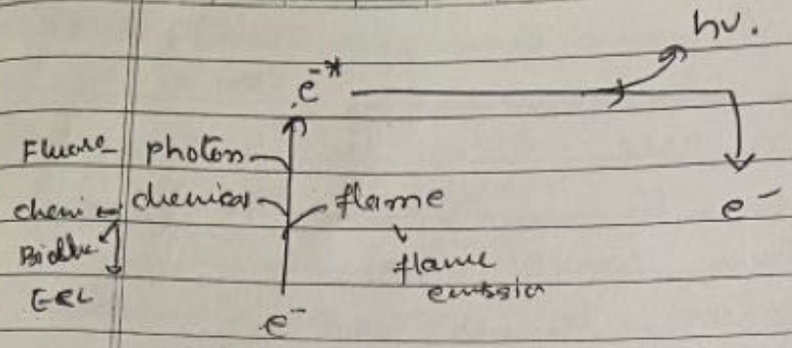
Chemiluminescence
Bioluminescence
Electrochemiluminescence.



(1) Chemiluminescence :-

excitation event → chemical reaction involves oxidat^{n} of organic compounds e.g. luminol, isoluminol, acridinium esters, luciferin.

$$\text{luminol} \xrightarrow[\text{ALP/HPO}]{\overset{\text{HPO}}{\underset{H_2O_2}{\rightleftharpoons}}\ H_2O} \text{ox-luminol}^{*} \longrightarrow \text{ox.luminol} + h\nu$$

· ALP = Alkaline phosphatase
HPO - Horse radish peroxidase.

(2) Bioluminescence → special form of CL occuring in biological system.
↳ Enzyme luciferase → ↑ efficiency of luminescence

$$\text{luciferin} \xrightarrow[V_2O_2.]{\text{luciferase}} \text{ox.luciferin}^{*} \downarrow h\nu$$

ox. luciferin.

Luciferin :- group of compounds that are substrate for luciferase.
↳ Diff in dif. biological system

PAGE NO.:
DATE:

Use :-

→ Chemiluminescence is ultra sensitive assay (10^{-18} - 10^{-21} moles) detect^n limit.

- Automated immunoassay
- DNA probe assay system

Difference b/w CL & BL

CL	BL
quantum yeild = 0.1 to 10 %.	10-30 %.
out of 100 molecule reacting 0.1-10 photons emitted 90.-99.9 % heat	100 molecule of reacting : 10-30 photon emitted : 90-70 heat.

* Immuno chemiluminescence assays :-
Modes used are

① Ab bound to luciferase

Ab-luciferase → luciferin / ox. luciferin* → ox luciferin + hν.

② Ab bound to HPO (horse radish peroxidase)

Ab-HPO → H_2O_2 → luminol / ox luminol* → ox luminol + hν

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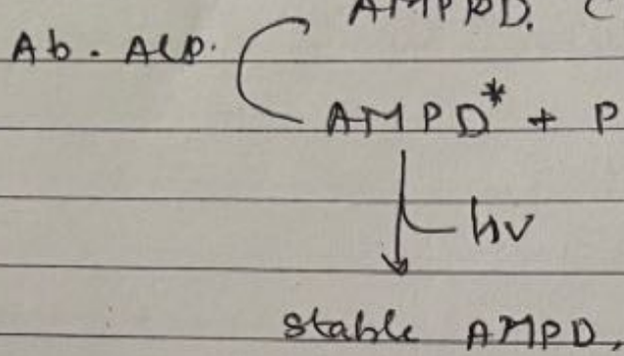
(3). Ab bound to ALP.



(4) Enhanced chemiluminescence.

PAGE NO.:
DATE: / /

* Electrochemiluminescence:-

Basis → Reactive species producing chemiluminescence is electrically generated. from stable precursor

↳ At surface of electrode

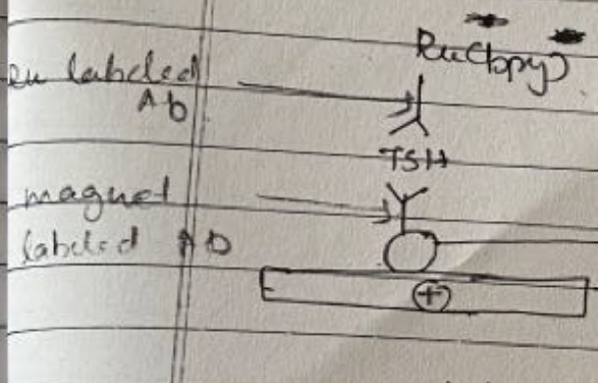
→ electrochemiluminescence lable → Ru^{*} (Ruthenium)

↓

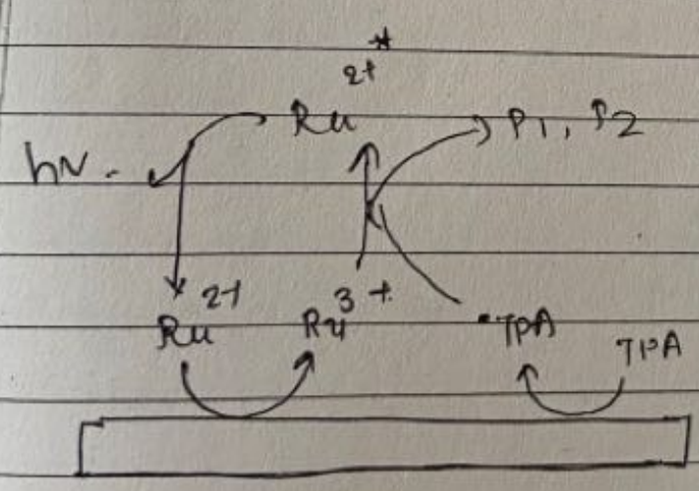
- mc used
- Ru(bpy) = bipyridyl chelate used.

↓

stable chelate.



- Ru(bpy) bound Ab. is anchored to electrode surface by complexing with magnate bound Ab.



TPA = tripropalamine

↓

reducing agent

Use → Immunoassay & Nucleic acid assay.

Adv.

Use: ① Improved reagent stability
② Simple reagent preparation.
③ enhanced. sensitivity