1). $[Pt(en)_2Cl_2]$

Co-ordination number → 6

Oxidation state → +2 [Pt(II)]

2). FeO has a non-stoichiometric composition due to metal deficiency defect due to cationic vacancies.

In the crystal some Fe^{2+} ions are missing and the nearby Fe^{2+} atoms/ions are oxidised to Fe^{3+} to maintain electrical neutrality. So for every 3 Fe^{2+}, only 2 Fe^{3+} are present and one vacancy is created.

The composition thus becomes $Fe_{0.95}O$.

3).

chloro benzene

benzyl chloride

Benzyl chloride is hydrolysed easily because the benzyl carbocation formed is more stable.

On the other hand, C-Cl bond in chlorobenzene acquires

partial double bond character due to resonance and the carbon is sp^2 hybridised. Also, phenyl carbocation formed is highly unstable. There is possible repulsion between approaching nucleophile and electron rich arene. This is more in case of chloro benzene than benzoyl chloride.

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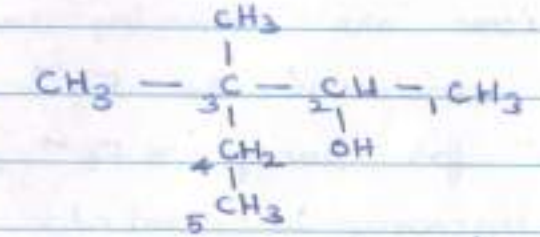
4)



3, 3 - dimethyl pentan-2-ol

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5) These reaction shows the selectivity of the catalyst. It is the ability of the catalyst to direct the reaction to yield particular products.

Example:

$$CO + 3H_2 \xrightarrow{Ni} CH_4 + H_2O$$

$$CO + 2H_2 \xrightarrow{Cu/ZnO-Cr_2O_3} CH_3OH$$

$$CO + H_2 \xrightarrow{Cu} HCHO$$

6) NH_3, PH_3, AsH_3, SbH_3, BiH_3

(a) PH_3

(b) NH_3

(c) NH_3

(d) BiH_3

7) Mass of glucose, $w_2 = 60g$

Molar mass of glucose, $M_2 = 180\ g\ mol^{-1}$

Mass of water, $w_1 = 250g$

$K_f = 1.86\ K\ Kg\ mol^{-1}$

Molality of the solution, $m = \frac{w_2 \times 1000}{M_2 \times w_1}$

$$m = \frac{60g \times 1000}{180\ g\ mol^{-1} \times 250g}$$

$$m = 1.333\ mol\ Kg^{-1}$$

Depression in freezing point, $\Delta T_f = K_f \times m$

$$\Delta T_f = 1.86\ K\ Kg\ mol^{-1} \times 1.333\ mol\ Kg^{-1}$$

$$\Delta T_f = 2.479\ K$$

$$\Delta T_f = 2.48\ K$$

log(1.74) = 0.2395

log(1.33) = 0.1249

anti log(0.3944)

2.479

$\therefore \quad T_f^\circ - T_f = \cancel{2.474K}\ 2.48\,K$

$273.15K - T_f = \cancel{2.474K}\ 2.48\,K$

$T_f = 273.15\,K - \cancel{2.474K}\ 2.48K$

$T_f = \cancel{270.676K}\ 270.67\,K$

(or)

$T_f = \cancel{-2.474^\circ C}\ -2.48\,K$

∴ The freezing point of the solution is $\cancel{270.676K}\ 270.67K$ or $\cancel{-2.474^\circ C}\ -2.48^\circ C$

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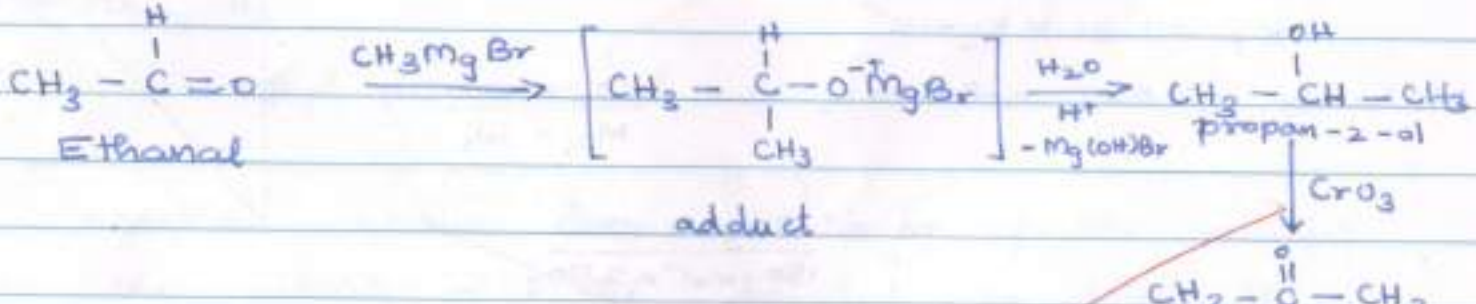
8). (a)



(b)