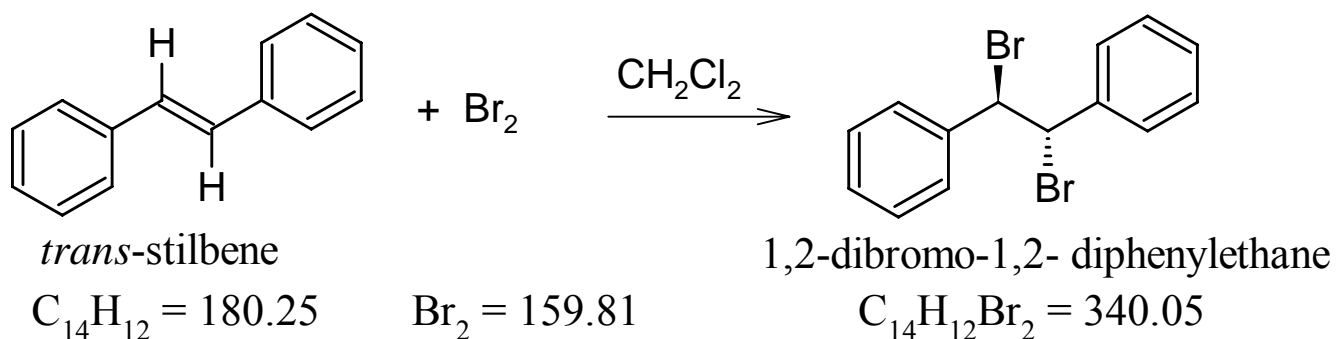


What is the atom economy of this reaction?

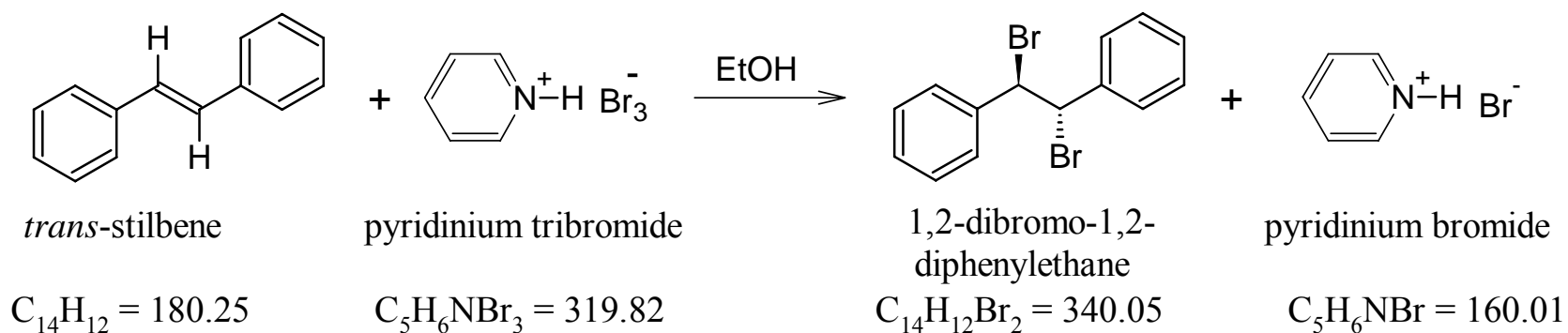
Reaction 1. Traditional Bromination



$$\text{Atom economy} = \left(\frac{MW_{\text{desired product}}}{\sum MW_{\text{reagents}}} \right) \times 100\%$$

What is the atom economy of this reaction?

