

1. The rate of acid catalysed hydrolysis of ethyl acetate in excess hydrochloric acid obeys the following rate law,

$$-d[\text{ester}]/dt = k[\text{ester}][\text{HCl}],$$

where  $k = 0.1 \text{ M}^{-1} \text{ h}^{-1}$  at  $25^\circ\text{C}$ . Calculate the required time for half of the ester to be hydrolysed. (Initial conc. of HCl = 0.01 M)

- a. 622.10 h
  - b. 693.15 h
  - c. 670.25 h
  - d. 682.23 h
2. One mol of water at  $100^\circ\text{C}$  and 1 atm is converted to its vapour at 0.5 atm isothermally and reversibly. Calculate the work done (W) for this process. (Assume that  $\text{H}_2\text{O}$  vapour behaves ideally and volume of liquid  $\text{H}_2\text{O}$  is negligible with respect to its vapour) [ $R = 1.98 \text{ cal K}^{-1} \text{ mol}^{-1}$ ]

- a. -1250.46 cal
- b. -1210.43 cal
- c. -738.45 cal
- d. -511.81 cal

3. Calculate the percentage of void space in case of face centred cubic (FCC) crystal.

- a. 23.21
- b. 21.67
- c. 25.93
- d. 30.43

4. What is the shape of  $\text{XeOF}_4$  molecule?

- a. Trigonal bipyramidal
- b. Tetrahedral
- c. Square planar
- d. Square pyramidal

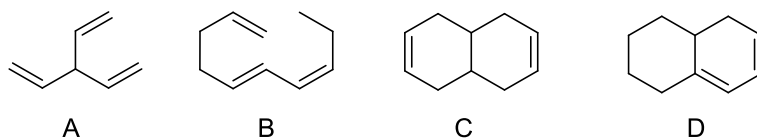
5. How many unpaired electrons are there in  $\text{O}^{2-}$ ?

- a. 0
- b. 2
- c. 4
- d. 6

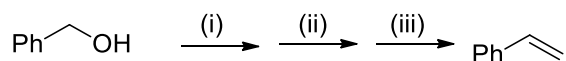
6. What is the correct order of increasing acidity for the following oxides?

- a.  $\text{MgO} < \text{Al}_2\text{O}_3 < \text{SiO}_2 < \text{SO}_2$
- b.  $\text{Al}_2\text{O}_3 < \text{SO}_2 < \text{SiO}_2 < \text{MgO}$
- c.  $\text{SiO}_2 < \text{SiO}_2 < \text{MgO} < \text{Al}_2\text{O}_3$
- d.  $\text{SO}_2 < \text{SiO}_2 < \text{Al}_2\text{O}_3 < \text{MgO}$

7. Which one of the following alkenes is expected to give a product with highest number of carbonyl group upon ozonolysis?



8. Identify the correct sequence of reagents for the below given transformation.



- A) (i)  $\text{CrO}_3$ ; (ii)  $\text{CH}_3\text{MgBr}$ ; (iii)  $\text{H}_3\text{O}^+$
- B) (i)  $\text{H}_3\text{O}^+$ ; (ii)  $\text{CrO}_3$ ; (iii)  $\text{CH}_3\text{MgBr}$
- C) (i)  $\text{CH}_3\text{MgBr}$ ; (ii)  $\text{H}_3\text{O}^+$ ; (iii)  $\text{CrO}_3$
- D) (i)  $\text{CrO}_3$ ; (ii)  $\text{H}_3\text{O}^+$ ; (iii)  $\text{CH}_3\text{MgBr}$

9. Molecular mass of a polyhydroxy alcohol changes from 282 to 576 after acylation with  $\text{CH}_3\text{COCl}$ . Predict how many hydroxyl groups are present per molecule of the former compound?

- a. 6
- b. 7
- c. 8
- d. 4

10. Which one of the following compounds will be most readily dehydrated under acidic condition?

