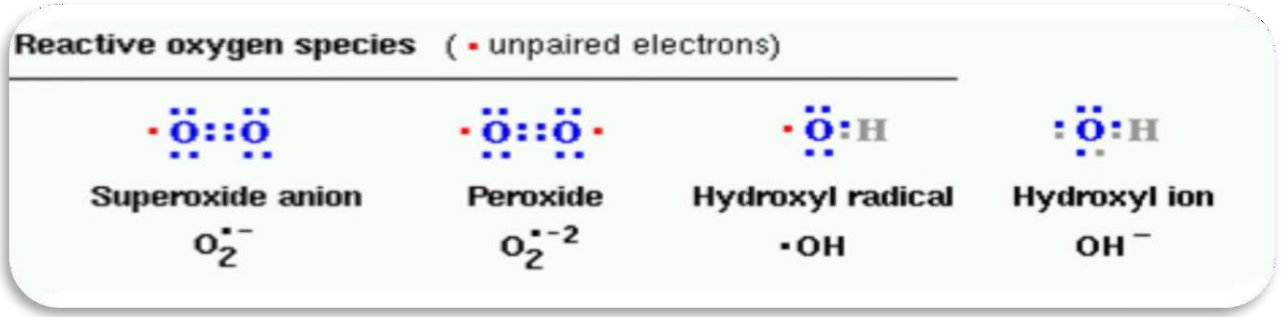
Estimation of Total phenolic content in different plants

Free radicals:

- Free radicals are those particles and molecules that cause damage to the body's cells and essential fatty acids by their ready reactivity and oxidizing ability.
- This characteristic is defined by their unpaired electron.



- These free radical molecules are released during the normal metabolic process of oxidation.

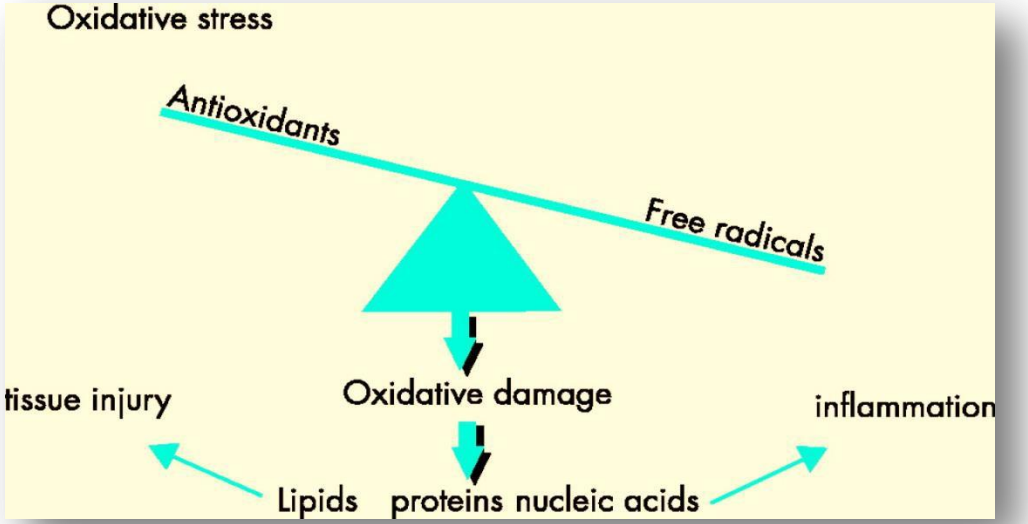
Free radicals:

- Free radicals come from a wide variety of sources but mainly our diet.

