51. An aqueous solution of X is added slowly to an aqueous solution of Y as shown in List I. The variation in conductivity of these reactions is given in List II. Match list I with List II and select the correct answer using the code given below the lists : **[JEE (Adv)-2013 (Paper-2)]**

**List I**

P. $(C_2H_5)_3N$ (**X**) + $CH_3COOH$ (**Y**)

Q. KI (0.1M) (**X**) + $AgNO_3$ (0.01M) (**Y**)

R. $CH_3COOH$ (**X**) + KOH (**Y**)

S. NaOH (**X**) + HI (**Y**)

**List II**

1. Conductivity decreases and then increases
2. Conductivity decreases and then does not change much
3. Conductivity increases and then does not change much
4. Conductivity does not change much and then increases

Codes :

| | P | Q | R | S |
|---|---|---|---|---|
| (A) | 3 | 4 | 2 | 1 |
| (B) | 4 | 3 | 2 | 1 |
| (C) | 2 | 3 | 4 | 1 |
| (D) | 1 | 4 | 3 | 2 |

52. The standard reduction potential data at 25ºC is given below.

$E^o(Fe^{3+}, Fe^{2+}) = + 0.77$ V;

$E^\circ(Fe^{2+}, Fe) = - 0.44$ V

$E^o(Cu^{2+}, Cu) = + 0.34$ V;

$E^o(Cu^{+}, Cu) = + 0.52$ V

$E^o[O_2(g) + 4H^+ + 4e^- \rightarrow 2H_2O] = + 1.23$ V;

$E^o[O_2(g) + 2\ H_2O + 4e^- \rightarrow 4OH^-] = + 0.40$ V

$E^o(Cr^{3+}, Cr) = - 0.74$ V;

$E^o(Cr^{2+}, Cr) = - 0.91$ V

Match $E^o$ of the redox pair in List I with the values given in List II and select the correct answer using the code given below the lists : **[JEE (Adv)-2013 (Paper-2)]**

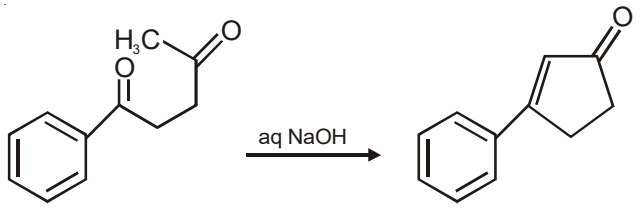
| **List I** | **List II** |
|---|---|
| P. $E^o(Fe^{3+}, Fe)$ | 1. –0.18 V |
| Q. $E^o(4H_2O \rightleftharpoons 4H^+ + 4OH^-)$ | 2. –0.4 V |
| R. $E^o(Cu^{2+} + Cu \rightarrow 2Cu^+)$ | 3. –0.04 V |
| S. $E^o(Cr^{3+}, Cr^{2+})$ | 4. –0.83 V |

Codes :

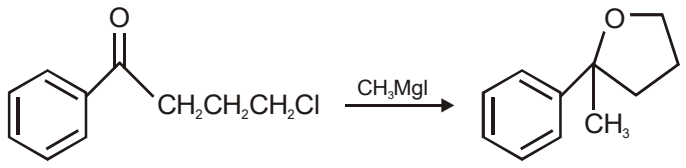
| | P | Q | R | S |
|---|---|---|---|---|
| (A) | 4 | 1 | 2 | 3 |
| (B) | 2 | 3 | 4 | 1 |
| (C) | 1 | 2 | 3 | 4 |
| (D) | 3 | 4 | 1 | 2 |

53. Match the reactions in **Column-I** with appropriate types of steps/reactive intermediate involved in these reactions as given in **Column-II** **[IIT-JEE-2011 (Paper-2)]**

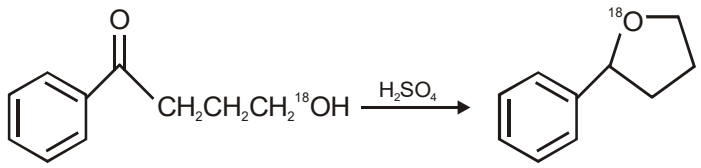
**Column I** **Column II**

(A) 

