### The Chemical Structure of Fibers

**Name: Date:**

#### Animal Fibers p136

1. Wool, and other animal hair is made of a protein called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Use the terms *polypeptide* and *helix* to describe the structure of keratin.
3. The amino acid found in keratin that has a large number of ***–S—S—*** bonds is .
4. What makes the structure of silk simpler than wool?

#### Cellulosic Fibers p 137 &138

1. When cotton burns it smells like burning leaves because   
    .
2. Summarize the chemical make-up of cotton.

1. Why does cotton have relatively low *probative value*?
2. Contrast linen from cotton.
3. Compare linen with cotton.
4. Linen fibers are often found in blends because

#### Synthetic fibers p 138

1. How are Rayon and acetate different from other natural fibers?
2. What is a **plastic**?
3. The first mass-produced plastic fiber is .
4. What synthetic fiber is manufactured in the greatest quantity?

### Synthetic Polymers p 139

1. The functional group for polyamides, such as **nylon**, is the \_\_\_\_\_\_\_\_\_\_\_\_.
2. The functional group for **polyesters**, such as Dacron, is the \_\_\_\_\_\_\_\_\_\_\_\_.
3. Contrast the physical properties of linear polymers and cross-linked polymers.
4. **Polyesters** are found in such products as .
5. **Acrylics** are often found in .
6. What is a quick test for identifying acrylics?
7. What two types of fibers can be found in **Spandex**?
8. Olefins contain the polymer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
9. What is one distinctive property of olefins?
10. Olefins are found in consumer products including .

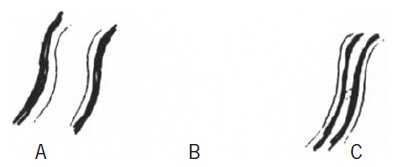
## Fiber Analysis (Pages 143-157)

1. The four tests used in this section are

### Density p 147

1. How is density calculated?
2. What makes olefins different from other fibers?
3. How would you design a simple density test to distinguish nylon from rayon?

### Refractive Index

1. Define **refractive index (RI)**.
2. What happens to a fiber when it is placed into a liquid that has the same refractive index (RI)?
3. What is a Becke line?
4. When Becke lines appear inside a fiber, then the liquid has a \_\_\_\_\_\_\_\_\_\_\_ refractive index than the fiber.
5. If Becke lines do not appear, then the refractive index (RI) is the \_\_\_\_\_\_\_\_\_\_\_ as the fiber.
6. Match the diagram to the description of Becke lines below.  
   α. RI of liquid > RI of fiber   
   β. RI of liquid < RI of fiber   
   γ. RI of liquid = RI of fiber

|  |  |
| --- | --- |
| **Liquid** | **Refractive Index** |
| Water | 1.333 |
| n-butyl alcohol | 1.402 |
| Olive oil | 1.467 |
| Caster oil | 1.482 |
| Clove oil | 1.543 |