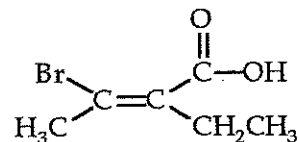
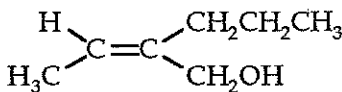
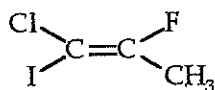


- (3) 1. Which one of the following compounds is achiral?
- a) trans-1,2-dimethylcyclopentane
  - b) trans-1,3-dimethylcyclopentane
  - c) trans-1,2-dimethylcyclohexane
  - d) trans-1,3-dimethylcyclohexane
  - e) trans-1,4-dimethylcyclohexane
- (3) 2. How many distinct stereoisomers (be sure to count individual enantiomers, if any) are possible for 1-bromo-2,3-dichlorobutane?
- a) one      b) two      c) three      d) four      e) eight
- (3) 3. How many of the stereoisomers of 1-bromo-2,3-dichlorobutane can rotate the plane of polarized light?
- a) none      b) one      c) two      d) three      e) four
- (4) 4. In the monochlorination of (S)-1-chloro-3-methylpentane to give isomeric  $C_6H_{12}Cl_2$  products, the number of fractions that can be collected by distillation is:
- a) six      b) seven      c) eight      d) nine      e) ten
- (4) 5. Of the  $C_6H_{12}Cl_2$  products obtained from the monochlorination of (S)-1-chloro-3-methylpentane, the number that will exhibit optical activity is:
- a) six      b) seven      c) eight      d) nine      e) ten
- (12) 6. Identify each of the following stereoisomers as (E) or (Z) and, if appropriate, cis or trans:

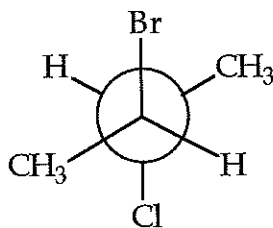


\_\_\_\_\_

\_\_\_\_\_

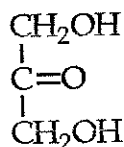
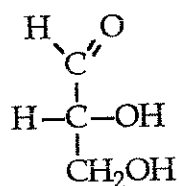
\_\_\_\_\_

- (12) 7. Consider the stereoisomer of 2-bromo-3-chlorobutane shown below:

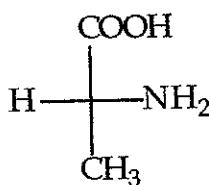
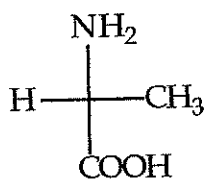


- a) Which one of the following would have the same optical activity (same magnitude and same direction of rotation) and the same physical properties as (I)?
- (2R,3S)-2-bromo-3-chlorobutane
  - (2R,3R)-2-bromo-3-chlorobutane
  - (2S,3R)-2-bromo-3-chlorobutane
  - (2S,3S)-2-bromo-3-chlorobutane
- b) Which one of the following would have a different optical activity (same magnitude - opposite rotation) compared to (I) but would have the same physical properties as (I)?
- (2R,3S)-2-bromo-3-chlorobutane
  - (2R,3R)-2-bromo-3-chlorobutane
  - (2S,3R)-2-bromo-3-chlorobutane
  - (2S,3S)-2-bromo-3-chlorobutane
- c) Stereoisomer (I) can be designated as:
- meso
  - erythro
  - threo
  - none of the other choices
- d) It is unequivocal that stereoisomer (I) is:
- an achiral compound
  - a chiral compound
  - dextrorotatory
  - levorotatory

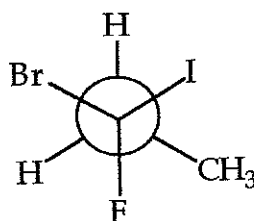
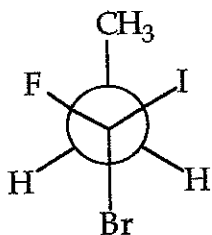
- (20) 8. Which of the following terms best describes the relationship between the pairs of compounds shown below: identical structures, constitutional isomers, enantiomers, or diastereomers?