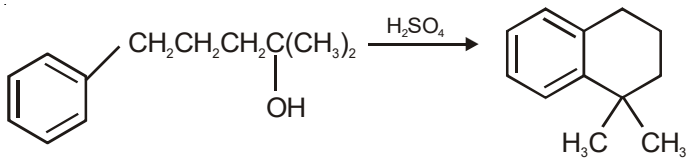

(p) Nucleophilic substitution

(B) 


(q) Electrophilic substitution

(C) 

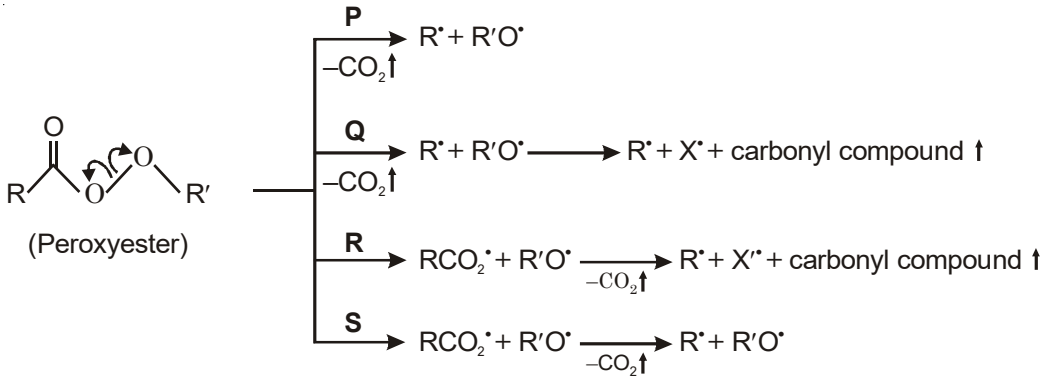

(r) Dehydration

(D) 


(s) Nucleophilic addition

(t) Carbanion

54. Different possible **thermal** decomposition pathways for peroxyesters are shown below. Match each pathway from **List I** with an appropriate structure from **List II** and select the correct answer using the code given below the lists. **[JEE (Adv)-2014 (Paper-2)]**




**List-I**

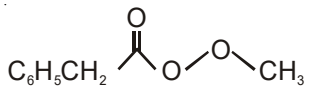
**P.** Pathway **P**

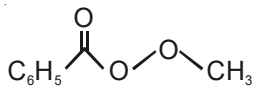
**Q.** Pathway **Q**

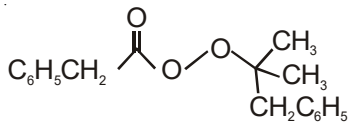
**R.** Pathway **R**

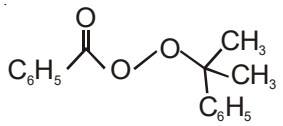
**S.** Pathway **S**

**List-II**

**1.** 

**2.** 

**3.** 

**4.** 

**Code :**

| | P | Q | R | S |
|---|---|---|---|---|
| (A) | 1 | 3 | 4 | 2 |
| (B) | 2 | 4 | 3 | 1 |
| (C) | 4 | 1 | 2 | 3 |
| (D) | 3 | 2 | 1 | 4 |

**Answer Q.53, Q.54 and Q.55 by appropriately matching the information given in the three columns of the following table.** **[JEE (Adv)-2017 (Paper-1)]**

Columns 1, 2 and 3 contain starting materials, reaction conditions, and type of reactions, respectively.

| Column 1 | | Column 2 | | Column 3 | |
|---|---|---|---|---|---|
| (I) | Toluene | (i) | $NaOH/Br_2$ | (P) | Condensation |
| (II) | Acetophenone | (ii) | $Br_2/h\nu$ | (Q) | Carboxylation |
| (III) | Benzaldehyde | (iii) | $(CH_3CO)_2O/CH_3COOK$ | (R) | Substitution |
| (IV) | Phenol | (iv) | $NaOH/CO_2$ | (S) | Haloform |

