

CHAPTER 7 : SYNTHETIC MATERIALS IN INDUSTRY

7.1 Synthetic Polymers

- Are a ____f_____ polymers
- Synthetic polymers are man made
- They are made from c _____ s
- Examples : i. synthetic rubbers such as balloons, g _____ s, t ____ es and engine belts
 - ii. synthetic fibers such as n____n and polyester
 - iii. plastics such as PVC and polystyrene
- Can be classified into : i. elastomers
 - ii. thermoplastics
 - iii. thermosets
- Making synthetic polymers
 - ❖ Produced through p_____ n (small units of monomers bound together to form longer chain of polymers)
 - ❖ There are categories of polymerization reactions:
 - i. Addition polymerization :
 - monomers are added to produce polymers without any by-products
 - ii. Condensation polymerization :
 - small molecule of by-products is produced (ex. Water)
- Synthetic rubbers
 - ❖ E_____ synthetic polymers
 - ❖ Resistant to _____, _____ and _____
 - ❖ Used to make : - balloons, gloves and raincoats (because they are elastic and
water resistant)
 - fan belts, gaskets and hoses (because they are elastic, strong
and resistant to oil and heat)

- teats of baby milk bottles (because they are clear, easy to clean, odourless and not sticky.

7.2 Plastics

- Are synthetic polymers
- Have wide variety depend on their properties
- Common types of plastics are :
 - ❖ Polyvinylchloride (PVC) - tough, flexibe, cheap to produce and easy to print on
- example : _____
 - ❖ Polystyrene - can either be foam and rigid, clean, lightweight, and water resistant
- example : _____
 - ❖ Polythene - has two types (low density and high density)
- example of low density polythene : _____
- example of high density polythene : _____
 - ❖ Polyamide - also known as nylon
- example : _____
 - ❖ Polyethylene terephthalate (PET) - strong and recyclable plastic
- example : _____
 - ❖ Polyurethane - strong and lightweight
- example : _____
- Can be divided into two main groups :
 - i. t_____
 - ii. t_____ plastics
- Compare t_____ and t_____ plastics (*)
- Disposal of plastic materials:
 - ❖ Plastics are non-degradable, plastics disposed into streams and rivers clog sewer system, end up in seas (hazardous to marine life) and burning plastics produce toxic gas (breathing difficulties to asthmatic person)
- Disposal of synthetic polymers:
 - ❖ Synthetic polymers are non-biodegradeable (materials cannoy be decomposed by living things such as bacteris and fungi)
 - ❖ Synthetic polymers cannot be decomposed in landfills (landfills are areas where garbage are left to be decomposed naturally)

- ❖ So, we need to reduce the amount of this wastes. How to do?
 - through recycling and reuse
 - using degradable synthetic polymers [classified into biodegradable (can be decomposed by microorganisms) and photodegradable (decomposed rapidly when exposed to bright light)].
 - Most synthetic polymers are made from petroleum. Will produce a lot of heat when burnt. This energy can be converted into electricity. This process is known as **incineration with energy recovery**.