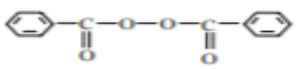
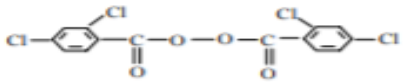
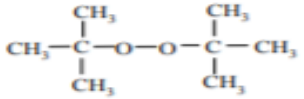
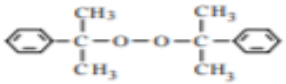
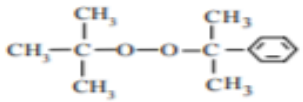
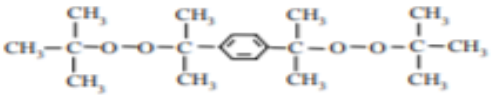
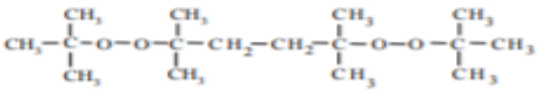
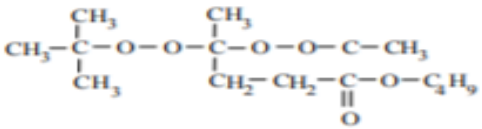
Tests applied to rubbers-1:

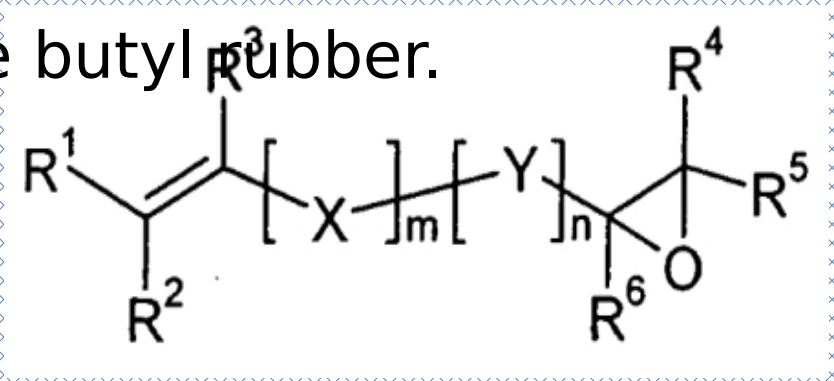
Examples of the peroxides used for vulcanization

Peroxide	Chemical formula
Dibenzoylperoxide	
Bis (2,4-dichloro)benzoylperoxide	
Di-terc.butylperoxide	
Dicumylperoxide	
Terc.butylcumylperoxide	
1,4-bis(terc.butylperoxyisopropyl) benzene	
2,5-bis-(terc.butylperoxy)-2,5-dimethylhexane	
4,4 di-terc.butylperoxy-n-butylvalerate	

And at the same time, it will also have an effect on high temperature compression set, since it will continue to cure at 1000°C. Thus, it would be unsatisfactory to shorten cure time unless