55. The only CORRECT combination in which the reaction proceeds through radical mechanism is

(A) (II) (iii) (R) (B) (III) (ii) (P)

(C) (IV) (i) (Q) (D) (I) (ii) (R)

56. For the synthesis of benzoic acid, the only CORRECT combination is

(A) (III) (iv) (R) (B) (IV) (ii) (P)

(C) (II) (i) (S) (D) (I) (iv) (Q)

57. The only CORRECT combination that gives two different carboxylic acids is

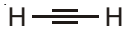
(A) (IV) (iii) (Q) (B) (I) (i) (S)

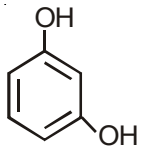
(C) (III) (iii) (P) (D) (II) (iv) (R)

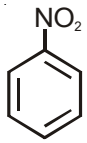
58. Match the four starting materials (**P, Q, R, S**) given in **List I** with the corresponding reaction schemes (**I, II, III, IV**) provided in **List II** and select the correct answer using the code given below the lists.

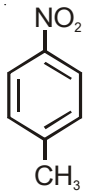
**[JEE (Adv)-2014 (Paper-2)]**

**List-I**

**P.** 

**Q.** 

**R.** 

**S.** 

**List-II**

**1. Scheme I**

(i) $KMnO_4$, $HO^{\ominus}$, heat (ii) H, $\overset{\oplus}{H}_2O$
(iii) $SOCl_2$ (iv) $NH_3$

? ⟶ $C_7H_6N_2O_3$

**2. Scheme II**

(i) Sn/HCl (ii) $CH_3COCl$ (iii) conc. $H_2SO_4$
(iv) $HNO_3$ (v) dil. $H_2SO_4$, heat (vi) $HO^{\ominus}$

? ⟶ $C_6H_6N_2O_2$

**3. Scheme III**

(i) red hot iron, 873 K (ii) fuming $HNO_3$, $H_2SO_4$, heat
(iii) $H_2S.NH_3$ (iv) $NaNO_2$, $H_2SO_4$ (v) hydrolysis

? ⟶ $C_6H_5NO_3$

**4. Scheme IV**

(i) conc. $H_2SO_4$, 60ºC
(ii) conc. $HNO_3$, conc. $H_2SO_4$ (iii) dil. $H_2SO_4$, heat

? ⟶ $C_6H_5NO_4$

**Code :**

| | P | Q | R | S |
|---|---|---|---|---|
| (A) | 1 | 4 | 2 | 3 |
| (B) | 3 | 1 | 4 | 2 |
| (C) | 3 | 4 | 2 | 1 |
| (D) | 4 | 1 | 3 | 2 |

59. The sum of the number of lone pairs of electrons on each central atom in the following species is

$[TeBr_6]^{2-}$, $[BrF_2]^+$, $SNF_3$ and $[XeF_3]^-$

(Atomic numbers: N = 7, F = 9, S = 16, Br = 35, Te = 52, Xe = 54) **[JEE (Adv)-2017 (Paper-1)]**

60. A closed tank has two compartments A and B, both filled with oxygen (assumed to be ideal gas). The partition separating the two compartments is fixed and is a perfect heat insulator (Figure 1). If the old partition is replaced by a new partition which can slide and conduct heat but does **NOT** allow the gas to leak across (Figure 2), the volume (in $m^3$) of the compartment A after the system attains equilibrium is ____. **[JEE (Adv)-2018 (Paper-1)]**

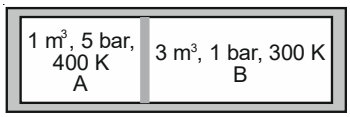


Figure 1

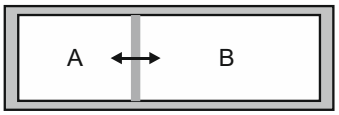


Figure 2