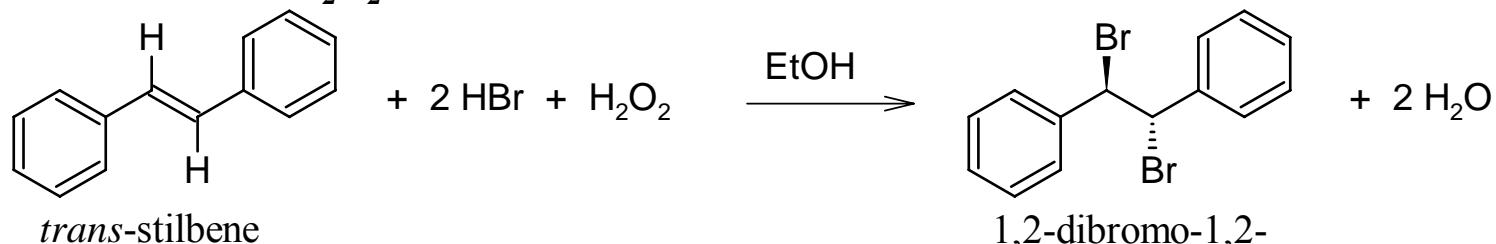
Reaction 2. Pyridinium tribromide



$$\text{Atom economy} = \left(\frac{MW_{\text{desired product}}}{\sum MW_{\text{reagents}}} \right) \times 100\%$$

What is the atom economy of this reaction?

Reaction 3. HBr/H₂O₂



$$\text{C}_{14}\text{H}_{12} = 180.25$$

$$\text{HBr} = 80.92$$

$$\text{H}_2\text{O}_2 = 34.02$$

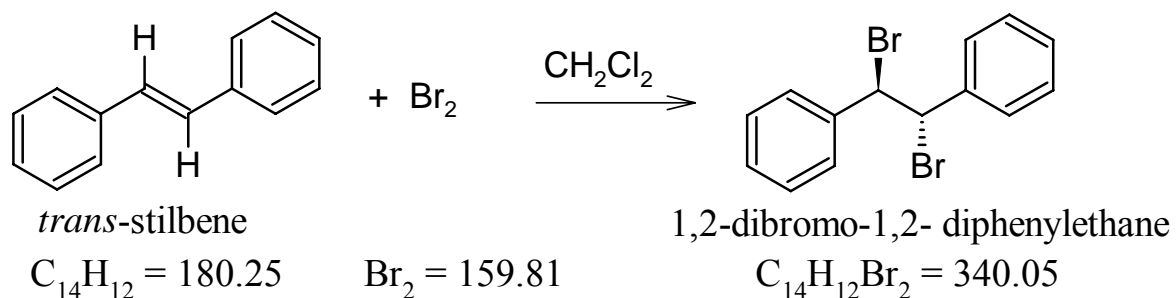
$$\text{C}_{14}\text{H}_{12}\text{Br}_2 = 340.05$$

$$\text{H}_2\text{O} = 18.01$$

$$\text{Atom economy} = \left(\frac{\text{MW}_{\text{desired product}}}{\sum \text{MW}_{\text{reagents}}} \right) \times 100\%$$

What is the effective mass yield of this reaction?

Reaction 1. Traditional Bromination



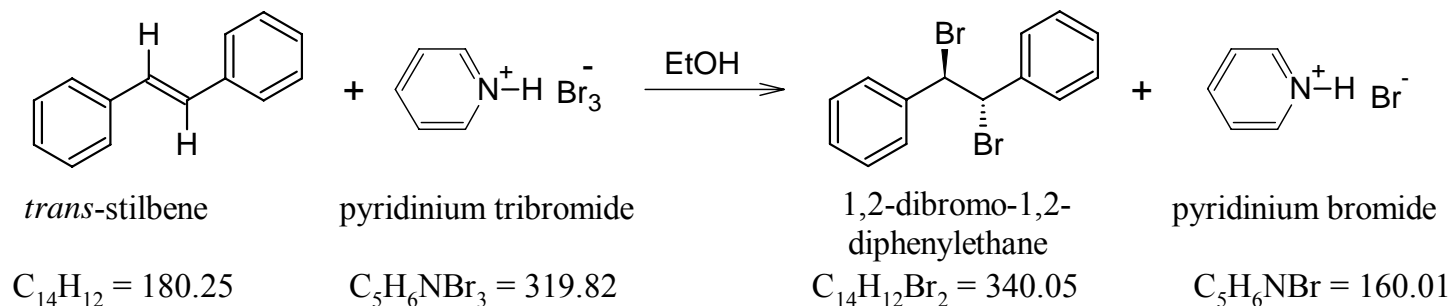
<u>Name</u>	<u>Formula</u> <u>Weight</u>	<u>eq</u>	<u>mmol</u>	<u>wt / vol</u>
<i>trans</i> -stilbene	180.25	1.00	10.0	1.80 g
bromine	159.81	1.05	10.5	1.68 g

Assume 90% yield

$$\text{Effective mass yield} = \left(\frac{\text{mass}_{\text{desired product}}}{\sum \text{mass}_{\text{reagents}}} \right) \times 100\%$$

What is the effective mass yield of this reaction?

