

Worksheet: Atom Economy



Q1: Which of the following is the best definition for the atom economy of a reaction?

- A The mass of useful products as a percentage of the mass of reactants
- B The percentage of atoms in the reactants that are converted to waste
- C The percentage of atoms in the reactants derived from economical sources
- D The ratio of the number of atoms in the products to the number of atoms in the reactants
- E The number of atoms in the useful products as a percentage of the number of atoms in the reactants

Q2: Which of the following reactions has the greatest atom economy for the production of hydrogen?



Question Video

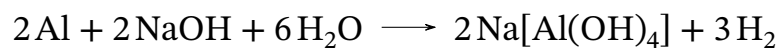
A



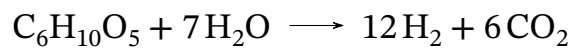
B



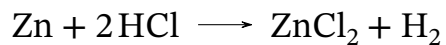
C



D



E



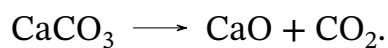
Q3: What is the formula for calculating the atom economy of a reaction?

- A Atom economy = $\frac{\text{relative formula mass of the useful product}}{\text{sum of relative formula masses of the reactants}} \times 100\%$
- B Atom economy = $\frac{\text{sum of relative formula masses of the reactants}}{\text{sum of relative formula masses of the products}}$
- C Atom economy = $\frac{\text{sum of the relative formula masses of the products}}{\text{sum of relative formula masses of the reactants}} \times 100\%$
- D Atom economy = $\frac{\text{number of atoms in the useful product}}{\text{number of atoms in the reactants}} \times 100\%$
- E Atom economy = $\frac{\text{number of atoms in the reactants}}{\text{number of atoms in the useful product}}$

Q4: Shown in the table are the molar masses of calcium oxide, calcium carbonate and carbon dioxide.

Substance	CaO	CaCO ₃	CO ₂
Molar Mass (g/mol)	56	100	44

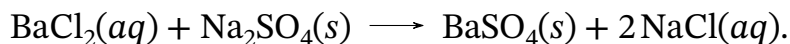
Calcium oxide can be made from calcium carbonate by heating, according to the equation:



To the nearest percentage unit, what is the atom economy for the production of calcium oxide via this process?

- A 227%
- B 44%
- C 56%
- D 177%
- E 100%

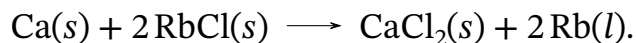
Q5: Barium sulfate (BaSO_4) can be made by adding sodium sulfate (Na_2SO_4) to a solution of barium chloride (BaCl_2), as illustrated by the equation:



To the nearest percentage unit, what is the atom economy for the production of barium sulfate via this process?

- A 55%
- B 62%
- C 67%
- D 60%
- E 70%

Q6: Calcium metal can be used to produce pure rubidium from its chloride according to the equation:



What is the atom economy for the production of rubidium by this process, to the nearest percentage unit?

- A 53%
- B 24%
- C 43%
- D 30%
- E 61%