ANSWER KEY | Curved-Arrow Reaction Mechanisms

Worked key for instructor review and student self-check. Credit sound chemical reasoning as well as the final result.

PART A: Multiple choice and application

1. The tail of a curved arrow showing an electron pair must start

Correct: A. At an electron source

Explanation: Arrows originate at lone pairs or bonds that supply electrons.

2. In SN2, bond-making and bond-breaking occur

Correct: A. In one concerted step

Explanation: SN2 is concerted, with no discrete carbocation intermediate.

3. What is the source of electrons forming the new pi bond in E2?

Correct: A. The beta C-H sigma bond

Explanation: The beta C-H bond electrons form C=C as base removes H.

4. Resonance contributors differ in

Correct: B. Electron distribution only

Explanation: Resonance does not move atoms or alter sigma connectivity.

5. What other arrow is needed when HO- attacks CH3Br?

Correct: A. C-Br bond electrons to Br

Explanation: The C-Br bond breaks as the new C-O bond forms.

6. If an arrow creates an extra bond at a neutral amine N, the N often becomes

Correct: B. Positively charged

Explanation: A neutral three-bond amine that makes a fourth bond without breaking another becomes ammonium (N+).

PART B: Drawing and reasoning

7. For HO- + CH3Br -> CH3OH + Br-, draw both curved arrows and identify what bonds change.

Worked answer: O lone pair -> methyl C; C-Br sigma bond -> Br. The C-O bond forms and C-Br breaks concertedly in SN2.

8. Draw all electron-pair arrows for E2 of bromoethane with ethoxide and name the organic product.

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Worked answer: Ethoxide lone pair -> beta H; beta C-H bond -> C-C pi bond; C-Br bond -> Br. Ethene is the organic product.

Equivalent chemically correct structures and mechanisms are acceptable.