2. Resin Vulcanization

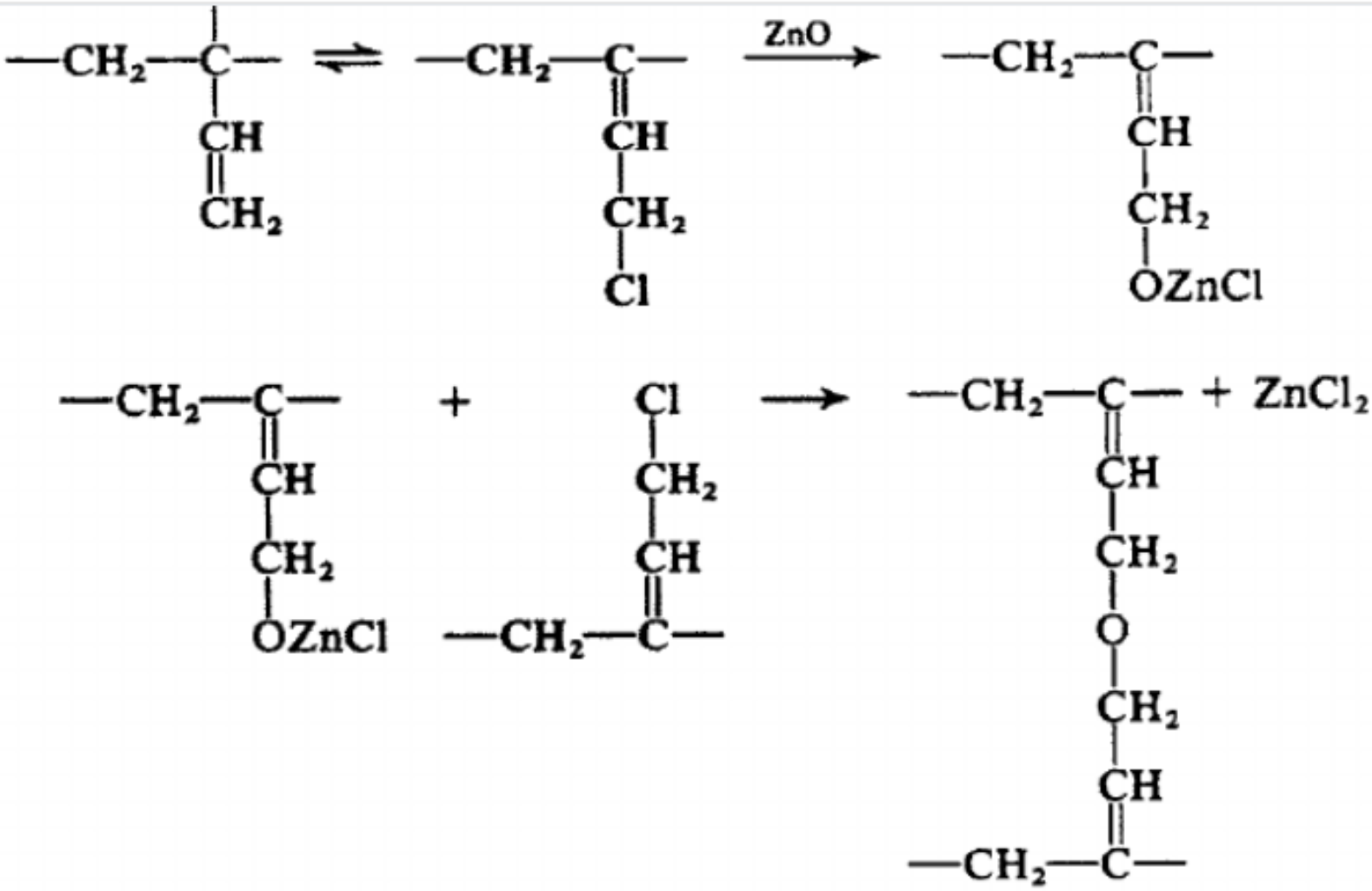
Certain difunctional compounds form cross-links with elastomers by reacting with two polymer molecules to form a bridge. Epoxy resins are used with nitrile, quinone dioximes, and phenolic resins with butyl rubber and dithiols or diamines with fluorocarbons. The most important of these is the use of phenolic resins to cure butyl rubber.



3. Metal Oxide Vulcanization

The polychloroprene rubber (CR or neoprene) and chlorosulfonated polyethylene (CSMor HypalonR) are vulcanized with by the action of metal oxides. The reaction involves active chlorine atoms, but not much is known about the nature of the resultant cross-links.

The crosslinking agent is usually zinc oxide, which is used along with magnesium oxide. CR can be vulcanized in the presence of zinc oxide alone; Magnesium oxide is necessary to give scorch resistance.



