#### **OUTLINE - TODAY'S CLASS**

INTRODUCTIONS

COURSE MATERIALS

Recommended books Tests and grades

WHAT IS THIS COURSE ALL ABOUT?

WHY ON EARTH SHOULD I BOTHER TO LEARN ANYTHING AT ALL ABOUT POLYMERS ?

#### **Course Outline/Syllabus**

BOOK - "FUNDAMENTALS OF POLYMER SCIENCE" (2<sup>nd</sup> ed.) P. Painter & M. Coleman

- 1. THE NATURE OF POLYMER MATERIALS AND POLYMER MICROSTRUCTURE (Chapter 1)
- 2. POLYMER SYNTHESIS (Chapter 2)
- 3. KINETICS OF POLYMERIZATION (Chapter 3)
- 4. STATISTICS OF STEP-GROWTH POLYMERIZATION (Chapter 4, Sections A, B and C)
- 5. COPOLYMERIZATION (Chapter 5, Sections A, B AND C)

- 6. STRUCTURE (Chapter 7)
- 7. CRYSTALLIZATION, MELTING AND THE GLASS TRANSITION (Chapter 8)
- 8. POLYMER SOLUTIONS (Most of Chapter 9)
- 9. THE MEASUREMENT OF MOLECULAR WEIGHT (Chapter 10, Sections A-E)
- 10.MECHANICAL & RHEOLOGICAL<br/>PROPERTIES(Chapter 11)

# PLMSE 406 Spring 2000

4 homeworks	25%
exam #1	15%
exam #2	15%
exam #3	15%
final exam	30%

exams 1, 2 & 3 are during class hours (2:30-3:20)

#### POLYMER SCIENCE AND ENGINEERING - WHAT IS IT ?

#### - THE SCIENCE OF LARGE MOLECULES



#### WHAT ARE POLYMERS AND WHY ARE THEY IMPORTANT ?

LONG CHAIN MOLECULES

EXTRAORDINARY RANGE OF PHYSICAL PROPERTIES

MANY (NOT ALL) ARE CHEAP

THEY ARE JUST DAMN INTERESTING!!!!!



POLY	MER
many	units



So envisage a chain of approximately 1/4" in diameter and 1/2 mile long !!!!

Most synthetic polymers are composed of a *Distribution* of chain lengths. Therefore we have to express the molecular weight of polymers in terms of an *Average* value.

### SOME BASIC DEFINITIONS

POLYMER	A large molecule made up of small building blocks
MONOMERS	The building blocks
HOMOPOLYMER	What you get if the building blocks are all the same
COPOLYMER	A polymer made up of different monomers
BLEND	A mixture of different polymers

### **APPLICATIONS**

PACKAGING/FILMS

**EVERYDAY HOUSEHOLD STUFF** 

PAINT

**ADHESIVES** 

STRUCTURAL MATERIALS auto's, aerospace

**FIBRES** 

**ELECTRONIC APPLICATIONS** 

**ELASTOMERS** 

# Some homopolymer animals

linear polymer

branched polymer

network

graft polymer

star polymer

dendrimer

# Some copolymer animals

random cop

alternating copo

diblock copo

triblock copo

grafted copo

star copo