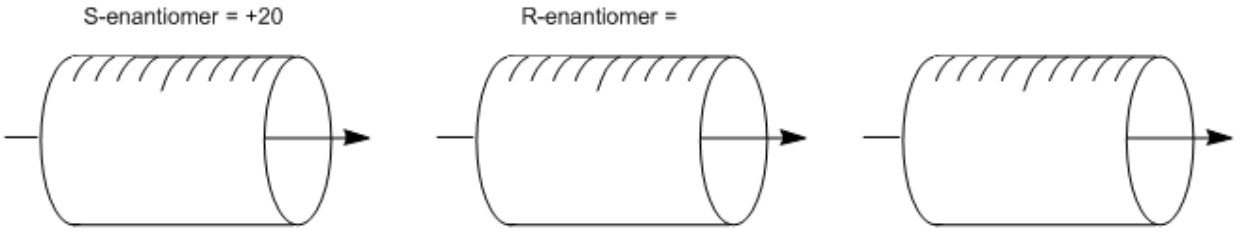
CONCEPT: ENANTIOMERIC EXCESS

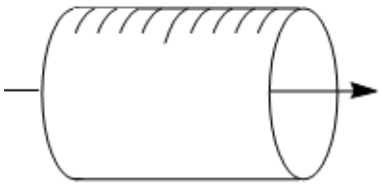
● Specific rotation [α] is the rotation that 100% pure enantiomers produce. Opposite enantiomer = _____ rotation.

● A perfect 1:1 ratio of enantiomers is called _____ ● Non-1:1 ratio is called _____



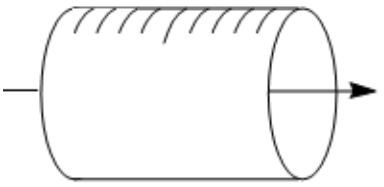
The ***enantiomeric excess:*** ***ee*** = % ↑ Enantiomer - % ↓ Enantiomer ***Observed Rotation:*** $\alpha = [\alpha] \times ee$

EXAMPLE: Calculate the *ee* and observed rotation for the following chiral mixtures where S-enantiomer has [α] = +20.



ee =

Observed rotation =



ee =

Observed rotation =

PRACTICE: OPTICAL ACTIVITY

a. When 0.200 g of lactose is dissolved in 10.0 ml of water and placed in a sample cell 10.0 cm in length, the observed rotation is +2 ^{O}. Calculate the specific rotation of lactose.

$$[\alpha] = \frac{\alpha}{\mathbf{c} \times \mathbf{l}}$$

α =

c (g/ml) =

l (dm) =

b. Calculate the observed rotation of a chiral mixture that contains 65% (S)-stereoisomer where the [α] of pure (S)-stereoisomer = -118

ee = % ↑ Enantiomer - % ↓ Enantiomer

$\alpha = [\alpha] \times ee$

c. An optically pure (R)-stereoisomer of a molecule has a specific rotation of – 20^{O}. What specific rotation would be observed for a mixture of the (R) and (S) stereoisomer where there is an enantiomeric excess equal to (S) 60%