$$ZnCl_2 + MgO \longrightarrow ZnO + MgCl_2$$

4. Urethane Vulcanization

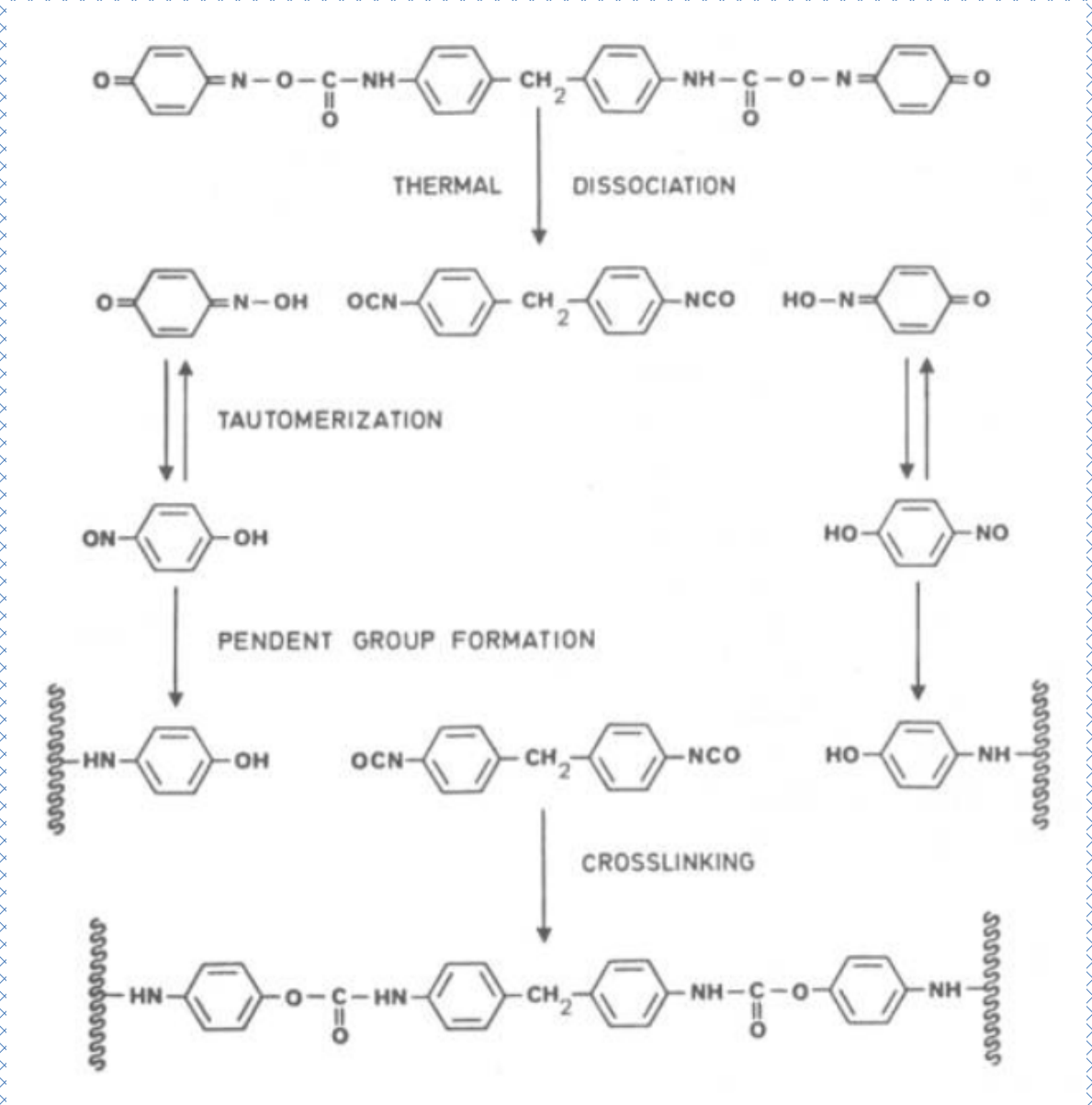
Vulcanizing chemicals based on such products are commercially available. The vulcanizing agent in these systems is derived from p-benzoquinone monoxime (p-nitrosophenol) and a di- or polyisocyanate.

Unlike sulfur vulcanization, accelerators are not necessary. Problems can occur with their lower scorch, rate of cure, and modulus.

Urethane crosslinkers were developed to improve the resistance to reversion and ageing of natural compounds. Due to relatively short time they have been in use and their reactivity, their functioning has not been fully determined.000

The system that will be discussed here which using the urethane basic principle, is the new urethane or Novor, a technical acronym from Nitroso Vulcanization of Rubber system.

The core mechanisms involved in using the urethane crosslinker



Novor crosslinking mechanism

REF: Jurnal Teknologi, bil. 25, Disember 1996 him. 19-25

In addition a drying agent like calcium oxide is used to absorb moisture present in the rubber compound which might hydrolyse free isocynate producing carbon dioxide and causing porosity in the vulcanisates.

In most cases for economy urethane crosslinkers are used in conjunction with sulphur curing systems. Fortunately the two systems are synergistic, which further reduces the cost.

The reagents are adducts of the oxime form of the p-nitrosophenol and a diisocyanate which at vulcanizing temperature dissociate in the rubber into their component species. The nitrosophenol so produced adds into the rubber chain to give pendant aminophenol groups which are linked up by the diisocyanate also generated, this is almost entirely via the amino group thus giving a thermally stable urea-urea type

The basic principles of the urethane vulcanization system is shown in Figure Novor 924 formulation in general used, (Chen and Yeoh [5]) contains 6. 7 parts Novor, 2 parts zinc dialkyl dithiocarbamate, 3-5 parts calcium oxide drying agent and 2:2 parts ZMBI:TMQ protect system. The dithiocarbamate acts as a catalyst for the nitroso addition reaction and a calcium oxide type drying agent ensures that there is a hydrolysis of the isocyanate group generated. These system provide exceptionally good resistance to heat, especially with respect to overcure, which can be useful for thick article, and retain their properties well on air oven ageing or in service, with an added advantage of improved fatigue with time. The unaged fatigue of Novor vulcanizate usually lies between that of EV and semi-EV systems, Baker [3] but on ageing show an improvement with no change in modulus. Therefore, the Novor system may be of particular use in application where a