How is benzene prepared by cumene hydroperoxide method?

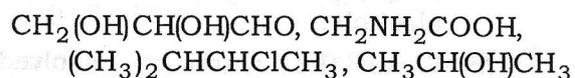
12. Answer either (a) or (b) from the following : 5
- (a) (i) Write the general method of preparation of 1°, 2° and 3° alcohols. 3
- (ii) Write the reactions involved in Reimer-Tiemann reaction. 2
- (b) (i) Write the chemical tests to distinguish between the following pairs : 3
- (CH₃)₃COH and (CH₃)₂CHOH; alcohol and phenol; CH₃COCH₃ and CH₃CH₂CHO.
- (ii) Explain the necessary condition for a carbonyl compound to show Cannizzaro's reaction with suitable example. 2

UNIT—V

13. Answer any three questions from the following : 1×3=3
- (a) What is chirality?
- (b) Write one example each of monosaccharide and polysaccharide.
- (c) Why is glucose a reducing sugar?
- (d) What are meso-compounds?

14. Answer either (a) or (b) from the following : 2

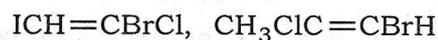
(a) Which of the following compounds exhibit enantiomerism?



(b) Draw the cyclic and open-chain structures of glucose.

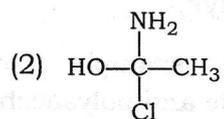
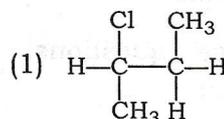
15. Answer either (a) or (b) from the following : 5

(a) (i) Assign *E*- and *Z*-configurations for the following : 1×2=2



(ii) What is mutarotation? Why does D-glucose show the phenomenon of mutarotation? 1+2=3

(b) (i) Assign *R*- and *S*-configurations for the following compounds : 1×2=2



(ii) Discuss the structure of maltose. 3

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