SAVITRIBAI PHULE PUNE UNIVERSITY
Progressive Education Society's
Modern College of Arts, Science and Commerce, Ganeshkhind, Pune-411016
B.Sc. Blended Program
(A degree of Savitribai Phule Pune University equivalent to the degree of University of Melbourne)

End Semester Examination: October 2023

Program: B.Sc. Blended **Program (Specific):** B.Sc. Blended(Chemistry) **Set: B**

Class: S.Y. B.Sc. Blended **Semester: III**
Course code: CHM303
Course name: Reactions and Synthesis
Credits: 3 **Time: 2½ hours** **Maximum marks: 50**

Instructions to the candidate:
- All questions are compulsory.
- Figures to the right indicate marks.
- Draw diagrams wherever necessary.
- Use of scientific calculator is allowed.
- Ask for graph paper if needed.

Q.1] Choose the correct option (Solve ANY 10 out of 12) **[10 x 1 =10M]**

1. 2 moles of ethyl acetate react in presence of base to give –
   a. Acetic anhydride b. Ethyl acetoacetate c. Cinnamaldehyde d. Malonic ester

2. The principle of steam distillation is based on —---.
   a. Henry's law b. Boyle's law c. Raoult's law d. Fost diagram

3. Activity of non-ideal solution is —- to its concentration.
   a. equal b. less than c. more than d. negative

4. When the gases are mixed, the entropy —.
   a. increases b. decreases c. remains same d. is zero

5. The Gibb's fee energy is explained by –
   a. G = H-TS b. T = GS+H c. G = TH- S d. TH=S+G

6. Identify X in the reaction $[Pt(NH_3)_4]^{2+} + 2HCl \rightarrow X$
   a. cis $[PtCl_2(NH_3)_2]$ b. trans$[PtCl_2(NH_3)_2]$ c. $[PtCl_2(NH_3)_2]^+$ d. $[PtCl_2(NH_3)_2]^+$

7. Which amongst the following molecule contains highly acidic proton?
   a. Ethyl acetate b. Ethyl acetoacetate c. Ethanaldehyde d. Acetone

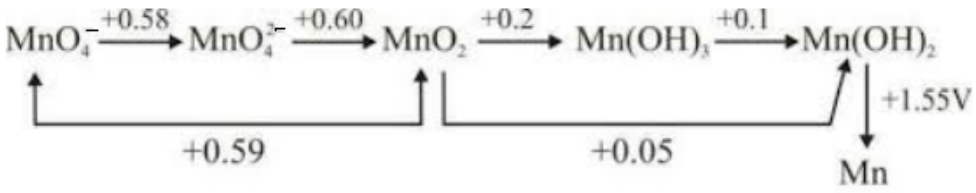
8. The presence of methyl group in ketone is detected by — reaction.
   a. Haloform b. Mannich c. Condensation d.Addition

9. The substitution reaction mechanism in which the departing ligand leaves and the intermediate with a lower coordination is formed is known as …… mechanism.
   a. association b. dissociation c. interchange d. intimate

10. In a mixture, the sum of the mole fractions of all the components is --
   a. the sum of its weights
   b. equal to zero
   c. equal to one
   d. always a fraction

11. In the electrochemical cell, negative Gibb's free energy indicates —- of the reaction.
   a. Spontaneity b. non spontaneity c.fast rate d.slow rate

12. Identify the following diagram



   a. Pourbaix diagram
   b. Latimer diagram
   c. Frost diagram
   d. Ellingham diagram

Q.2] Answer the following in short (<u>ANY 10</u> out of 12) [10 x2 = 20M]

1. What is colligative property? Explain depression in freezing point with suitable example.
2. Compare the Raoult's law and Henry's law.
3. Explain inner and outer-sphere reactions in the complexes.
4. Explain the application of cis platin .
5. Calculate the kinetic energy of an idal gas at 530 K.
6. Write the reaction at cathode, reaction at anode and overall cell reaction of the following

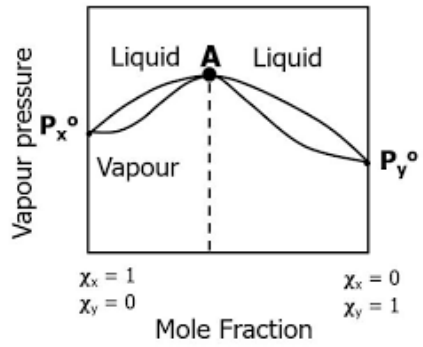
electrochemical cell. Comment on its spontaneity.

- $Cu|Cu^{2+}(aq)||\ Ag^{+}(aq)|Ag\ +$

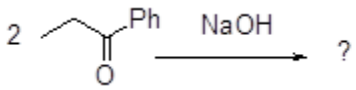
7. Explain interchange mechanisms in substitution in octahedral complexes.
8. Explain Aldol condensation. Predict all the products of reaction between Acetaldehyde and propionaldehyde in presence of NaOH.

9. Explain trans effect.

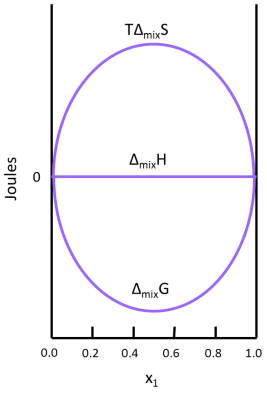
10. Explain the given vapor pressure diagram. What is point A?



11. Predict the product of following reaction.

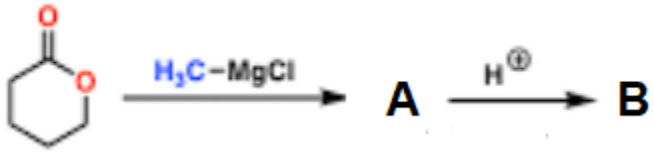


12. Explain the thermodynamics of mixing with help of following diagram



Q.3. Answer in brief (ANY 4 out of 6) **[4 x 5 = 20M]**

1. Explain the kinetic theory of gasses.
2. Explain Claisen reduction.
3. Calculate the Gibbs free energy of mixing where 21 grams of nitrogen, 32 grams of oxygen and 11 grams of carbon dioxide are mixed at 300K. (R= 8.314 J/mol/K). Atomic weight of C is 12. Atomic weight of O is 16. Atomic weight of N is 14.
4. Explain the Ellingham diagram with suitable example.
5. Differentiate between hard acid and soft acid theory and its applications.
6. Show the mechanism and identify A and B.



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