Chemistry Assignment-2

Slot : $H_2 + TH_2$

① (a)

(i) $NH_4NO_2(s) \longrightarrow N_2(g) + 2H_2O(g)$

is a redox reaction.

NH_4NO_2 exists as NH_4^+ and NO_2^-

→ N in NH_4^+ oxidises from −3 to 0 (Oxidation)

→ N in NO_2^{-2} reduces from +3 to 0 (Reduction)

∴ N is oxidesed in NH_4^+

(b) $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(s)$ is a 'redox' reaction

$\Rightarrow Ca^{+2} = Ca^{+2}$ (no change)

$\Rightarrow O^{2-} + 1e^- = O^{1-}$ (oxidation)

$\Rightarrow H^{1+} - 2e^- = H^{1-}$ (reduction)

(c) $(NH_4)_2Cr_2O_7(s) \rightarrow N_2(g) + 4H_2$ is redox reaction

$2N^{-3} - 6e^- \rightarrow 2N^0$ (oxidation)

$2Cr^{+4} + 6e^- \rightarrow 2Cr^{+3}$ (reduction)

$(\overset{(-3)}{N}H_4)_2\overset{+4}{Cr_2}O_7 \longrightarrow \overset{0}{N_2}(g) + 4H_2O(l) + \overset{0}{Cr_2}$

(b) Lithium-ion battery Vs lead acid battery

Lithium-ion battery expected to show high energy density when compared to lead acid battery. Because, these are cobalt-based. The system contains cobalt oxide positive electrode (cathode) and a graphite carbon in the negative electrode (anode). The lithium ions are bound to the cobaltoxide. During discharge the lithium ions move from the cathode to the anode. The flow reverse on charge.

Efficiency: Most lithium-ion batteries are 95% efficient more, meaning that 95% more energy stored in lithium-ion battery is actually able to be used lead acid batteries → 80 to 85% used and has high depth of discharge when compared to lead acid battery.

(2) a) A $\xrightarrow{PH}$ 2.6 B $\xrightarrow{PH}$ 7.0

Iron rusts more quickly at low pH (high $[H^+]$)

So, solution A of 2.6 p^H value corrosion will be faster than B. As p^H decreased (increasing acidity), the corrosion rate also increased. This is due to low p^H solution accelerate corrosion by providing hydrogen ion resulting in attacking and damaging the surface of steel as well as weight loss.

(b) Cathodic protection:

a) ~~Sac~~ Sacrificed anode method

Sacrificial anode — Aluminium

protected cathod → copper

(Galvanic corrosion) bimetallic couple of Al and Cu.

The metal with low standand reduction potential acts as anode. Here

$\{(Al^{+s}/Al)\epsilon^\circ\ Al^{+s}/Al = -1.66V\}$

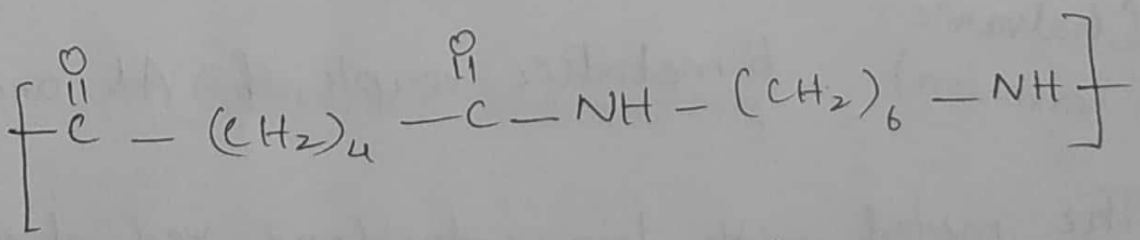
The later sensors that target molecule in an analyte.

Transducer: The second component held in common with all chemical sensors is the transducer. Transducers are responsible for intaking the chemical information of the interaction between the receptor and analyte and converting it into corresponding electrical information.

=> Process at the receptor - analyte interface can be classified into

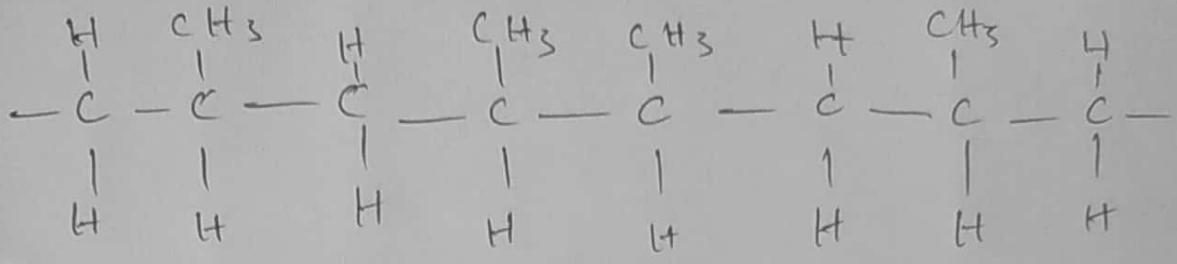
* Interaction equilibria and
* Chemical reaction equilibria.