Reaction 2. Pyridinium tribromide



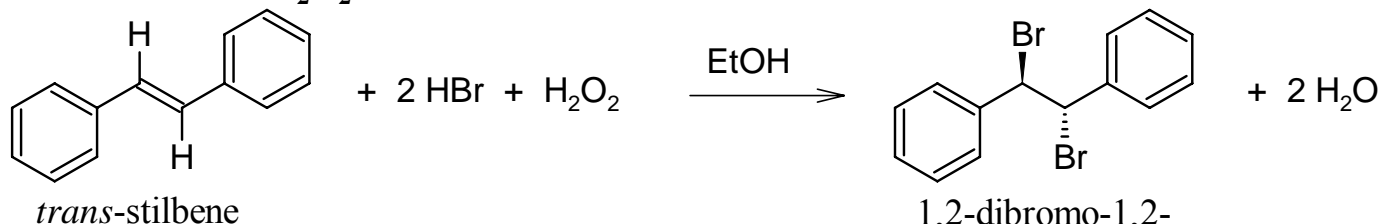
Name	Formula			
	Weight	eq	mmol	wt / vol
<i>trans</i> -stilbene	180.25	1.00	10.0	1.80 g
pyridinium tribromide (90%)	319.82	1.13	11.3	3.61 g

Assume 90% yield

$$\text{Effective mass yield} = \left(\frac{\text{mass}_{\text{desired product}}}{\sum \text{mass}_{\text{reagents}}} \right) \times 100\%$$

What is the effective mass yield of this reaction?

Reaction 3. HBr/H₂O₂



$$C_{14}H_{12} = 180.25$$

$$HBr = 80.92$$

$$H_2O_2 = 34.02$$

$$C_{14}H_{12}Br_2 = 340.05$$

$$H_2O = 18.01$$

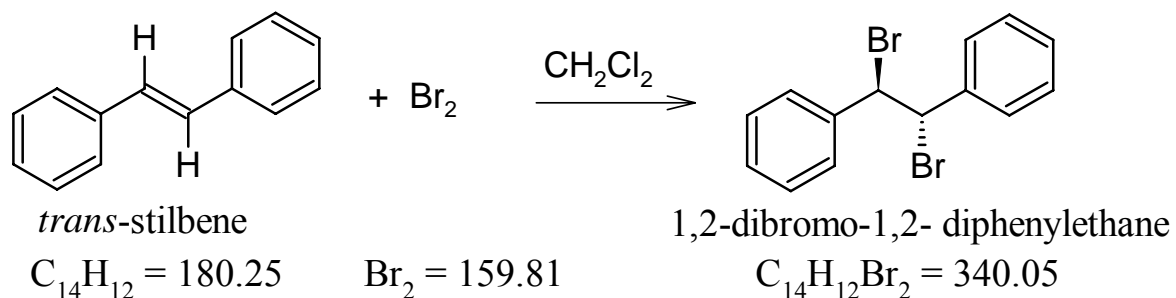
Name	Formula	Weight	density	eq	mmol	wt / vol
<i>trans</i> -stilbene		180.25	--	1.00	10.0	1.80 g
hydrobromic acid 48%		80.92	1.49	2.80	28.0	3.18 mL
hydrogen peroxide 30%		34.02	1.11	2.06	20.6	2.12 mL

Assume 90% yield

$$\text{Effective mass yield} = \left(\frac{\text{mass}_{\text{desired product}}}{\sum \text{mass}_{\text{reagents}}} \right) \times 100\%$$

What is the solvent?

Reaction 1. Traditional Bromination



Name	Formula	Weight	eq	mmol	wt / vol
<i>trans</i> -stilbene		180.25	1.00	10.0	1.80 g
bromine		159.81	1.05	10.5	1.68 g

Is CH₂Cl₂ benign?

What is the mass of CH₂Cl₂ ?

Assume that the concentration of stilbene in CH₂Cl₂ is 0.25 M

Assume 90% yield

$$\text{Effective mass yield} = \left(\frac{\text{mass}_{\text{desired product}}}{\sum \text{mass}_{\text{reagents \& non-benign solvent}}} \right) \times 100\%$$