

SN1

Substrate (R) 3° fast, 2° slow 1° impossible

Nucleophile/Base Does not matter--does not effect rate

Leaving group (X) Must be stable once left--must be weak base (stable anion)

Solvent Polar protic works best, polar aprotic also works.

Temperature competes better with E1 at low temp

E1

Substrate (R) 3° fast, 2° slow 1° impossible

Nucleophile/Base Base Does not matter-- does not effect rate

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Solvent Polar protic works best, polar aprotic also works.

Temperature. Competes with SN1 Better at high temp (above 50 °C)

SN2

Substrate (R) 1° best (fast) 2° slow but possible, 3° impossible too much steric crowding

Nucleophile/Base Important, must be strong nucleophile; large atom with a - charge and /or strong base (Br⁻ SH⁻ CN⁻ I⁻, RO⁻) Bad if nucleophile is too large such as (CH₃)₃C-O⁻

Leaving group (X) Important: Must be stable once left--must be weak base (stable anion)

Solvent Polar aprotic is the best (e.g. acetone)
Temperature Not important

Steric effect-- Incoming nucleophiles must be small molecules (large atoms ok)

E2

Substrate (R) Not much effect-- 1°, 2°, 3° all possibly can react.

Nucleophile/Base. Must be strong Base, (e.g R-O⁻). Strong bulky base is best (CH₃)₃C-O⁻ (will not undergo SN2)

Leaving group (X) Important: Must be stable once left--must be weak base (stable anion)

Solvent Not much effect, general polar solvent.

Temperature Competes with SN2 Better at high temp (above 50 C)

Note: to compete with SN2 for 2° substrates must have bulky base