(3)

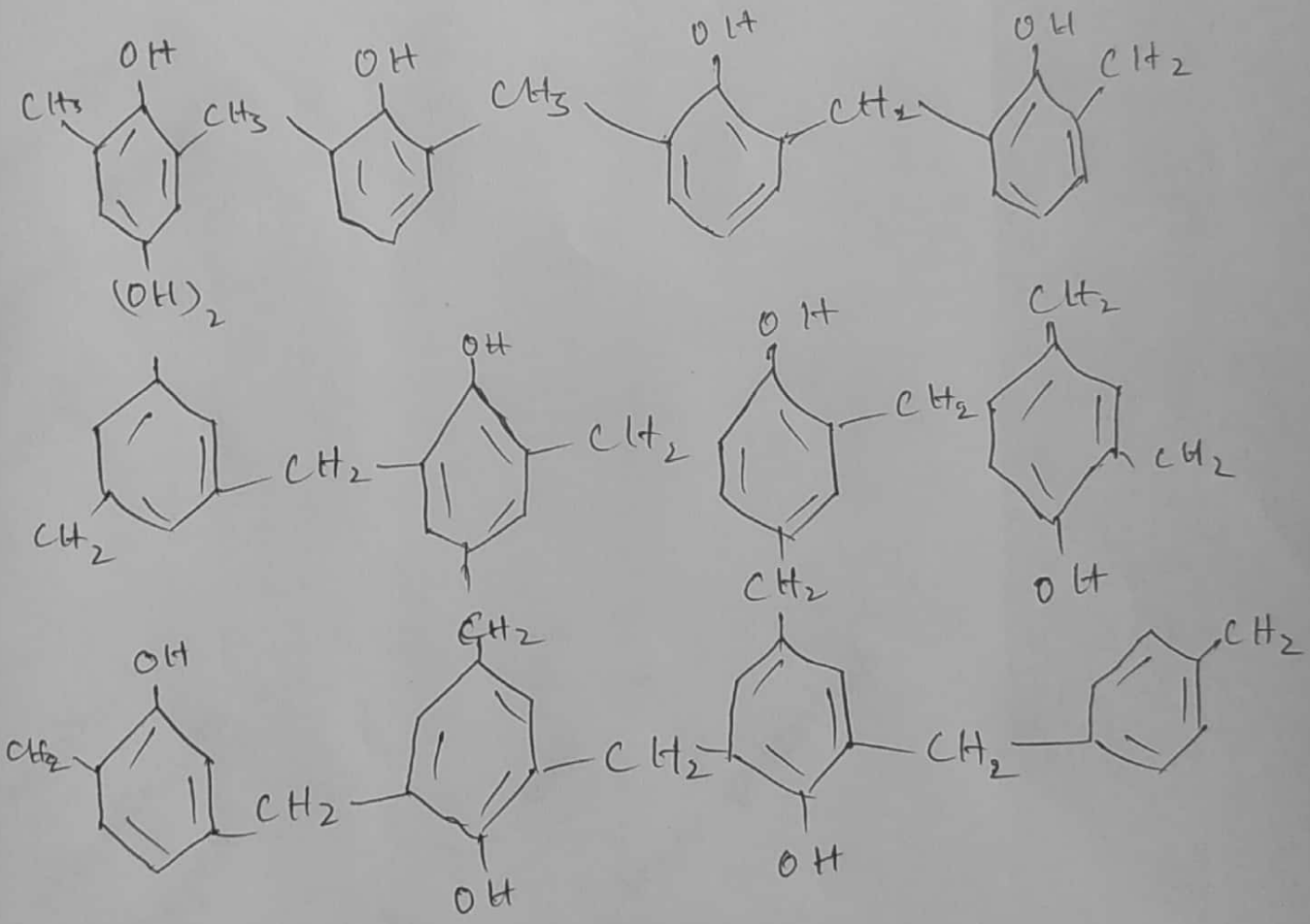


{Nylon-6,6} (fiber)

(Hydrogen bonding)



(Polypropylene) (plastic)



(Bakelite) Thermosetting

Nylon-66 > Bakelite > Polypropelene