



**2019/TDC/EVEN/CHMDSC/
CHMGEC-201T/071**

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.



(2)

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

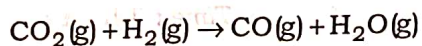
(a) Write the mathematical statement of first law of thermodynamics.

(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

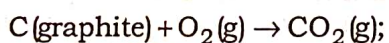
(ii) Calculate ΔH° for the reaction



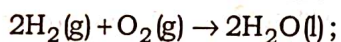
given that ΔH_f° for $\text{CO}_2(\text{g})$, $\text{CO}(\text{g})$, $\text{H}_2\text{O}(\text{g})$ and $\text{H}_2(\text{g})$ are -393.5 kJ/mol , -111.3 kJ/mol , -241.8 kJ/mol and -542.6 kJ/mol respectively. 3

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

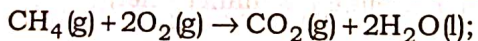
(ii) Calculate enthalpy of formation of CH_4 from the following thermochemical data : 3



$$\Delta H = -393.5 \text{ kJ}$$



$$\Delta H = -571.8 \text{ kJ}$$



$$\Delta H = -890.3 \text{ kJ}$$

(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

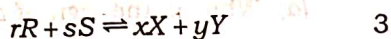
(ii) State and explain Le Chatelier's principle. 3



(4)

(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

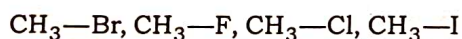
(Organic Chemistry)

UNIT—III

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

(a) What is nucleophilic reaction?

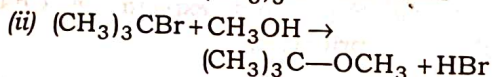
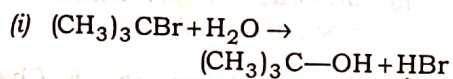
(b) Arrange the following molecules in ascending order of reactivity :



(c) Complete the following reaction :



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



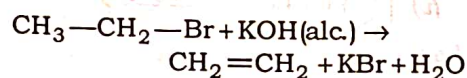
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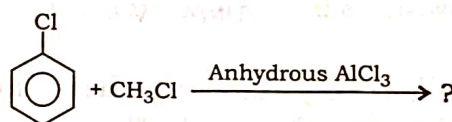
(5)

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

(a) Propose the mechanism for the following reaction :

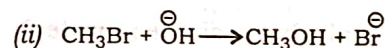
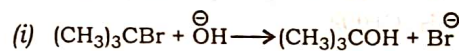


(b) Name and complete the following reaction :

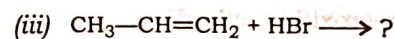
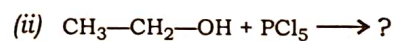
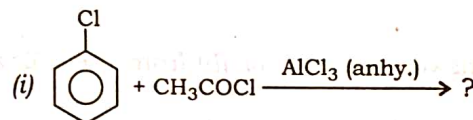


9. Answer either (a) or (b) from the following : 5

(a) Write the S_N1 and S_N2 mechanism for the following reactions : 2½×2=5



(b) Complete the following reactions : 1×5=5

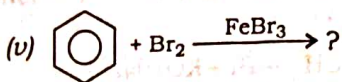
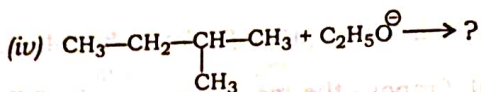


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(Turn Over)



(6)



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 $\text{CH}_3\text{CH}_2\text{OH}$ prepared from CH_3CHO ?

(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?

(7)

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

$(\text{CH}_3)_3\text{COH}$ and $(\text{CH}_3)_2\text{CHOH}$; alcohol and phenol; CH_3COCH_3 and $\text{CH}_3\text{CH}_2\text{CHO}$.

(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.

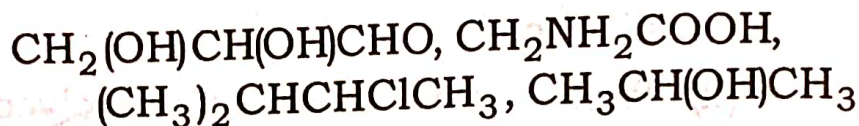
(c) Why is glucose a reducing sugar?

(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.

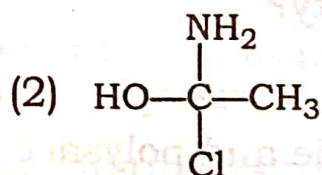
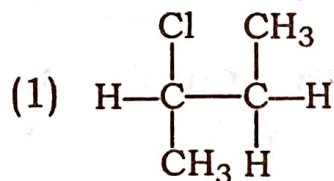
15. Answer either (a) or (b) from the following : 5

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



(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 : $1 \times 2 = 2$



(ii) Discuss the structure of maltose. 3