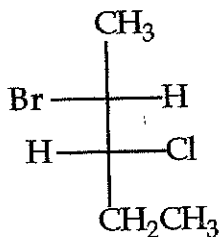
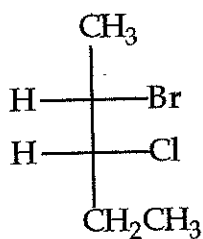
\_\_\_\_\_



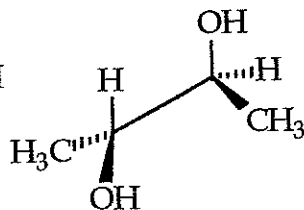
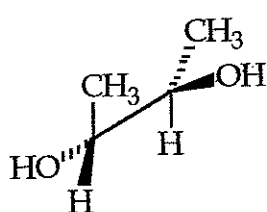
\_\_\_\_\_



\_\_\_\_\_

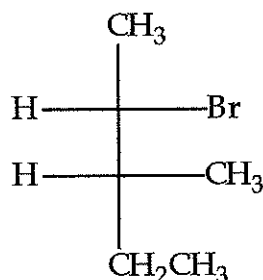


\_\_\_\_\_



\_\_\_\_\_

- (12) 9. Consider the  $S_N2$  hydrolysis of (2S,3R)-2-bromo-3-methylpentane (shown below) to give alcohol product(s):



- i) The number of alcohol products of different boiling point (fractions) obtained in the  $S_N2$  displacement reaction will be:
- a) one      b) two      c) three      d) four
- ii) The number of distinct alcohol stereoisomers obtained (count enantiomers) in the  $S_N2$  displacement reaction will be:
- a) one      b) two      c) three      d) four
- iii) The number of alcohol fractions obtained in the  $S_N2$  displacement reaction that will exhibit optical activity will be:
- a) one      b) two      c) three      d) four
- (12) 10. For each one of the following descriptions (corresponding to the reaction of an alkyl halide with an anionic nucleophile), specify  $S_N1$  only,  $S_N2$  only, or both  $S_N1$  and  $S_N2$ :
- a) substitution is **never** accompanied by skeletal rearrangements
- b) the weaker the carbon-halogen bond in the alkyl halide, the faster the substitution progresses
- c) substitution at a chiral center results in both inversion and retention of configuration
- d) the rate of reaction is faster in dimethyl sulfoxide (DMSO) than it is in ethanol-water
- e) the rate of reaction is independent of the concentration of nucleophile
- f) If all other factors are equal, 1-bromo-2-methylbutane undergoes substitution **more rapidly** than 2-bromo-2-methylbutane

- (15) 11. For each of the descriptions listed in column A, find the term or species in column B that best correlates with it.

<u>Column A</u>	<u>Column B</u>
a racemic mixture that will not exhibit optical activity _____	A. bromide
	B. 1-bromo-2,2-dimethylpropane
a mixture of diastereomers that will exhibit optical activity _____	C. 2-bromo-2-methylpropane
	D. bromomethane
a good leaving group in a displacement reaction _____	E. a 1:1 mixture of (2R,3S)-2,3-dibromopentane & (2S,4R)-2,4-dibromopentane
a reactive substrate in a unimolecular nucleophilic substitution reaction _____	F. a 1:1 mixture of (2R,3S)-2,3-dibromopentane & (2R,3R)-2,3-dibromopentane
	G. a 1:1 mixture of (2R,3S)-2,3-dibromopentane & (2S,3R)-2,3-dibromopentane
a substrate subject to skeletal rearrangement when substitution is carried out in a polar, protic solvent _____	