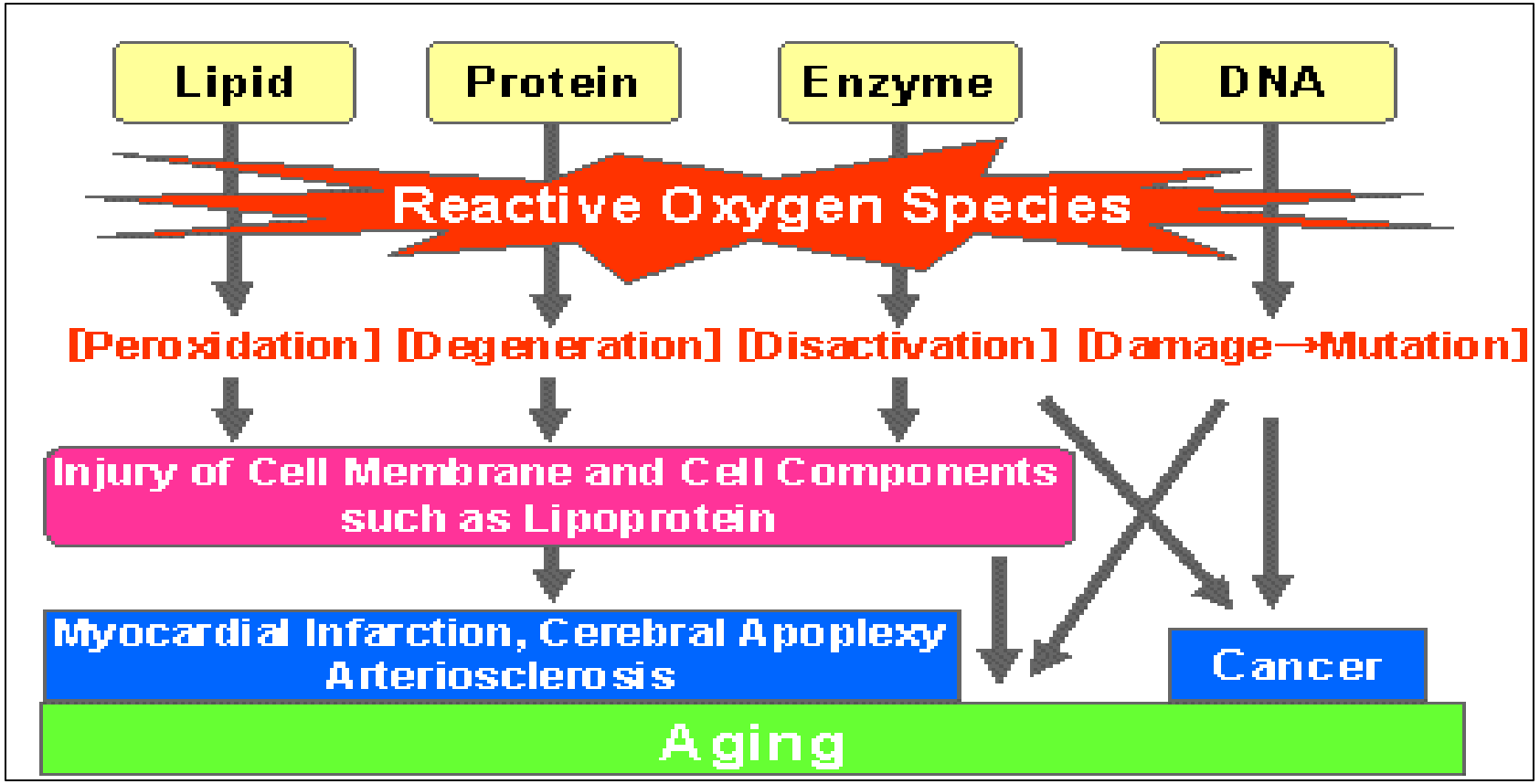
- The biggest source of ingested free radicals is probably fried foods and heated cooking oils, e.g. potato crisps/chips, french fries, onion rings etc. (fried in vegetable oils which oxidises readily into free radicals).

Oxidative stress:

- Oxidative stress is an **imbalanced state** where excessive quantities of reactive oxygen and/or nitrogen species **over come** endogenous antioxidant capacity, leading to oxidation of a varieties of biomacromolecules, such as enzymes, proteins, DNA and lipids.



- Oxidative stress involve in the development of chronic degenerative diseases including coronary heart disease, cancer and aging.



Antioxidants:

- **Antioxidants are defined as** compounds that can delay, inhibit, or prevent the oxidation of oxidizable materials by scavenging free radicals and diminishing oxidative stress.

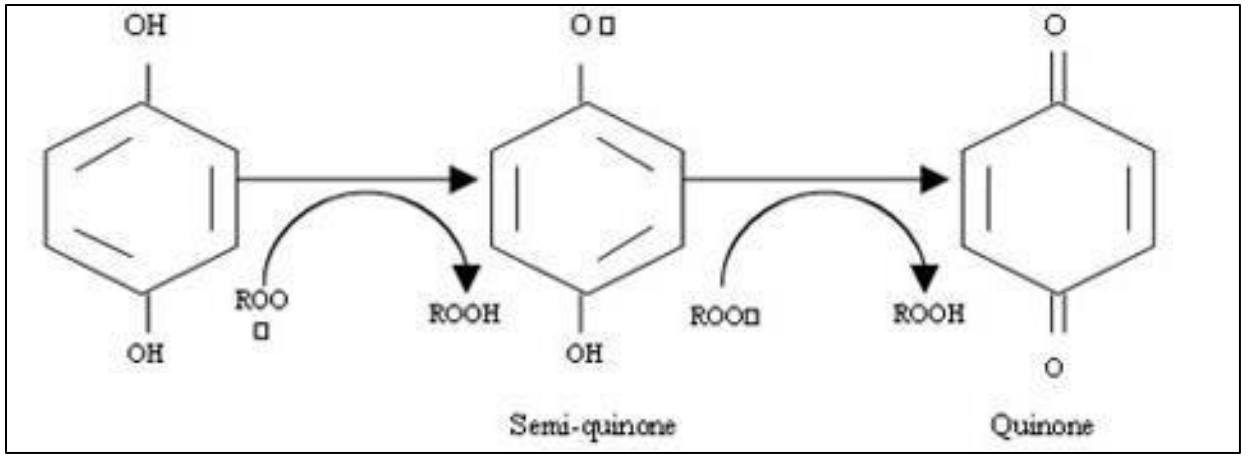
- Fruits and vegetables contain a wide variety of free-radical scavenging molecules, including phenolic compounds, carotenoids, and vitamins.

