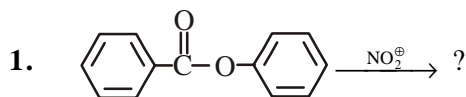# CBSE Mains- 2008
CHEMISTRY

1.

 $\xrightarrow{\;NO_2^{\oplus}\;}$?

Sol:

(1)   (2)
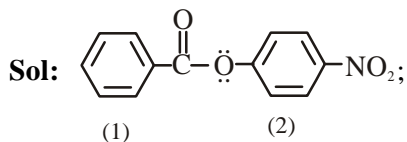
because ring (2) is activated due to delocalisation of lone pair of e⁻s of O; and $NO_2^{\oplus}$ preferably goes to para position because O-position is sterically hindered.

2.

 (electrophilicity)

(1)   (2)   (3)   (4)
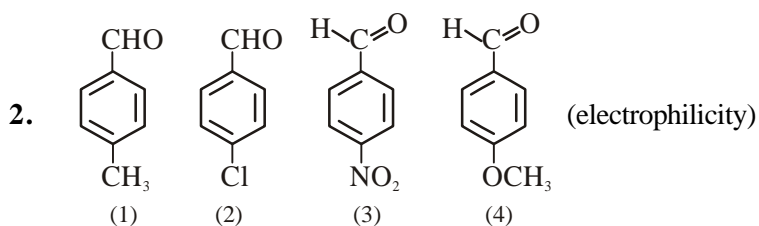
Sol: Order of electrophilicity is $3 > 2 > 1 > 4$

3.

 $\xrightarrow{\;Na_2CO_3 + H_2O\;}$?

Sol:
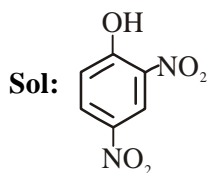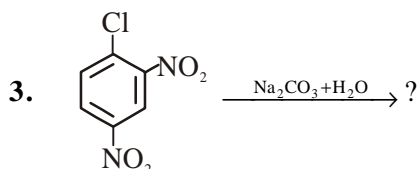
due to two $-NO_2$ gps present at o-and p- position, Cl becomes more reactive towards nucleophilic substitution.

4.

$$\underset{H}{\overset{Ph}{>}}C = C\underset{CH_3}{\overset{H}{<}} \quad \xrightarrow{\text{HBr}} \quad ?$$

Sol: Ph = C_6H_5

$$\underset{H}{>}C = C\underset{CH_3}{\overset{H}{<}} \quad \xrightarrow{H^{\oplus}} \quad \underset{H}{>}\overset{\oplus}{C}- CH_2 - CH_3 \quad \xrightarrow{Br^-} \quad \underset{H}{>}\overset{Br}{C}- CH_2 - CH_3$$
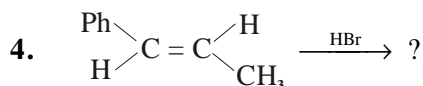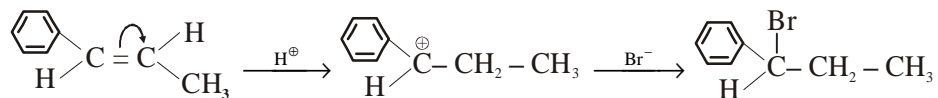
5. Why mobility of $Li^{\oplus}$ is less than that of $Cs^{\oplus}$ ion.

Sol: Mobility of $Li^{\oplus}$ is less than that of $Cs^{\oplus}$ due to greater degree of hydration of $Li^{\oplus}$ ion.
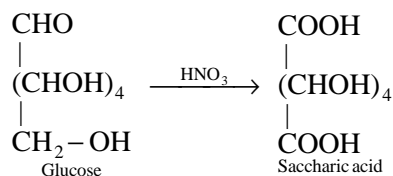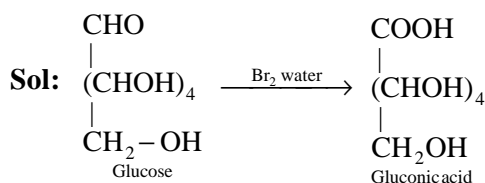
6. Why H_2O is more viscous than HF.

Sol: H_2O is more viscous than HF due to more number of H-bonds per molecule of H_2O and it is highly associated *i.e.* $(H_2O)_n$.

7. Give the products when glucose is treated with Br_2 water and HNO_3.

Sol:

$$\underset{\underset{\text{Glucose}}{CH_2-OH}}{\overset{CHO}{\underset{|}{\overset{|}{(CHOH)_4}}}} \quad \xrightarrow{Br_2 \text{ water}} \quad \underset{\underset{\text{Gluconic acid}}{CH_2OH}}{\overset{COOH}{\underset{|}{\overset{|}{(CHOH)_4}}}}$$

$$\underset{\underset{\text{Glucose}}{CH_2-OH}}{\overset{CHO}{\underset{|}{\overset{|}{(CHOH)_4}}}} \quad \xrightarrow{HNO_3} \quad \underset{\underset{\text{Saccharic acid}}{COOH}}{\overset{COOH}{\underset{|}{\overset{|}{(CHOH)_4}}}}$$

8. Arrange the following in decreasing order of dehydration
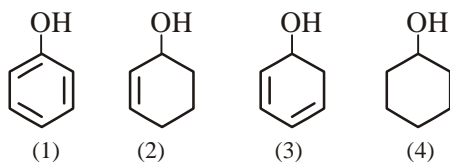
Sol: Order of dehydration is $3 > 2 > 4 > 1$

9. Give the unit cell structure of diamond.

Sol: In Diamond structure, C forms FCC or CCP and also C is present at half of the tetrahedral voids (*i.e.* alternate tetrahedral void); Diamond structure is similar to ZnS type structure.

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10. Out of $CH \equiv C^-$ and $CH_2 = CH^-$ which is more basic.

Sol.: $HC \equiv C:^- < CH_2 = C\ddot{H}^-$; *i.e.,* $CH_2 = C\ddot{H}^-$ is stronger base than $CH \equiv C:^-$.

11. Name the polymer formed when adipic acid and hexamethylene diamine condense?

Sol: Adipic acid *i.e.* $HOOC\ (CH_2)_4COOH$ and hexamethylene diamine *i.e.* $NH_2(CH_2)_6NH_2$ form a condensation (polyamide) polymer known as Nylon-66.

12. Give the stereoisomers of $[Co(en)_2Cl_2]^{\oplus}$

Sol: geometrical isomers

cis   trans

trans form doesnot show optical isomerism while cis form shows *i.e.*

13. Copper crystallises in fcc structure having edge length 361.4 pm. calculate its density?

Sol: $z = 4$

At. wt. = 63.5

$$d = \frac{z \times M}{a^3 \times N_A}$$

$$= \frac{4 \times 63.5}{(361.4 \times 10^{-10})^3 \times 6.023 \times 10^{23}} = 8.9 \text{ g/cc}$$

14. Find the vont hoff's factor *i* and dissociation constant for KI solution : Given $\Delta T_f = -0.201$ and molality is 0.1 and K_f is 1.86° mol/kg

Sol: $\Delta T_f = K_f.m = 1.86 \times 0.1 = 0.186$

(calculated)

$$i = \frac{\text{observed colligative property}}{\text{calculated colligative property}}$$

$$i = \frac{0.201}{0.186} = 1.08$$

$i = 1 + \alpha = 1.08$

$\alpha = 0.08$ *i.e.,* 8%

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15. K_1 and K_2 are given at 17°C and 27°C, find out expression for Ea (Activation energy)

Sol: $\log_{10} \dfrac{K_2}{K_1} = \dfrac{Ea}{2.303R}\left[\dfrac{1}{T_1} - \dfrac{1}{T_2}\right]$

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