Phenolic compounds:

- Phenolics are compounds possessing one or more aromatic rings with one or more hydroxyl groups.
- Plant phenolic compounds are extremely heterogeneous and may range from simple monomers to very large polymers.
- Studies have shown that consumption of food rich in phenolics can slow the progression of various debilitating diseases.

- Therefore, mostly, the current focus is on the **anti-oxidant action of phenolics**.

- The antioxidant activity of phenol is mainly related to redox properties.



- **Tea** remains one of the most popular beverages world-wide and contains a variety of phenolic compounds which are potent antioxidants.

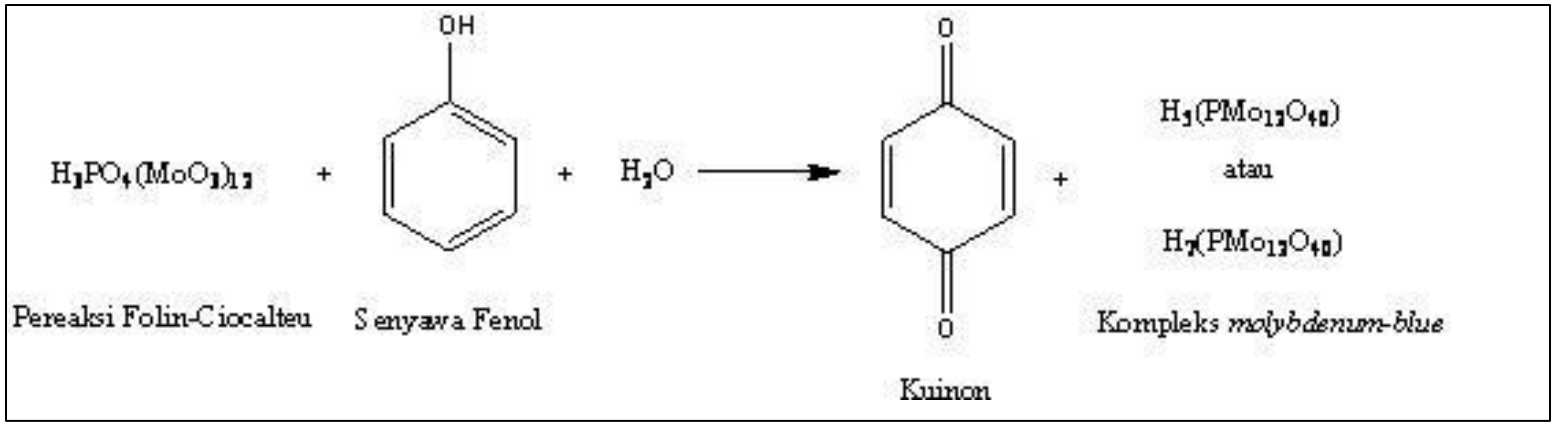
Practical Part

Objective:

- Determination of total phenolic content in green tea and black tea.

Principle:

- In this method, we will use a colorimetric method, the Folin-Ciocalteu assay, to quantify the total phenolic content of the samples.
- The oxidation of a phenolate ion from the sample and the reduction of the phosphotungstic-phosphomolybdic reagent which known as Folin-Ciocalteu result of in the formation of a blue complex that absorb light at 650nm.



Principle cont’:

- The reaction must take place **under alkaline conditions** in order to aid with the uptake of oxygen by the phenol , which occurs most efficiently near the pka (approximately 10) of the phenol, and this is done by **the addition of sodium carbonate.**

Method:

Tube	Catechol standard 5mg/100ml	Sample (ml)	Dist. H2O (ml)	Folin-Ciocalteu reagent (ml)		Na2CO3 (ml)
1	0.2	--	3.8	**0.5 ml**	**Wait 3 min**	**2 ml**
2	0.4	--	3.6			
3	0.6	--	3.4			
4	0.8	--	3.2			
5	1	--	3			
6	1.2	--	2.8			
7	1.4	--	2.6			
Black tea	--	0.1	3.8			
Green tea	--	0.1	3.8			
Coffee	--	0.1	3.8			
Mint	--	0.1	3.8			

Method:

- Mix thoroughly and measure the absorbance at 650 nm against a reagent blank.
- Prepare a standard curve using different concentrations of catechol.

Results:

Tube	Absorbance	Concentration (mg/dl)
1		
2		
3		
4		
5		
6		
7		
Black tea		
Green tea		
Coffee		
Mint		

Calculations:

- The concentration from the standard curve x dilution factor =……A….
- A x 1 dl = ……B…..
- B ➔ 2 grams
- ? ➔ 100 grams
- **Phenol content=**……..mg/100 g